Chapter II
Development and Description of Tools
CHAPTER II

DEVELOPMENT AND DESCRIPTION OF TOOLS

In the preceding chapter, the introduction to different variables under study, the theoretical framework of the problem, review of related literature, objectives and hypotheses were discussed. The present chapter has been devoted to the development and description of the tools used. For the present investigation the following tools were employed for collecting the data:

- Instructional packages on Bamlund’s Transactional Model of Communication (developed and validated by the investigator)
- Entry Behaviour Test (developed and validated by the investigator)
- Formative Unit Tests (developed and validated by the investigator)
- Summative Test (developed and validated by the investigator)
- Life Skills Questionnaire (adopted from Botvin’s Life Skills Training (LST) program, 1985 and validated by the investigator)
- Revised Two – Factor Study Process Questionnaire for Learning Approaches (developed and standardized by Biggs, J., 2001).

Each of the above tools has been discussed in the following paragraphs:

TOOL I

INSTRUCTIONAL PACKAGES ON BARNLUND’S TRANSACTIONAL MODEL OF COMMUNICATION (BTMC)

For convenience of the research, BTMC was used in three phases:

- Phase – I: Planning of BTMC Instructional Packages.
- Phase – II: Designing of BTMC Instructional Packages.
- Phase – III: Tryout of BTMC Instructional Packages.

PHASE I

PLANNING OF BTMC INSTRUCTIONAL PACKAGES

In the present study, BTMC (Barnlund’s Transactional Model of Communication) has been implemented in classrooms. This model shows the transactional mode of communication behaviour in a communication process. Hence at the planning stage, the
appropriation and justification of this model was first of all sought out through the satisfaction of basic components of models of teaching as discussed in the following paragraphs.

At the planning stage the most important task was to plan the steps according to the components of BTMC model. Hence the investigator identified the components of BTMC model and organized them into the FOCUS of the model.

IDENTIFYING COMPONENTS OF BTMC

FOCUS OF THE BTMC: OBJECTIVES

The following objectives were considered under Barnlund’s Transactional Model of Communication under the heading FOCUS of the model:

A. Organization
B. Transactionality
C. Observation
D. Instructional Objectives

A. ORGANIZATION. It serves as a mode to organize the various elements and processes of the communication act in the classroom. It was concerned with developing a framework where encoding and decoding of messages was structured according to the content matter, in order to achieve the transactional approach in communication. The ultimate aim of the concern was proper coordination in different elements of communication. The organization objective was amendable according to the changing situations in the classroom communication context and scope of making necessary adjustments was not ignored at all, in the instructional packages. During the planning stage, the following components were taken into consideration viz.:

- **Content**: To select topics from the content of Economics was a tough job. As the present study was limited for class X and the curriculum prescribed by the National Council of Educational Research and Training (NCERT) did not fulfill the condition for stable content and in-built logical sequence in Economics subject. So, for selection of topics, teachers of different schools in the said subject were consulted to know their views and opinions. Researcher herself chose some topics and discussed these topics with the concerned teachers. After discussing each topic in detail, ten topics were finalized on the basis of the knowledge, interest and difficulty level required in class X students. The weightages and ranks assigned to various topics for the said criteria were collected and have been reported in the Table 2.1.
Table 2.1

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Topic(s)</th>
<th>Knowledge</th>
<th>Interest</th>
<th>Difficulty level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Economic Development</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Toward Liberalisation</td>
<td>1</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Major Challenges before the Indian Economy</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>4.</td>
<td>Consumer Awareness</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Social Development and concerned issues</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>Dynamics of Human Development</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>7.</td>
<td>Land and soil resources</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>8.</td>
<td>Forest and water resources</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>9.</td>
<td>Agriculture</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>10.</td>
<td>Manufacturing Industries</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

While planning for the organization of content material, the first priority was given to the knowledge objective. The difficulty level was kept to minimum because of students who were getting knowledge on the said topics for the first time. The principle of interest was also not ignored. With the coming of Liberalization, Privatization and Globalization (LPG) era, knowledge about economic concepts, terminologies were considered very essential for the students.

Before preparing the lesson plans for the BTMC, the selected subject matter was analyzed, sequenced and streamlined unit-wise starting from Unit 1 to Unit 10. The unit-wise sequential arrangement for the selected subject matter has been placed in Table 2.2.

Table 2.2

<table>
<thead>
<tr>
<th>Unit I</th>
<th>Unit –Topic: Economic Activities:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Defining attributes of an economy.</td>
</tr>
<tr>
<td>b.</td>
<td>Defining different activities of an economy.</td>
</tr>
<tr>
<td>c.</td>
<td>Definition of the term enterprises.</td>
</tr>
<tr>
<td>d.</td>
<td>Examples of private enterprises.</td>
</tr>
<tr>
<td>e.</td>
<td>Examples of public enterprises.</td>
</tr>
<tr>
<td>f.</td>
<td>Examples of joint enterprises.</td>
</tr>
<tr>
<td>g.</td>
<td>Explain non-economic activity.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Unit II</th>
<th>Unit –Topic: Three Sectors of an Economy:</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Defining three sectors of an economy.</td>
</tr>
<tr>
<td>b.</td>
<td>Defining attributes of Primary Sector.</td>
</tr>
<tr>
<td>d.</td>
<td>Defining attributes of Tertiary Sector.</td>
</tr>
<tr>
<td>e.</td>
<td>Activities included in all the three sectors of an economy.</td>
</tr>
<tr>
<td>f.</td>
<td>Classification of industries.</td>
</tr>
</tbody>
</table>
### Development and Description of Tools

- Differentiating goods and services.
- Showing interdependence of primary and secondary sector.
- Showing interdependence of secondary and tertiary sector.
- Showing interdependence of primary and tertiary sector.
- Justifying the interdependence of all the sectors of an economy.

#### Unit III

**Unit - Topic: Irrigation in India:**

- Discussing the types of sources of irrigation.
- Giving information through map about sources of irrigation in India.
- Giving facts and data about sources of irrigation.
- Discussing the uses of each source of irrigation.
- Understanding the importance of sources of irrigation.

#### Unit IV

**Unit - Topic: Features of Indian Economy:**

- Basic features of Indian Economy.
- Problems of Indian Economy.
- Suggestions to improve the Indian Economy.

#### Unit V

**Unit - Topic: Population:**

- Discussing population growth in general.
- Defining birth rate.
- Defining death rate.
- Differentiating types of migration.
- Explaining the causes of over-population in India.
- Explaining optimum population with the help of a diagram.
- Giving facts and data about India’s population.

#### Unit VI

**Unit - Topic: Unemployment:**

- Defining unemployment.
- Discussing the six types of unemployment.
- Explaining the causes of unemployment problem in India.
- Defining over-qualification.
- Explaining capitalist economy.
- Explaining mixed economy.
- Giving information about sources/agencies, which provide data on unemployment in India.
- Giving facts and data about unemployment problem in India.

#### Unit VII

**Unit - Topic: Price Rise:**

- Defining price rise.
- Defining inflation.
- Giving facts and data about problem of inflation in India.
- Defining CPI.
- Defining WPI.
- Explaining the causes of price rise in India.
- Giving hints to solve the problem of inflation in India.

#### Unit VIII

**Unit - Topic: Economic Development:**

- Differentiating development and growth.
- Features of developed nations.
- Features of under-developed nations.
- Defining national income.
- Defining per-capita income.
- Defining economic development.
Development and Description of Tools

Unit IX  
**Unit – Topic: Human Development:**
1. Differentiating economic development and human development.
2. Defining the term human development.
3. Indicators of human development.
4. Position of India in HDI.

Unit X  
**Unit – Topic: Consumer Awareness:**
1. Defining the attributes of consumer.
2. Explaining the concept of market.
3. Identify the forms of consumer exploitation.
4. Measures to aware the consumer about consumer exploitation.

A summary description of the instructional plans for BTMC thus prepared has been placed in Table 2.3.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Instructional Units</th>
<th>No. of Instructional Objectives</th>
<th>Content Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Economic Activities</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>2.</td>
<td>Three Sectors of an Economy</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>3.</td>
<td>Irrigation in India</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>4.</td>
<td>Features of Indian Economy</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Population</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>6.</td>
<td>Unemployment</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>7.</td>
<td>Price Rise</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>8.</td>
<td>Economic Development</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>9.</td>
<td>Human Development</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>10.</td>
<td>Consumer Awareness</td>
<td>2</td>
<td>4</td>
</tr>
</tbody>
</table>

The ten lesson plans for the BTMC group have been enclosed in (Appendix A-2) under the heading Barnlund’s Transactional Model of Communication (BTMC) Packages.

- **Method:** The investigator used verbal as well as non-verbal communication mode, instructional aids, charts, flow charts, models, maps etc. for the implementation of BTMC Instructional Packages. For the control group, which was of Conventional Group Learning (CGL), the concerned subject teachers of the group were given a list of objectives and the list of content to be taught but they were not given any directions on how to teach. They were requested to teach in their conventional way.
• **Evaluation**: The main tools developed for the purpose of evaluation include the following:
  - Unit Criterion Tests developed for the purpose of Formative Evaluation.
  - Summative Test for Summative Evaluation.
  These have been discussed separately in the following paragraphs.

• **Assumptions about the students**: Factors like student's age, gender and status of the school were taken into consideration. The role of the teacher and student was the same as discussed under the heading of *Social System* in this section while in Conventional Group Learning (CGL) the role of the student could vary i.e. from active to passive. For the purpose of implementing the BTMC Instructional Packages in the classrooms, some assumptions were made about the learners, viz:
  - The Instructional Packages were designed for the X grade students, both boys and girls.
  - The average age of the students ranged between 13 + to 16 Years.
  - The students had successfully cleared their ninth class examination.
  - The students were studying in the X grade for the session 2004-05 academic years.
  - The students were studying in Government Model schools in which medium of instruction was English.
  - The schools were situated within the Union Territory of Chandigarh.
  - The schools were affiliated to the Central Board of Secondary Education (C.B.S.E.), New Delhi.
  - The content was selected from Economics Section on the guidelines of the syllabus developed by the NCERT for class X.
  - The students hailed from the urban areas only and majority of them belonged to the middle class families.
  - Parents of none of these students were completely illiterate.
  - The students were mostly average in their abilities and achievements.

