CHAPTER IV
THE TRIOUT AND REVISION OF THE ITEMS