The Pre-requisite skills were identified which were later used for developing a test for Entry Behaviour (The details of Entry Behaviour Test have been prepared in the following paragraphs under the heading Tool-II).
• **Teacher:** The investigator herself performed the role of the teacher in terms of developing and implementing BTMC Instructional Packages in the classrooms. The role of the Social Studies (Economics) teacher of the X grade students was to teach the control group in the Conventional Group Learning (CGL).

• **Class:** Classrooms were adequately equipped with basic minimum requirements of blackboard, chalks, duster, pointer etc. This component comes under *public cues* in BTMC Instructional Packages.

• **School:** It was planned to take four Secondary Schools, affiliated to the Central Board of Secondary Education (C.B.S.E.). The criteria for selecting the schools have been discussed in Chapter III under the heading of Sample Selection.

**B. TRANSACTIONALITY.**

Ensuring the transactional nature of the communication process during delivery of lessons via decoding - encoding of messages was of prime importance here. Under transactional approach all elements of communication were not to be viewed as separate but inter-related and inter-dependent. To ensure the achievement of this objective, there were three considerations:

- Messages must be clearly defined and understood both by the speaker and listener.
- Receiving and understanding the intended messages as sent by the other.
- Investigator must have some control over the flow of the communication.

**C. OBSERVATION.**

Observing the communication behaviour: verbal, non-verbal, public cues, private cues. This objective implies that there is much more in communication than just speech.

**D. INSTRUCTIONAL OBJECTIVES.**

- **Knowledge** – The students will get the knowledge about the concept being discussed by the teacher. It requires the student to recall specific information about the learned material. Each lesson varied on account of this objective, the specification of this was made in all lessons (see Table 2.4).

- **Understanding** – The students will understand the learning matter being discussed by the teacher.

- **Application** – The students will learn to apply the acquired knowledge and understanding of the content matter in real life situations.

- **Skills** - Objectives under this require, acquiring communication and practical skills essential to express concepts of Economics more clearly. To demonstrate the
achievement of this objective, the pupil can draw maps, charts, tables, diagrams, graphs etc. from the given data and can translate it from one form of presentation to another (written communication skill). The other dimension of this objective was to communicate or express verbally the concepts more clearly and effectively. As communication skill is the ability to express the concepts more clearly and concisely.

- **Attitude Formation** – The objective of attitude formation meant that attitudes are necessary for developing constructive outlook towards economic and social problems. To demonstrate the achievement of this objective, the pupil can respect the views, opinions and problems of others and display empathy and fellow feelings towards them. They will also show tolerance and can discuss the issues of disagreement with others impartially.

The selected content was scrutinized and divided into ten units of related concepts. The learning outcomes of each unit were formulated in behavioural terms. The statements of unit – wise instructional objectives have been documented in the following Table 2.4.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>At the end of the instructions, the students will be able to:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>(Unit I)</strong></td>
</tr>
<tr>
<td>1.1</td>
<td>Choose correctly, statements which best explain the characteristic of economy.</td>
</tr>
<tr>
<td>1.2</td>
<td>Identify from the given choices, statements, which best define economic activities.</td>
</tr>
<tr>
<td>1.3</td>
<td>Explain the term SBI.</td>
</tr>
<tr>
<td>1.4</td>
<td>Identify from the given choices, statements, that HIL and RIL are enterprises.</td>
</tr>
<tr>
<td>1.5</td>
<td>Identify from the given choices, statements, which best explains the term enterprise.</td>
</tr>
<tr>
<td>1.6</td>
<td>Choose correctly, statements which best explain the private sector enterprises.</td>
</tr>
<tr>
<td>1.7</td>
<td>Choose correctly from the given list, an example of private sector enterprises.</td>
</tr>
<tr>
<td>1.8</td>
<td>Identify from the choices given, the defining attributes of public sector enterprises.</td>
</tr>
<tr>
<td>1.9</td>
<td>Identify from the given statements, an example of public sector enterprises.</td>
</tr>
<tr>
<td>1.10</td>
<td>Identify from the given statements, an example of joint sector enterprises.</td>
</tr>
<tr>
<td></td>
<td><strong>(Unit II)</strong></td>
</tr>
<tr>
<td>2.1</td>
<td>From the given choices, mention the number of sectors in the economy.</td>
</tr>
<tr>
<td>2.2</td>
<td>Detect from the given statements, an industry that uses less capital and less labour for the production.</td>
</tr>
<tr>
<td>2.3</td>
<td>Name the sector, which supports other two sectors of the economy.</td>
</tr>
<tr>
<td>2.4</td>
<td>Identify from the given choices, which sector provides services to the economy.</td>
</tr>
<tr>
<td>2.5</td>
<td>Match List A with List B, the names of three sectors of an economy in List A with List B, which show the attributes of the three sectors of an economy.</td>
</tr>
</tbody>
</table>
2.6 Write down the other name of the secondary sector.
2.7 Identify the falsity of the given statements, which highlights the three types of secondary sector.

(Unit III)
3.1 Given statements, write down the average annual rainfall in India.
3.2 Discriminate from the given choices, statements, the average annual rainfall in Thar Desert.
3.3 Discriminate from the given choices, statements, the average annual rainfall in Eastern India.
3.4 Estimate the mean annual flow of the Indian rivers from the given statements.
3.5 Identify from the given choices, given statements, the attributes of Indian rivers.
3.6 Identify from the given choices, the source of Himalayan rivers.
3.7 Choose statement out of the given statements, the one which best illustrate the development of canal irrigation.
3.8 Choose from the choices given, statement, the common source of irrigation in India.

(Unit IV)
4.1 Identify the year in which the India followed NEP.
4.2 Discriminate the existing situation of India in terms of development, from the given alternatives.

(Unit V)
5.1 Explain the term birth rate.
5.2 Explain the term death rate.
5.3 Discriminate from the given alternatives, which best define migration.
5.4 Define the term optimum population.
5.5 From the given diagram, identify the optimum population point.
5.6 From the given diagram, identify the point after which it is not possible to produce the basic goods and services required by the people.
5.7 Write down the years taken to conduct the census in India
5.8 Identify the falsity of the given statements, which mentions the causes of over population.
5.9 Identify the falsity of the given statements, which reflects the major reasons for migration.

(Unit VI)
6.1 Write down in their own words, the measures taken to control the unemployment problem in India.
6.2 Match List A with List B, the types of unemployment in List A with List B of the basic attributes of the types of unemployment.

(Unit VII)
7.1 Choose from the given choices, the meaning of inflation.
7.2 Explain the term CPI.
7.3 Explain the term WPI.
7.4 Identify from, the given statements, the basic feature of WPI.
7.5 Identify from, the given statements, the basic feature of CPI.
7.6 Identify the reasons for the price increase, from the given alternative statements.
7.7 Identify the major feature of hoarding, from the given alternative statements.
7.8 Locate the impact of increase in the money supply from the given choices.
7.9 Write down the term meant for the artificial scarcity of goods and services created to earn the profit.
8.1 Identify from the choices given, the names of the economically developed countries.
8.2 Given a list of choices, identify the position of India compared to other nations in development context.
8.3 Define national income.
8.4 Locate the right formula of per capita income from the given alternatives.
8.5 Discriminate the position of India in terms of per capita income from the given alternatives.
8.6 Identify from the given choices, the needs of India in developmental terms.

(Unit IX)

9.1 Explain the term HDI.
9.2 Write down the position of India in HDI in 2004.
9.3 Write down the indicator of development.
9.4 Identify the falsity of the given statements, which shows the indicator of economic development.
9.5 Identify the falsity of the given statements, which shows the indicator of human development.

(Unit X)

10.1 Write down the types of consumer exploitation.
10.2 Identify from the given statement, the forms of consumer exploitation.

PHASE II

DESIGNING OF BTMC INSTRUCTIONAL PACKAGES

The designing of various steps for BTMC have been discussed under remaining components of the BTMC model, viz:

- Syntax of BTMC
- Social System
- Principles of Reaction
- Support System
- Instructional and Nurturant Effects

SYNTAX OF BTMC

The syntax under Barnlund’s Transactional Model of Communication (BTMC), includes:

I. Building effective relationship between Learner’s Knowledge and the Learning Experiences of knower.

This stage was planned to be of short term and was of small scale. Two ways were adopted to ensure this:
Informal way—greeting, wishing, querying, joking, making gestures etc.

Formal way—establishing relationships between what is known and the social location of the knower.
-Initiating students through statement/questioning.
-Taking response.
-Supporting/contradicting/briefing the statement.

II. Field of experiences must be common, as it is necessary to move to stage III.

Assumptions based on the previous knowledge and experiences, form the common base for both teacher and students. Hence entry behaviour statuses of all the learners were identified. The discussion of which has been mentioned in the following paragraphs (under Tool II).

- Previous Knowledge Assumptions (PKA) / Field of Experiences: Like conventional teaching where the entry behaviour starts from teacher’s assumption about the student’s previous knowledge acquired on the topic, BTMC will take this assumption along with the public and private cues into consideration to form the common field of experiences.

- Selection of Messages (SM): The common field of experiences provided a platform for the investigator to encode selective messages to start the communication process in the classroom.

III. Barnlund’s Transactional Process of Communication (BTMC)

(Basic structure)

The basic structure of BTMC consists of:
- Decoding – encoding of messages
- No distinction between speaker and hearer.
- Studying available environment.
- Role of cues – public and private.
- Studying verbal and non-verbal behaviour of communication.

The decoding and encoding of messages simply implies that whatever intended messages have been sent by the investigator or students were properly understood by both the parties. For this, whatever topic/content was to be discussed by the investigator was properly planned in behavioural terms (See Appendix A-2). As the communication process under BTMC was not of linear type, that is, the role of speaker and hearer was of
parallel nature and no single party holds the dominant position, the investigator took notice to the available classroom environment so that the role of public cues could be channelized for effective transaction of communication process. On the equal footing, the investigator studied not only the verbal and non-verbal behaviour of the students but also introspected her own behaviour. This was done in order so that the working of communication process couldn’t get hampered due to these factors. For example, the facial expressions of students were the indicators of their non-verbal behaviour, i.e., whether they were taking an interest in the classroom activities or not.

**Emergence of six persons** each time whenever two persons enter into a transaction. These 6 persons will emerge as follows:

- How will you view yourself?
- How will you view the other person?
- How will you believe the other person views you?
- How will the other person view himself/herself?
- How will the other person view you?
- How will the other person believe you view him/her?

It is concerned with how the mind organizes the stream of messages into a mental map that represents the perception of us, is one of the important things before establishing any sort of communication. For example, if the person lacks self-esteem, the communicative ability will certainly be marred due to his low level of perception about himself.

In communication, the person actively makes sense out of what people say. The people demonstrating this, take the main ideas of the opening statement and start working on them. The person then constantly and actively assigns values, or makes sense of or an incredible number of things to messages. In nutshell, the person not only spend a sizable amount of his time striving to make sense of the things around him but also gets duly affected by making sense of his own persona.

Both participants in the communication process can choose from among positive, negative or neutral private cues, public cues and verbal and non-verbal behaviour cues in determining to what they can attend. At the same time, each participant transmits numerous non-messages cues (nervous movements, physical appearance, clothing and so forth), which may be attended to in lieu of message cues. But, to which extent the non-message cues capture the attention of a receiver influences the message information, which can be either lost or distorted. In the communication process if the focus is on the
non-verbal aspect of the other person than on the verbal messages or a vice-versa, both the extremes result in a communication breakdown.

Because our perceptions are unique, the ideas we want to express differ from other people. As senders, we choose the details that seem important and focus our attention on the most relevant and general. As receivers, we always try to fit new things into our existing pattern. If the scheme of things doesn’t seem to fit in our mental map, we incline to destroy that information rather than reconsidering the facts of failure.

Therefore, framing of the messages in terms of the other person and then trying to find something positive in every message (verbal, non-verbal) is essential for the success of any transactional communication process. The emergence of six persons each time wherever two persons enter into a transaction is simply the fact that the elements of intra-personal communication (communicating with oneself) and inter-personal communication (communicating with other) emerges along with its observable interaction pattern (immediate or after contact feedback).

In a sense, Barnlund (1970) is arguing that as we interact with others, we construct ourselves and our participation in the interaction process is limited by how we view the situation.

IV. Exploration of Communication Process

For exploring the communication process, following measures have been suggested by Barnlund (1970):

- Extension of a preceding remark.
- Removing hesitations.

Initial Phase: This phase was not only the extension of a preceding remark but also a deliberate effort of selecting right messages to communicate. The role of teacher was very much important here because the expanding of thought loosely or tightly was all dependent on her. Initially, the teacher had a deliberate control over the discussion. It consisted of:

- Questioning / statements.
- Thought development (i) loosely expanding, and (ii) tightly expanding.
- Supporting evidences.
- Deliberate control over the discussion.
Following parameters were used under this phase:

- Building relationship between learner’s knowledge and learning experiences of knower.
- Forming common field of experiences.
- Selection of messages spontaneously.
- Motivating students to respond / communicate.
- Removing hesitation in communication.

Each lesson followed this pattern (See Appendix A-2).

Middle Phase consisted of:

- **Changing directions of the discourse.** For example while dealing with cyclical unemployment in Lesson VI, the students took the meaning of it as related to the production of cycles. The investigator without making any serious fuss about the matter changed the direction of the discourse by properly exemplifying the content matter (See Appendix A-2).

- **Maintaining close link between succeeding utterances.** Whatever the investigator has uttered was sequential in approach and step-by-step procedure followed to explore the matter in a right direction. Written lesson plans provided support to this evidence (See Appendix A-2).

- **Frequent modifications.** Wherever the lesson/content demanded modifications at the deliverance stage, this was done without disturbing the basic structure of BTMC. The modifications were in terms of concept, terminologies, and verbal, non-verbal communication behaviour.

- **Classifying concepts.** Lessons, which demanded classification or categorization of the concepts, were done for the convenience of understanding the matter. For example, lessons concerned with *Sectors of an Economy, Unemployment* etc were classified and categorized.

- **Full explanation for difficult terms.** The economic terms, which were of difficult nature, were fully explained so that transactional process of communication couldn’t get jeopardized. For example, terms like *economy, economic activities, three sectors of an economy, HDI, LPG*, etc. were explained to the students.

- **Using instructional aids.** The use of visual aids, charts, maps, globes were intensified in each lesson. Use of more examples from real life situations was
Development and Description of Tools

effectively demonstrated throughout the ten units of the programme. (See Appendix A-3).

- **Inviting students to participate in the communication process.** The investigator took special effort to encourage and motivate students to participate in the classroom communication process. Verbal as well as non-verbal communication behaviour of the investigator provided positive reinforcement to the students so that their confidence level can be built up to the maximum level.

- **Supporting evidences.** The following enrichment material was used for guiding the students. This also acted as supporting evidence to the content material discussed in the classrooms.
  - Other national and regional newspapers.

- **Categorizing the whole discourse (If necessary).** This step was followed on the same pattern of classification of concepts as discussed above.

Here the learning material/content was communicated to the students by changing the direction of the discourse from initial phase. The sequential order of this phase was hereby summarized as follows:

- Maintaining logical order between succeeding utterances.
- Clarifying concepts.
- Using instructional aids.
- Inviting students to participate in the communication process.
- Supporting evidences.
- Classifying the whole discourse (if necessary).
- Sharing the experiences / information.

➢ **Final phase:** It comprised of:

- **Creating self-awareness.** Various topics like *Unemployment, Price Rise, Development, Human Development, and Consumer Exploitation* were of such type, which successfully created self-awareness among students.

- **Restatement of the task.** Wherever, learning problems emerged, the cause was located and the investigator took remedial measures.
• **Acknowledging others opinions.** The investigator acknowledged the students’ opinion without being judgemental about any issue and settled the matter for better understanding.

• **Suggestive measures.** Individual attention was paid to those students who were not so fast in grasping the technicalities of the topic.

  In this final phase, the teacher initiated questions or comments that promoted active and effective communication through transactional approach to the subject matter. Following activities were involved in this phase:
  
  - Creating self-awareness
  - Restatement of the learning task
  - Acknowledging and positively criticizing others opinions
  - Suggesting constructive and remedial measures
  - Asking students to communicate the material from alternative point of view and selecting the appropriate messages.

  Thus, this phase declared the achievement of objectives.

**V (a) Using Communication Skills**

It plays an important role in an environment of communication events, where sense-making and our attempt to share that sense can either coincide or contradict to its true meaning or nature. That’s the basic idea that we can alter and shape our perspective on something by examining the following aspects:

• **Progress through task-questioning.** It states that which channel allows depth of communication. So, the investigator adopted the very feasible approach where the progress of content matter was done via task-questioning.

• **Shifting towards a new topic.** The versatility of the communication always allows having broader perspective on the subject matter as well as on initiating several other topics. The investigator took the same benefit in the present investigation.

• **Ending the discussion.** The investigator with positive concluding note ended the reactions, which were basically verbalized by students on some of the conflicting points.

• **Avoiding unpleasant things.** The investigator in appropriate verbal and non-verbal communication behaviour controlled the settling of the unpleasant things.
• **Contradicting, approving / disapproving of opinions.** The concern of the students on certain issues was handled appropriately by either approval or disapproval of the opinions.

• **Sharing feelings (building of field of experiences).** This accounted for the extension in the space through which students can form the common basis of experiences and can share their feelings without hurting others sentiments. It also implied that common platform always provide a scope to expand and move freely.

• **Monitoring own speech and thought.** The investigator analyzed her own communicative behaviour so that the number of things could be taken care of like, what she says, how she says it, the context of what she says.

• **Inter-relating alternative viewpoints.** It was concerned with understanding of A in terms of B and was not just a way of gaining broader perspective on something, but actually a pervasive, subtle and compelling determinants of how we come to develop our working view points by inter-relating other alternative position.

• **Evaluating one’s own performance.** It was concerned with the question of does the whole process of communication served the interests of the students more than the traditional approach of teaching.

**V (b) Non-verbal Communication in the Classroom.**

Although non-verbal communication was often unplanned, it had more impact than the verbal communication alone. Words were relatively easy to control but the investigator monitored body language, facial expressions and vocal characteristics of her simultaneously. The following things were kept in mind:

• Body movement and gesture.
• Eye behaviour in the classroom.
• Objects in the classroom.
• Space in the classroom.
• Time management in the classroom.
• The impact of students’ perception of teachers.
• Teacher’s image.
• Alternate sources of communication in the classroom, like determining the ability of medium of communication to convey a message using more than one informational cue (visual, verbal, vocal) to facilitate feedback and to establish personal factor in the whole communication process.

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SOCIAL SYSTEM

As Bamlund’s Transactional Model of Communication was based on the transactionality of communication where both the speaker and the listener have equal say, the question of passivity was ruled out here. It is however true, that investigator formulated instructional objectives and decided about the instructional process to be carried out in the classroom according to the said model.

The intellectual structure of the model was controlled by the investigator and was transmitted up to the equal level of participation of students in the communication process in later stages. The role of the students was activated till it achieved the goal of transactional nature of communication process.

The model included a number of cues in behavioral terms: verbal as well as non-verbal (for e.g., vocabulary usage, style of speech, repetition of certain words/sentences, encoding of messages, attitude, dress, posture, movement, gestures etc.); public versus private cues (for e.g., external disturbances in the classroom, fatigue, headache or any other physical or psychological problem). All the cues had direct or indirect influence on the messages sent by the encoders or decoders.

Regarding the structure of the model, it was highly structured from the point of view of the investigator because she had to strictly follow the path of Bamlund’s Transactional Model of Communication. However, students were at their liberty because no external conditions or situations were forced upon them. The master key to hold communication process on the right track remained in the investigator’s hands. The investigator acted as an initiator. She decided the sequence of activities in advance and managed the classroom activities. Once the transactional nature of communication process started the structure of model moved from high to moderate where the investigator and students equally shared the distribution of activities.

PRINCIPLES OF REACTION

Generally, it tells about the nature of interaction between the teacher and the students. In Bamlund’s Transactional Model of Communication, it is the transactional nature of communication that matters. Here a number of public and private cues also influence the transactional process of communication. For example:

- BTMC not restricts student’s freedom by avoiding public and private cues. Non-verbal communication behaviour matters here.
• At the initial level, the role of teacher’s verbal as well as non-verbal behaviour dominates. Student’s role in terms of verbal behaviour is minimum but their non-verbal behaviour will have much influence on teacher’s behaviour.
• Gradually, teacher’s role in verbal as well as non-verbal perspective diminishes and student’s verbal behaviour becomes prominent along with their non-verbal behaviour.
• Finally, there is equal participation of speakers and listeners.

SUPPORT SYSTEM
This component was used to describe the supporting conditions necessary to attain the model’s goal. It describes what additional equipment or what agencies in addition to the school will throw more light on the subject. Barnlund’s Transactional Model of Communication requires a trained person who can handle the verbal as well as non-verbal communication behavior in a conducive manner.

INSTRUCTIONAL AND NURTURANT EFFECTS
In Barnlund’s Transactional Model of Communication, both the effects play an important role in the communication process, via verbal communication behaviour (instructional effects) and non-verbal via private and public cues. In addition to improving the learning performance of students in any area of verbal knowledge, children were trained for independence in intellectual pursuit and problem solving. They were trained to argue systematically and lead to a conclusion.

Ten units were prepared on these lines and have been attached as Appendix A-2.

PHASE III
TRY OUT OF INSTRUCTIONAL PACKAGE
The designed instructional packages needed to be implemented and monitored to evaluate its validity. For this, a try out of the package was done. Following steps were taken:

Implementing Instructional Programmes:

This is the final phase of the Barnlund’s Transactional Model of Communication (BTMC). Validation of the instructional programme was done at Government Model

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High School, Sector-20, Chandigarh. Thirty students were taught through the BTMC instructional packages.

**Conduct Formative Evaluation and Remedial Instruction:**

Diagnosis of instructional programmes was done through Formative Evaluation. Formative Unit Tests have been given in Appendix A-4. Remedial instructions were provided whenever needed. This was followed by corrective feedback enrichment procedures.

**Conduct Summative Evaluation:**

In the end, Summative Test was administered to produce the evidence of the summed effects of a set of lessons (Appendix A-5).

**Revision of Instruction and Materials on Evaluation Data:**

Based on the data of a Formative and Summative Evaluation, the deficiencies exhibited by instructional process in the plans of instructions, were identified and the lessons were modified accordingly. Final ten instructional plans under Bamlund's Transactional Model of Communication (BTMC) Packages have been given in Appendix A-2.

### TOOL II

**TEST OF ENTRY BEHAVIOUR**

The N.C.E.R.T. has not included Economics as a separate subject in X class curriculum of Social Studies. So, before proceeding to the implementation of BTMC Instructional Packages in the classrooms, measuring of Entry Behaviour (EB) / pre-requisite skills was equally important for measuring of Terminal Behaviour (TB). Entry Behaviour (EB) describes the behaviour or knowledge, the students must possess before they undergo any treatment. It also forms the base for future learning which the teacher wants them to attain. Hence a test was required to be developed which could measure pre-requisite skills of students.

The three stages of test construction (Gronlund, 1998) were followed viz.:

- Planning the test.
- Writing the test items.
- Validation of the test.
PLANNING OF ENTRY BEHAVIOUR TEST:

This stage of test construction focuses on following three steps:

- Domain Definitions and Specification of Target Behaviour.
- Content Outline.
- Preparing Table of Specifications.

❖ DOMAIN DEFINITIONS AND SPECIFICATION OF TARGET BEHAVIOUR.

It is the most difficult but important step in the construction of any test. Here, the limits of behaviour that the test items would measure and to which all-individual performance to be referenced, were determined. It is concerned with the boundaries of content to be included. The judgement about the relevance of test items and steps taken to achieve representativeness of content serve the dual purpose of guiding test development and documenting validation evidence. Written documentation of the domain specifications, the nature of the test tasks and the reasons for using those tasks provide intrinsic rational validity evidence (Ebel, R.L., 1983). Specifications of the pre-criterion/pre-requisite skills assumed that the learners before successfully passing their ninth class examinations; have studied and covered the syllabus meant for the ninth class students. Content for pre-requisite skills has been given in the following paragraphs. The behavioural specifications for Entry Behaviour Content that the students were expected to have acquired before undergoing instructional process were assumed to be:

- Write down the number of the sectors in the economy.
- Write down the type of Indian economy.
- Give the names of at least two states of the Northern India.
- Write down the names of at least two populated states of the India.
- Write down the type of USA economy.
- Identify from the given choices, the main occupation of people living in Indian villages.
- Identify from the given choices, how clothes are manufactured.
- From the given choices, identify the statement, which shows the basic attribute of large-scale industries.
- Identify the location of cottage industries, from the given choices.
- Identify from the given choices, statement, which best describe the meaning of a price rise.
Name the country from the given alternatives, which has maximum population in the world.

Write down the position of India in the world population.

Identify from the given choices, statement, the population of India in 2001.

Identify from the given choices, statement, the falsity of the reasons for increase in the price.

Identify from the given choices, statement, the falsity of the things needed for the crops to grow.

Identify from the given choices, statement, the correct reason on which the Indian farmers generally depend upon to water their fields.

Mention the name given to the use of water for agriculture purpose.

Define unemployment from the given choices.

Identify the name of the state in India having the highest literacy rate, from the given choices.

Choose from the given alternative statements, the natural resources of irrigation.

Choose from the given alternative statements, the man-made resources of irrigation.

Identify from the given statements, the level of ground water of tube wells and other wells.

Given from the choices, choose where the Bhakra Dam is built.

From the given alternative statements, choose the most populated state in India.

From the given statements, identify the thing, which is not cereal.

From the given alternative statements, choose the least populated state in India.

Identify from the given statements, the correct formula of profit.

From the given reasons, identify the statement why the agricultural production in India is less.

Explain population explosion.

Given the choices, choose the correct statement about the impact of increase in population in India.

Identify from the given statements, the statement, which best reflects the attribute of natural resources.
Development and Description of Tools

- Identify the right statement from the given statements, how the rise in prices cause the real wages to decrease.
- Estimating the impact of increase in population and problem of unemployment from the given alternatives.
- Write down the basic difference between goods and services in their own words.

Content Outline

The content/topics that were considered to be necessary pre-requisites for the topic to be taught before undergoing the experimental treatment of BTMC instructional packages were identified. A list of contents as necessary Entry Behaviour has been given below:

Specification of the content of the learner's Entry Behaviour Pre-requisite skills

| 1. Meaning of the economy –Set of principles and techniques by which a society decides and organizes the ownership and allocation of economic resources. |
| 2. The main allocation of people living in Indian villages is agriculture. |
| 3. Goods and services-Goods and services are not the same things. Service is not tangible like goods. In services we do not produce anything but produce our services. For example, services of a teacher, doctor, lawyer, bank, post-office, insurance sector etc. |
| 4. Large scale industries –Large-scale industries are those industries, which have large financial investment, give employment to many and manufacture goods on a large scale. |
| 5. Small – scale industries –Small-scale industries use less capital and the scale of production is also smaller than the large –scale industries. |
| 6. Cottage industries-Cottage industries are generally found in villages. |
| 7. Price Rise-A continuous increase in the level of prices of the commodities. |
| 8. China is the most populated country in the world. |
| 9. India holds second position in the world in the population growth. |
| 10. The growth of population is a concern for any country because it utilizes maximum resources in a short span. The over – utilization of these resources lead the economy to problems of poverty, unemployment, mal-nutrition etc. |
| 11. According to the Census 2001, the population of India is 102.70 crore. |
12. The information about population is provided by Census in India after every 10 years.
13. Unemployment-It is that situation in which a section of people, who are willing and able to work at the primarily wage rate but are unable to get a job.
14. Over-qualification--Over-qualified person is that who possesses more qualification than for a particular job.
15. Capitalist Economy-The capitalist economy uses much capital for the growth and development of there economy.
16. India has a mixed economy.
17. The Indian farmers generally depend upon monsoons to water their fields.
18. There are various ways of irrigation, which are being used in India.
19. Natural Resources of Irrigation- It comprises the availability of water from the nature. For example rain water, rivers and streams.

❖ Preparing Table of Specifications

After learning outcomes were specified in behavioural terms and the course content was outlined, a table of specifications of Entry Behaviour was developed. The purpose of the Table of Specifications was to relate the learning outcomes to the content and indicate relative weightage to be given to each of these areas. The unit-wise distribution of Entry Behaviour (EB) Test items has been placed in Table 2.5.

<table>
<thead>
<tr>
<th>S.No</th>
<th>Unit/content</th>
<th>Multiple Choice Type</th>
<th>Fill in the Blank Type</th>
<th>Completion Type</th>
<th>Short Answer Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Economy</td>
<td>13</td>
<td>2</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>Indian Economy</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>3.</td>
<td>Development</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>4.</td>
<td>Consumer Awareness</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Total Questions</td>
<td>29</td>
<td>6</td>
<td>2</td>
<td>3</td>
</tr>
</tbody>
</table>
WRITING STAGE

Writing of Entry Behaviour (EB) Test Items for the Initial Draft

The following considerations were kept in mind while writing the items for the first draft:

- The items should measure the desired outcomes as far as possible and
- Every item should be quite relevant to the criterion situation of that item.

Planning and Construction of Entry Behaviour (EB) Test Items

The construction of the Entry Behaviour (EB) Test Items was planned with the objective of measuring prior learning, which was essential for the topics to be studied. More than one item for each pre-requisite skill was developed in all types of questions. The items developed by the investigator were first of all shown to 14 teachers of Economics who were teaching the subject. These teachers were asked to give their views about the (EB) Test Items generated. Teachers were also encouraged to state each item in as many ways as possible. They were also encouraged to add items wherever they felt the need for doing so. All this was done to ensure the reliability of the items generated.

Thus, the items generated (Table 2.5) covered the following areas: Multiple choice type 29 questions; Fill-in the blanks 6; Completion type 2 and Short answer type 3 questions respectively. After doing all this necessary work, a test comprising of 40 Entry Behaviour Test Items was ready for try-out.

VALIDATION STAGE

First Try-out of EB Test:

The initial EB Test consisting of 40 items was administered on a group of 30 tenth grade students studying in the Union Territory of Chandigarh. The try-out was conducted to ensure that the entire class of the learners’ behaviour had been circumscribed. The try-out was verified to see whether the items generated displayed uniform stimulus homogeneity. Once more, the five educational experts were consulted to review the test items and give their comments and judgements whether the items generated by the investigator were congruent with the required domain definitions.

Table 2.6 shows the rejected, modified and retained items of Entry Behaviour Test. Five items 11,12,15,26 and 29 generated under various types of test items were found to be either ambiguous or lacked continuity or were irrelevant and hence, were deleted. Item numbers 8 and 27 were modified accordingly. The second version of the EB Test Items was therefore ready for administration. It contained 35 items.
Table 2.6
Rejected, Modified and Retained EB Test Items (First Draft)

<table>
<thead>
<tr>
<th>Items</th>
<th>S.No. of Items</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rejected:</td>
<td>11; 12; 15; 26 and 29.</td>
<td>5</td>
</tr>
<tr>
<td>Modified:</td>
<td>8 and 27</td>
<td>2</td>
</tr>
<tr>
<td>Retained:</td>
<td>1; 2; 3; 4; 5; 6; 7; 9; 10; 13; 14; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25; 28; 30; 31; 32; 33; 34; 35; 36; 37; 38; 39 and 40.</td>
<td>33</td>
</tr>
</tbody>
</table>

Total No. of Items 40-5=35

Distribution of the items in the Second Draft:

The description of the second version of the Entry Behaviour Test Items has been placed in Table 2.7.

Table 2.7
Distribution of the items in the Second Draft of EB Test

<table>
<thead>
<tr>
<th>S.No</th>
<th>Unit/Content</th>
<th>Multiple Choice Type</th>
<th>Fill in the Blank Type</th>
<th>Completion Type</th>
<th>Short Answer Type</th>
<th>Definition/Explanation</th>
<th>Total No. of Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Economy</td>
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<td>2</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>15</td>
</tr>
<tr>
<td>2.</td>
<td>Indian Economy</td>
<td>10</td>
<td>3</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>14</td>
</tr>
<tr>
<td>3.</td>
<td>Development</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Consumer Awareness</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>27</td>
<td>5</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>35</td>
</tr>
</tbody>
</table>

Administration of the Second Draft:

The second draft of the EB Test was administered to a group of 30 students and the DP and DV of each item was calculated. Kelly's Method (1939) was adopted to find the Difficulty Value (DV) and Discriminating Power (DP) of each item. Item difficulty is the mean item score, which stands for empirical probability that the target population will pass the item (Libert, 1977; Lewis – Berk, 1993). For calculating the Difficulty Value (DV) and Discriminating Power (DP), the following formulae were used:

\[
DV = \frac{R_U + R_L}{N} \quad \text{and} \quad DP = \frac{R_U - R_L}{N}
\]

where

- \(R_U\) - No. of correct responses in the upper group.
- \(R_L\) - No. of correct responses in the lower group.
The upper and lower groups were formed as follows:

- All the students’ answer scripts were arranged in the descending order on the basis of total marks obtained.
- The first 27 percent cases formed the upper group and the last 27 percent cases formed the lower group.

The criteria of taking 27 percent cases in the upper and lower group each is in accordance with Kelly’s remarks that the best discrimination is obtained if one takes this percentage in the two groups. In this way, the DP and DV for each item were calculated for the EB Test items and have been reported in Table 2.8.

### Table 2.8

<table>
<thead>
<tr>
<th>S.No</th>
<th>DV</th>
<th>DP</th>
<th>Comments</th>
<th>S.No</th>
<th>DV</th>
<th>DP</th>
<th>Comments</th>
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<td>1</td>
<td>.44</td>
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<td>Accepted</td>
<td>19</td>
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</tr>
<tr>
<td>2</td>
<td>.56</td>
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</tr>
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<td>Accepted</td>
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<td>.75</td>
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</tr>
<tr>
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<td>22</td>
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<tr>
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</tr>
<tr>
<td>6</td>
<td>.75</td>
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<tr>
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</tbody>
</table>

The Table 2.8 reveals that the DV of 35 items of the second draft ranged from 0.44 to 0.75 and the DP ranged from 0.38 to 0.75. Thus, items, which have, item difficulty value varying between 0.44 to 0.75 and discriminating power’s ranging between 0.38 to 0.75 were retained. Items at serial numbers 1 to 35 were retained as such no item was rejected from the EB Test items at this stage.

The Table 2.8 therefore indicates that majority of the proportions of differences between students showed a marked level of consistency across the score levels. Hence, Entry Behaviour (EB) Test Items were considered reliable for measuring the performance of EB of the students.
Scoring Key:

The scoring procedure adopted for the Test Items of Entry Behaviour had marks of assigned magnitude at the end of each test item. The magnitude score was indicated to reinforce the students.

Reliability:

Reliability is the term used to describe one of the most significant properties of a set of test scores- how consistent or error free the measurements are. Scores that are highly reliable are accurate, reproducible and generalizable to other testing occasions and other similar test instruments (Frisbie, D. A., 1988). Reliability co-efficient computed through split – half method was found to be 0.92, which indicates that the tool was highly reliable.

Validity:

The question of validity concerns the accuracy with which the items generated measures what it purports to measure (Davis, 1964; Klevin and Kosecoff; Ebel, 1979). The validity of the EB Test items has been determined as follows:

Face Validity: The list of selected items was once more given to seven experts with a request to state their own opinions and judgements regarding the suitability of the items. Items (11,12,15,26 and 29), which raised doubts in the opinions of the experts were deleted. The ambiguous items (numbers 8 and 27) were modified and the rest were retained as such. Face validity was therefore ensured for the test.

Content Validity: A test of scale is said to possess Content Validity if in the opinion of competent judges, the sampling of items is wise, judicious and when adequate standardization groups are used (Lindquist, 1956; McClintock, 1975; Garret, 1966; Myers, 1980). The process of preparing the EB test items was such that practically, all the objectives bearing the different relevant units may be assumed to have been included and tested. When the selected 35 items were sent to the seven experts, they opined that these items serve the purpose. Hence, the 35 Test items, which were administered as Entry Behaviour (pre – requisite skills test) were considered to possess content validity. A copy of the final draft of EB Test Items along with its scoring procedure has been attached as Appendix A- 1.
Development and Description of Tools

TOOL III

FORMATIVE UNIT TESTS

The success of any competency-based educational programme is dependent upon the student’s success in attaining the levels of performance that are essential to competence (Torsten, 1967). While the instruction was in progress, Formative Unit Tests, provided information concerning how well the instructional programme was working. This assessment procedure measured what each student has learned and what he has failed to learn at regular intervals throughout the instructional programme. Though the feedback element was not there in original BTMC, Formative Tests for each unit was developed and validated by the investigator herself to make the effectual use of the model in classroom setting. For each of the ten units, ten separate Formative Tests were prepared each one of which was of 20 to 30 minutes duration. On the basis of the scores obtained by students from these Formative Tests, the investigator located the learning problems and took remedial efforts to remove them.

Two types of criterion reference tests were developed in the present investigation. One such test was developed on each unit for the purpose of Formative Evaluation (Appendix A-4). The other was on the entire content of ten units for the purpose of Summative Evaluation (Appendix A-5). Since a formative instrument is administered at the close of a unit, it therefore provides an in depth picture of what skills each student has or has not mastered (Block, 1971). Consequently, Formative Evaluation suggests in what ways the students’ original instruction must be supplemented if he is to complete his learning before proceeding on to a new instructional unit.

Unit Tests:

The construction of the initial items of Formative Tests was planned with the objective of measuring curricular activities taking place in the classroom. The following considerations were kept in mind while writing the items for the first draft of each unit test:

- The items should measure the desired situations as far as possible and;
- Every item generated should be quite relevant to the criterion situation at that item.

More than one item for each objective of unit test was developed. The items developed by the investigator were shown to the 14 teachers who were teaching
Economics to various sections of the X grade students. These teachers were asked to give their views about the Formative Test items generated. Another group of 12 educational experts were further consulted for their views regarding the items.

As earlier stated for each of the ten units, ten separate Formative Tests were prepared, each one of which was of 20 to 30 minutes duration. Five types of question items were generated through multiple choice type 5 questions; the short answer type 24; draw and label the diagrams 1; true false type 12; fill in the blank type 40 and making it a total number of 82 test items. Type-wise distribution of items for each unit test has been tabulated in Table 2.9.

Table 2.9
Description of type and number of Initial Test Items in the Initial Draft of Unit Tests

<table>
<thead>
<tr>
<th>Unit(s)</th>
<th>Multiple Choice Type</th>
<th>Short Answer Type</th>
<th>Draw and Label the Diagram</th>
<th>True/False Type</th>
<th>Fill in the Blanks Type</th>
<th>Total no. of Test Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>9</td>
</tr>
<tr>
<td>II</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>III</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>IV</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>V</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>5</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td>VI</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>VII</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>VIII</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>IX</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>X</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>5</td>
<td>4</td>
<td>12</td>
</tr>
<tr>
<td>Total</td>
<td>5</td>
<td>24</td>
<td>1</td>
<td>12</td>
<td>40</td>
<td>82</td>
</tr>
</tbody>
</table>

Each test item of Unit Criterion Test was reviewed for the language, content and its relationship with the instructional programme. A total number of 26 educational experts were consulted for the purpose of validating the Formative Test items, for ten unit tests. Based on the learner’s pre-requisite skills, the investigator first generated 82 test items.

First Try-out of Formative Test Items:

The initial Formative Test, consisting of 82 items was again administered to a sample of 30 Tenth grade students studying in the Union Territory of Chandigarh. The try-out was conducted to ensure that the entire class of the learners’ behaviour had been circumscribed. Verification of the trial ensured that items generated displayed uniform stimulus homogeneity. Once more, the various educational experts were consulted to review the test items and give their comments and judgements whether the items
generated by the investigator were congruent with the required domain definitions. Eight items were deleted, item number 52 was modified and the rest were retained as such. Table 2.10 shows the rejected, modified and retained items.

### Table 2.10

<table>
<thead>
<tr>
<th>Items S.No. of Items</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Rejected:</strong></td>
<td></td>
</tr>
<tr>
<td>8; 11; 12; 28; 29; 41; 49; 55</td>
<td>8</td>
</tr>
<tr>
<td><strong>Modified:</strong></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>1</td>
</tr>
<tr>
<td><strong>Retained:</strong></td>
<td></td>
</tr>
<tr>
<td>1; 2; 3; 4; 5; 6; 7; 9; 10; 13; 14; 15; 16; 17; 18; 19; 20; 21; 22; 23; 24; 25; 26; 27; 30; 31; 32; 33; 34; 35; 36; 37; 38; 39; 40; 42; 43; 44; 45; 46; 47; 48; 50; 51; 53; 54; 56; 57; 58; 59; 60; 61; 62; 63; 64; 65; 66; 67; 68; 69; 70; 71; 72; 73; 74; 75; 76; 77; 78; 79; 80; 81 and 82.</td>
<td>73</td>
</tr>
<tr>
<td><strong>Total No. of Items</strong></td>
<td><strong>82</strong></td>
</tr>
</tbody>
</table>

**Improving the Items:**

Out of 82 test items that were generated to measure instructional objectives, 8 were rejected, one was modified (item no. 52) and the rest were retained. Some changes were also made on the wordings to make the items measure the intended instructional objectives. In order to improve thoroughly on the quality of the items, the generated items were tested for response homogeneity. Analysis of items was also done on the basis of responses of students as follows:

**Item Analysis of Unit Tests:**

An index of sensitivity to instructional effect was computed, by the formula as given by Krispin and Feldhusen (1974) viz:

\[
S = \frac{R_A - R_B}{T}
\]

Where

- \(R_A\) = Number of students answering the items correctly after instruction
- \(R_B\) = Number of students answering the items correctly before the instruction and
- \(T\) = Total number of students answering the items both the times.

Sensitivity index for each items of *Formative Test* was calculated using the above stated formula. The values of sensitivity indices for each item have been placed in Table 2.11.
Table 2.11 reveals that the sensitivity indices of all the items except items numbers 8, 11, 12, 28, 29, 41, 49 and 55 were 0.4 or more. Hence items having sensitivity indices in the range of 0.40 to 0.80 were accepted and retained as such for the final draft of the Formative Test. Item number 52 was modified for the language ambiguity and retained later. Item no. 8, 11, 12, 28, 29, 41, 49 and 55 were rejected. Since these items had parallel terms in the test and coverage of respective objective was not at risk.

The Final Draft of Formative Test:

After analysis of items in the initial draft, the above said items were retained as such, some were rejected and some were modified. The description of the final version of the *Formative Test* items has been placed in the Table 2.12.
Table 2.12
**Description of type and number of Final Formative Test Items**

<table>
<thead>
<tr>
<th>Unit(s)</th>
<th>Multiple Choice Type</th>
<th>Short answer Type</th>
<th>Draw and label the diagram</th>
<th>True/false Type</th>
<th>Fill in the Blanks Type</th>
<th>Total no. of test Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>II</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>III</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>IV</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>V</td>
<td>-</td>
<td>3</td>
<td>1</td>
<td>4</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>VI</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>VII</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>VIII</td>
<td>1</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>IX</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>X</td>
<td>1</td>
<td>2</td>
<td>-</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>4</td>
<td>22</td>
<td>1</td>
<td>9</td>
<td>38</td>
<td>74</td>
</tr>
</tbody>
</table>

Thus, 74 test items were ready for the purpose of data collection.

**Reliability**

Reliability concerns the extent to which measurements are repeated (Nunnally, 1959; 1964; Guilford, 1956; 1965). Measurements are intended to be stable over a variety of conditions in which essentially the same results would be obtained (Nunnally, 1982). For the purpose of determining reliability of the Formative Test, it was administered to 30 students of X grade studying in Chandigarh. The reliability coefficient of the Formative Test was computed with the help of KR-21 Formula:

\[ r = 1 - \frac{M(1-M)}{K} \]

Where

- \( K \) = Number of items in the test
- \( M \) = Mean of the test scores, and
- \( s \) = Standard Deviations of the Test Scores.

Reliability coefficient was found to be 0.79. Therefore, the Formative Test may be considered as a reliable tool for the diagnostic assessment of the students’ achievement at the end of each unit. Each test item of Unit Criterion Test was reviewed for the language, content and its relationship with the instructional programme.

**Validity:**

Validity of a test refers to the degree to which it measures what it intends to measure (Edwards, 1968; Morley, 1970; Wolf, 1982; Edgilton, 1987). In the context of
validity, each question must be related to the topic covering the overall topic (Popham, 1975). The process of validity involves checking the agreement between the responses elicited by each question item against the criterion. But in some cases, it is possible to validate questionnaire responses against the actual behavior of the respondents (Guilford, 1956).

Popham (1975) suggests that when marked range restrictions are present, it may be necessary to employ less sophisticated but more meaningful reliable estimates. In this study, Formative Test items just like the Entry Behaviour Test Items were validated against the criterion of the content validity. To determine the content validity, the test items and a list of outcomes were given to the panel of experts in the subject matter and they reviewed the content of the items focusing on its clarity, objectivity and validity. All the 74 items generated were considered to be valid. On the basis of obtained scores by students from these Formative Unit Tests, the investigator located the learning problems and took remedial efforts to remove them. For this individual attention was paid to the students after the class and their doubts/queries were clarified. A copy of the final draft of Formative Test Units has been appended as Appendix A-4.

**TOOL IV**

**SUMMATIVE TEST**

Summative evaluation is final and grades assigned are likely to follow the students throughout their scholastic career (Block, 1971; Ebel, 1979; Ebel and Frisbie, 1991; Montgomery, 1994). A Criterion Referenced Test (CRT) is used to ascertain an individual’s status with respect to a well-defined behaviour domain (Popham, 1975). Here, a person’s performance is referred to as a criterion i.e. a well-defined class of objectives. So, the essence of criterion referenced measurement is that:

- A well explicable domain of behaviour be delineated and
- An individual’s performance in relationship to this behaviour domain ascertained.

**CONSTRUCTING A SUMMATIVE TEST**

The following steps were followed in the construction of the Summative Test (Morley, 1970; Popham, 1975).

- Step I: Domain Definitions.
- Step II: Generating Test Items.
- Step III: Improving the items.
Domain Definitions:

An important step in the construction of a summative test is to limit the behavior that the test items would measure and to which all individual performance will be referenced, were determined. Domain definitions were formulated in such a way that they encompassed and sufficiently circumscribed the class of behaviours under consideration.

- Sufficient details for complete stimulus homogeneity of resulting test items, and
- Economy of resource investment.

Although a domain did not delimit all possible test items, it markedly reduced ambiguity associated with the class of learner behaviours under consideration. After identification of the learning outcomes from the selected sub-topics of Economics for Tenth grade students, the content was divided into ten units. The unit-wise instructional objectives for the treatment group (BTMC) covering the selected content have been presented in Table 2.4 of the preceding sections under the heading objectives.

The content outline has already been given in the preceding sections under the heading Tool –I, instructional package on BTMC (Table 2.2).

Generating Test Items:

Quite a number of items might be constructed for any given objectives. Even a highly specific objective could have a potential item pool of over several thousand items (Bruner, 1966; Bormuth, 1970; Hively, 1970; 1973). In terms of feasibility, a survey of the current measures revealed that the usual practice, however, does not have any sound foundation on psychometric theory of technology (Rogers and Dymond, 1954; Klevin and Kosecoff, 1976).

Each item was started as a multiple choice item and was switched to another type of item only when the learning outcomes or the subject matter made it desirable to do so (Gronlund, 1974; 1977). Whenever there were only two possible alternatives, a shift was made to a true/false item or another type. And when there was large number of similar factors to be related, a shift was made to hierarchical structures or matching type exercises.

Different types of items like multiple choices, short answer type, draw and label the diagram, matching and true/false types measured different abilities of the learners. In the cognitive domains, 44 multiple type; 3 short answer type; 2 draw and label the diagram type; 2 matching type; 3 fill in the blanks type and 2 questions for true/false statements.
Development and Description of Tools

were generated. A table of specifications with the detailed distribution of items along with their weightages has been presented in Table 2.13.

<table>
<thead>
<tr>
<th>Unit(s)</th>
<th>Multiple Choice Type</th>
<th>Short Answer Type</th>
<th>Draw and Label the Diagram</th>
<th>Matching Type</th>
<th>Fill in the Blanks Type</th>
<th>True/False Type</th>
<th>Total no. of Test Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>10</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>II</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>III</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>IV</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>V</td>
<td>3</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>6</td>
</tr>
<tr>
<td>VI</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>VII</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>VIII</td>
<td>6</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>IX</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>X</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>44</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>6</td>
<td>60</td>
</tr>
</tbody>
</table>

After generating items, they were edited with respect to clarity of language and ambiguity. Thus, each type of item was grouped together. Appropriate instructions for the subjects to attempt these questions were written and finally the scoring key was developed. Thus, the preliminary draft of the Summative Test was constructed.

Improving the Items:

In order to ensure that the entire class of the learners’ behaviours had been circumscribed, a try-out was conducted. It was to verify whether the items generated displayed stimulus homogeneity. Some experts and teachers in the field of Economics were once more consulted to review the items and give comments whether the items generated by the investigator were congruent with the domain definitions.

Out of 60 test items that were generated, none of them were dropped. However, some changes were made on the wordings to make the items measure the intended instructional objectives. The items generated by the investigator were found congruent with the intended domain definitions. In order to improve thoroughly on the quality of the items, the generated items were tested for response homogeneity. For conducting this exercise, items were administered to a group of 30 learners from the intended target population to see how they answer the items. The draft was administered to a group of 30 students of X grade of Government Model High School, Sector-20, Chandigarh who had
already mastered the selected content in their previous class. There was no time limit imposed on the students.

**Item Analysis (Summative Test):**

An index of sensitivity to instructional effect was computed, by the formula as given by Krispin and Feldhusen (1974) viz:

\[
S = \frac{R_a - R_b}{T}
\]

Where

- \(R_a\) = Number of students answering the items correctly after instruction
- \(R_b\) = Number of students answering the items correctly before the instruction and
- \(T\) = Total number of students answering the items both the times.

Despite quite a number of limitations, sensitivity index is a useful means of evaluating the effectiveness of items in a criterion test. Items are of little value in measuring the intended outcomes of instruction unless they are sensitive to instructional effects. Thus, sensitivity index was calculated for each item of the Summative Test after giving pre-test, post-test intervened by the instructional programme. The values of sensitivity indices for each item have been placed in Table 2.14.

**Table 2.14**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Sensitivity Index</th>
<th>S.No.</th>
<th>Sensitivity Index</th>
<th>S.No.</th>
<th>Sensitivity Index</th>
<th>S.No.</th>
<th>Sensitivity Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.50</td>
<td>16</td>
<td>0.47</td>
<td>31</td>
<td>0.73</td>
<td>46</td>
<td>0.53</td>
</tr>
<tr>
<td>2</td>
<td>0.53</td>
<td>17</td>
<td>0.57</td>
<td>32</td>
<td>0.84</td>
<td>47</td>
<td>0.70</td>
</tr>
<tr>
<td>3</td>
<td>0.60</td>
<td>18</td>
<td>0.63</td>
<td>33</td>
<td>0.66</td>
<td>48</td>
<td>0.63</td>
</tr>
<tr>
<td>4</td>
<td>0.40</td>
<td>19</td>
<td>0.77</td>
<td>34</td>
<td>0.50</td>
<td>49</td>
<td>0.43</td>
</tr>
<tr>
<td>5</td>
<td>0.70</td>
<td>20</td>
<td>0.84</td>
<td>35</td>
<td>0.73</td>
<td>50</td>
<td>0.50</td>
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<td>0.63</td>
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</tr>
<tr>
<td>7</td>
<td>0.53</td>
<td>22</td>
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<td>37</td>
<td>0.60</td>
<td>52</td>
<td>0.47</td>
</tr>
<tr>
<td>8</td>
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<td>23</td>
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<td>0.47</td>
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<td>0.53</td>
</tr>
<tr>
<td>9</td>
<td>0.50</td>
<td>24</td>
<td>0.60</td>
<td>39</td>
<td>0.50</td>
<td>54</td>
<td>0.77</td>
</tr>
<tr>
<td>10</td>
<td>0.57</td>
<td>25</td>
<td>0.73</td>
<td>40</td>
<td>0.63</td>
<td>55</td>
<td>0.60</td>
</tr>
<tr>
<td>11</td>
<td>0.63</td>
<td>26</td>
<td>0.50</td>
<td>41</td>
<td>0.47</td>
<td>56</td>
<td>0.47</td>
</tr>
<tr>
<td>12</td>
<td>0.80</td>
<td>27</td>
<td>0.47</td>
<td>42</td>
<td>0.40</td>
<td>57</td>
<td>0.80</td>
</tr>
<tr>
<td>13</td>
<td>0.43</td>
<td>28</td>
<td>0.40</td>
<td>43</td>
<td>0.70</td>
<td>58</td>
<td>0.63</td>
</tr>
<tr>
<td>14</td>
<td>0.63</td>
<td>29</td>
<td>0.53</td>
<td>44</td>
<td>0.53</td>
<td>59</td>
<td>0.50</td>
</tr>
<tr>
<td>15</td>
<td>0.70</td>
<td>30</td>
<td>0.60</td>
<td>45</td>
<td>0.57</td>
<td>60</td>
<td>0.57</td>
</tr>
</tbody>
</table>

The table 2.15 reveals that the indices of all the items fall in the range of acceptable sensitivity indices of 0.4 or more. Hence, items having sensitivity index in the range of 0.4 to 0.8 were accepted and retained as such for the final draft of the Summative Test.
The Final Draft of Summative Test:
After analysis of items in the initial draft, items were retained as such for the final draft. It contained 44 multiple type; 3 short answer type; 2 draw and label the diagram type; 2 matching type; 3 fill in the blanks type and 6 questions for true/false type of items the total being 60 items.

Scoring of the Summative Test:
The items in the Summative Test varied in form of multiple-choice type, short answer type, fill in the blanks type, draw and label the diagrams, matching type and true/false type of questions. Clear instructions were written on the answer sheets for the students to read the general instructions and become acquainted with them before the test items were distributed. The test items were divided into different sections A, B, C, D, E and F with each section having further instructions directing the students on the type of responses required. A copy of the response sheet has been placed as Appendix A-6.

Instructions for the test:
The investigator developed simple and concise directions, including purpose of the test and procedure of recording the response. The test comprised of six types of items. General directions were therefore provided for the entire test and specific directions for each part (see Appendix A-5).

Reliability and Validity:
For the purpose of determining reliability of the Summative Test, it was administered to 30 students of X grade studying in Chandigarh. The reliability coefficient of the Summative Test was computed with the help of KR-21 Formula:

\[ r = 1 - \frac{M(K-M)}{K(s)^2} \]

Where
K = Number of items in the test
M = Mean of the test scores, and
s = Standard Deviations of the Test Scores.

Reliability coefficient was found to be 0.96. Therefore, the Summative Test may be considered as a reliable tool for the final assessment of the students’ achievement at the end of instructional treatment.

The Content Validity of the test was determined by relating the tasks to instructional objectives. The correspondence between the two was also determined with the help of four experts. Two from the Department of Economics and two from
Kember et al. (1999) suggested in their study of reconsidering the dimensions of approaches to learning that the instruments be redeveloped in new forms. A simple two-factor - deep and surface - instrument would be suitable for teaching evaluation and simple research applications.

In the LPQ and SPQ, Surface Motive (SM) is a subscale of Surface Approach (Biggs, 1987). The surface motive subscale contains components referring to fear of failure and extrinsic motivation. Biggs (1993) recognized that the surface motive subscale had two components: the negative one of fearing failure and the positive reinforcement of obtaining a qualification. A typical item for the latter in the SPQ is *I chose my present courses largely with a view to the job situation when I graduate rather than out of intrinsic interest to me.*

The study of the SPQ and LPQ (Kember & Leung, 1998) had suggested further investigation of the motivational dimensions of approaches to learning. The above discussion questions whether career related motivation should be seen as a construct associated with undesirable learning approaches. To take this investigation further, they used structural equation modeling to see whether the SPQ had a factor structure more compatible with their qualitative data.

The SM subscale consists of seven items. The scale dimensionality of the seven items was re-examined by means of a factor analysis based on the data set used in (Kember & Leung, 1998) with a sample size of 4863. They used three common criteria to determine the number of factors to be retained in the factor-analysis (Kim & Mueller, 1978). A factor was retained if its eigenvalue is greater than 1.0, if it accounted for a significant percentage of total variance and if the final solution was interpretable. The two-factor model was chosen as the first two factors had eigenvalues greater than 1. The two-factor model accounted for 59 % of the total variance, while the one-factor model only explained 37 %. The two-factor model was also consistent with theoretical interpretation. The two factors had a factor correlation of 0.25.

Examination of the factor loadings after an oblivion rotation indicated that the first factor consists of three items (items 1,3 and 7) that related to Career Motivation while the second factor was defined by two items (item 2 and 4) categorized as Fear of Failure. Thus, items 1,3 and 7 were summed to give one measure, called Career Motive (CM). Its
reliability was determined by Cronbach’s alpha, which was 0.59. Items 2 and 4 were combined into one scale, Fear of Failure (FF), with a reliability of 0.54.

The Study Process Questionnaire (SPQ) (Biggs, 1987) was developed from an earlier 10-scale Study Behavior Questionnaire (SBQ), conceived within information – processing framework. Higher order factor analysis suggested that the 10 – scales could be interpreted in terms of three higher order factors. The most suitable interpretation of these factors, however, was in terms of the SAL (Student Approaches to Learning) conceptual framework, not the original IP (Information Processing) theory, because the three factors were found to be comprised of two kinds of items, those relating to a motive and those relating to a congruent strategy.

In this, the factor analysis recalled Morton and Saljo’s original point that a student handled task according to his or her intentions prior to engaging the task. However, whereas those authors were concerned with two intentions or motives, to remember significant facts and details or to understand what the author was trying to say, here dealing with three such motives: to keep out of trouble with minimal effort, to engage the task appropriately, and to maximize grades. Each such motive was associated with a congruent strategy: selective monitoring, seeking for meaning and optimal time and space management respectively. Given the different methodologies and context, the similarity between the first two motives and strategies and the Swedish work on Surface and Deep approaches were remarkable and to capture that similarity, the deep/ surface terminology was adopted for the first two dimensions. Thus, the SPQ yielded three approach scores: Surface, Deep and Achieving respectively and a component Motive and Strategy score for each approach.

The correlations between motives and strategies are reproduced in Table 2.19. As can be seen, strong positive correlation exists between a motive and its congruent strategy and negative for that motive and any other strategy. This confirmed Biggs (1987) original second – order factor analysis.

Table 2.19
Correlations between Motives and Strategies

<table>
<thead>
<tr>
<th></th>
<th>DM(r=)</th>
<th>Sig (2-tailed)</th>
<th>DS(r=)</th>
<th>Sig (2-tailed)</th>
<th>SM(r=)</th>
<th>Sig (2-tailed)</th>
<th>SS(r=)</th>
<th>Sig (2-tailed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DM</td>
<td>.840</td>
<td>.366</td>
<td>-1.000*</td>
<td>.000</td>
<td>-.840</td>
<td>.366</td>
<td>.840</td>
<td>.366</td>
</tr>
<tr>
<td>DS</td>
<td>.840</td>
<td>.366</td>
<td>-.840</td>
<td>.366</td>
<td>-1.000*</td>
<td>.000</td>
<td>.840</td>
<td>.366</td>
</tr>
<tr>
<td>SM</td>
<td>-1.000*</td>
<td>.000</td>
<td>-.840</td>
<td>.366</td>
<td>.840</td>
<td>.366</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS</td>
<td>-.840</td>
<td>.366</td>
<td>-1.000*</td>
<td>.000</td>
<td>.840</td>
<td>.366</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.01 level
The internal consistency reliability indices, Cronbach alpha, for the subscales for the recorded sample are reported in the Table 2.20. It can be seen that the indices of each subscale for the SPQ are higher than those for the LPQ.

<table>
<thead>
<tr>
<th>Subscales</th>
<th>SPQ</th>
<th>LPQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Strategy (DS)</td>
<td>0.71</td>
<td>0.64</td>
</tr>
<tr>
<td>Deep Motive (DM)</td>
<td>0.63</td>
<td>0.55</td>
</tr>
<tr>
<td>Surface Strategy (SS)</td>
<td>0.57</td>
<td>0.39</td>
</tr>
<tr>
<td>Surface Motive (SM)</td>
<td>0.60</td>
<td>0.48</td>
</tr>
<tr>
<td>Achieving Strategy (AS)</td>
<td>0.74</td>
<td>0.69</td>
</tr>
<tr>
<td>Achieving Motive (AM)</td>
<td>0.71</td>
<td>0.65</td>
</tr>
</tbody>
</table>

REVISED TWO-FACTOR STUDY PROCESS QUESTIONNIRE (R-SPQ-2F)

In 2001, Biggs decided that there was a need not only to update the instrument, but also to provide a shortened version dealing with Surface and Deep Approaches to be used principally for work on teaching effectiveness and staff development. The items on the SPQ are cycled so that every fourth item returns to the particular subscale in the order after the first item: Surface Motive (SM), Deep Motive (DM), Surface Strategy (SS), and Deep Strategy (DS). Figure 2.2 shows the relationship between the scales and subscales.

Fig 2.2: Relationship between the Scales and Subscales.

Table 2.21 provides a modified version of Biggs'1987 definition of motives and strategies in approaches to learning and studying.
Table 2.21
Motives and Strategies in Approaches to Learning and Studying (Modified)

<table>
<thead>
<tr>
<th>Approach</th>
<th>Motive</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>SA: Surface</td>
<td>Surface Motive (SM) is instrumental: main purpose is to meet requirements minimally: a balance between working too hard and failing.</td>
<td>Surface Strategy (SS) is reproductive: limit target to bare essentials and reproduce through rote learning.</td>
</tr>
<tr>
<td>DA: Deep</td>
<td>Deep motive (DM) is intrinsic: study of actualize interest and competence in particular academic.</td>
<td>Deep Strategy (DS) is meaningful: read widely, inter-relate with previous relevant knowledge.</td>
</tr>
</tbody>
</table>

The development of R-SPQ-2F

The development process commenced with the testing of 43 items taken from the original SPQ, some items were taken from the SPQ in modified form, or new items were framed. The process of drawing up the pool of items was guided by insights into approaches to learning established since the original version was devised.

Rationale of developing Revised Version

In using the SPQ as a means of monitoring teaching/learning environments, the role of the achieving – related scales is not as evident as those of Deep and Surface scales. In fact, the achieving motive and strategy had a different relationship with the Deep and Surface motives and strategies from the outset (Biggs, 1987). Whereas Deep and Surface strategies describe the way students engage the task itself, the Achieving Strategy refers to how the students organizes when and where the task will be engaged and for how long. Higher order factor analysis usually associate the achieving motive and strategy with the Deep Approach (Biggs, 1987a), but depending on the subject and teaching conditions, sometimes achieving-related scores load on the Surface Approach (Biggs, 1992). Indeed, Kember and Leung (1998) have shown that, using confirmatory factor analysis, the SPQ can most conveniently be described in terms of two factors: Deep and Surface, with Achieving Motive and Strategy subscales aligning themselves on both factors. The
confirmatory factor analysis of LPQ data by Wong, Lin, and Watkins (1996) could also be interpreted as consistent with the finding.

Thus, there was a need for a shorter two-factor version of the SPQ, addressing Deep and Surface approaches only, that can be administered quickly and easily by a regular teacher, for use in monitoring teaching contexts. Such uses might include:

- Teacher monitoring their teaching from class to class, or following some innovation in teaching or assessment in an action research design.
- An outcome measure of teaching in more formally structured research.
- Suggesting to curriculum developers where teachers or departments may get help.
- Diagnosis of students with study problems, by comparing individuals’ with deep and surface scores and comparing individuals to others in the same dimension.
- Examining the relationship of approaches to learning with other curriculum variables with a view to fine-tuning curricula based on the insights obtained.
- Quality assurance exercises in much the same way as the Course Experience Questionnaire is used in Australia to monitor students’ perceptions of courses.

In this last case institutions would keep their own norms but they would be used on a class or department basis, not on the basis of an individual student. The need for shorter instruments also seems to have influenced the development of ASI (Approaches to Studying Inventory). The original version (Ramsden & Entwistle, 1981) had 64 items and 16 subscales. Various shortened forms have been produced, including an 18-item version measuring meaning, reproducing and achieving orientations (Gibbs, Habeshaw & Habeshaw, 1989). A revised version (Revised Approaches to Studying Inventory, RASI) (Entwistle & Tait, 1994) has 38 items in 14 subscales, measuring five major dimensions. Richardson’s review (1994) concluded that the 18-item version of the ASI was not adequate from a psychometric point of view and reported that the RASI does not appear to represent an improvement on earlier versions of the ASI which have themselves been criticized.

Higher education has undergone a major transformation since the original Questionnaire was developed so it was inevitable that some items needed adapting and rewording to update the terminology. The questionnaire was also developed before the insights into approaches to learn gained from the intensive study of the approaches of Asian students (Kember, 1996; Watkins & Biggs, 1996).

For the simple two-factor version of the SPQ the intentions was not to develop scales which fully characterized the possible combinations of understanding and
memorizing. The work though was utilized to ensure that the Deep and Surface Approach items were consistent with the clearer descriptions, which had emerged from this body of work.

**Reduction of Items**

The revision of existing items and the development of new ones ultimately resulted in 43 items for testing. These were combined in a random order into a single questionnaire. Students were asked to respond to the questions on a five-point Likert scale. The 5-points represented:

- ▪ 5 = almost or always true of me.
- ▪ 4 = frequently true of me.
- ▪ 3 = true of me about half the time.
- ▪ 2 = sometimes true of me.
- ▪ 1 = never or only rarely true of me.

A sample of health science students from a university in Hong Kong was asked to complete the questionnaire. Two statistical tests were used to determine which items specified as forming a hypothesis scale. The procedure calculates a test of the reliability of items specified as forming a hypothesis scale and more importantly for the purposes, indicates a Cronbach alpha coefficient for the scale, if an item were deleted. The inter-item correlation matrix also provides useful information about the degree to which an item can form part of coherent scale. The more powerful test was through using the EQS (pronounced X) program (Structural Equation Modeling Software) (Bentler, 1995) in a confirmatory factor analysis mode.

An encouraging indication of the robustness and appropriateness of the procedures was that there was broad concurrence between the two quite different approaches. The process of trial and revision through reduction of items was repeated for two cycles. At each stage the questionnaire was further revised by deleting the items, which did not contribute to a component. The outcome of this exercise in reducing items was two, deep and surface factors each with 10 items. Within each of these two factors it was possible to distinguish strategy and motive subscales. Each of the subscale consisted of five items. The final version of the questionnaire therefore has two main scales: Deep Approach (DA) and Surface Approach (SA): with four subscales: Surface Motive (SM), Deep Motive (DM), Surface Strategy (SS), Deep Strategy (DS).
Final Version of the revised SPQ

The final version of the revised questionnaire was then tested with a sample of 495 undergraduate students from various disciplines across each year of study from one university in Hong Kong. However for the purpose of present investigation, the tool was administered on 312 secondary level students and relationship was computed. Kuder – Richardson formula 21 was found to be 0.79. In two earlier research works also a similar procedure was adopted. The reliability co-efficient in those two studies was also reported to be 0.75 and 0.82.

Scoring Study Process Questionnaire (SPQ)

Scoring the SPQ involves adding every fourth response each student scores on the above two dimensions of student learning: a Deep Approach (DA) which is characterized by an intention to understand the material by relating it to a wider context; and Surface Approach (SA) characterized by an intention to complete the task requirements and relying on memorization. The reliability of the SPQ has been found to be high in terms of internal consistency over times (Biggs, 1993; O’Neil & Child, 1984; Biggs and Kember, 2001).

To determine approach to learning scores the 20 SPQ questions were added together in four sets of five questions as follows:

Deep Motive (DM) = 1+5+9+13+17
Deep Strategy (DS) = 2+6+10+14+18
Surface Motive (SM) = 3+7+11+15+19
Surface Strategy (SS) = 4+8+12+16+20

As illustrated, each set provides either a motive or strategy subscale (theoretical range 5-20) or one of the two main learning approaches (theoretical range 10-50). The revised SPQ only allows analysis for motives and strategies as compared to the previous 43 instruments, which included achieving. The latest structure of R-SPQ-2F at item level has been given below in Figure 2.3.
Fig. 2.3: Latent Structure of R-SPQ-2F at Item Level.
Reliability and Unidimensionality of Subscales

The unidimensionality of each of the subscales was separately tested by fitting a single factor model to the corresponding five-items by the EQS program (Bentler, 1995). From the suggestions recommended by Bentler (1985; 1986; 1995), the Comparative Fit Index (CFI) and the Standardized Root Mean Squared Residual (SRMR) were chosen. A CFI value greater than 0.95 and SRMR less than 0.08 can be used as an indication of a relatively good fit between the hypothesized model and the observed data.

The results of separately testing each of the subscale are shown in Table 2.22. Good fits of the single factor models for the four subscales to the observed data were supported and hence it can be concluded that the items are unidimensional for each of the four subscales. Once the homogeneity of the items has been established, the Cronbach alpha values for each subscale in the instrument were computed and were given in Table 2.22. The value of all reach acceptable levels indicating that the subscales can be interpreted as internally consistent.

<table>
<thead>
<tr>
<th>Subscales</th>
<th>CFI</th>
<th>SRMR</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deep Strategy (DS)</td>
<td>0.998</td>
<td>0.02</td>
<td>0.63</td>
</tr>
<tr>
<td>Deep Motive (DM)</td>
<td>0.997</td>
<td>0.01</td>
<td>0.62</td>
</tr>
<tr>
<td>Surface Strategy (SS)</td>
<td>0.998</td>
<td>0.02</td>
<td>0.57</td>
</tr>
<tr>
<td>Surface Motive (SM)</td>
<td>0.998</td>
<td>0.02</td>
<td>0.72</td>
</tr>
</tbody>
</table>

Note: CFI= Comparative Fit Index, SRMR = Standardized Root Mean Squared Residual, Alpha= Cronbach Alpha

It is expected that most of the routine users will compute the scores for both Deep and Surface Approaches by summing up the corresponding 10 items. Thus it would be possible to provide the reliabilities of the two talent constructs for the sample. The Cronbach alpha values are 0.73 for DA and 0.64 for SA in the sample, which are considered as acceptable.

A process of testing and refinement resulted in a final version with Deep and Surface Approach scales. Each of these scales consists of 10 items so the questionnaire is short and simple enough for use by teachers. From a theoretical viewpoint it was also reassuring to see that the development of the questionnaire confirmed the vision of an approach as consisting of congruent motive and strategy components. A copy of the final version of the Learning Approaches tool has been given in Appendix C.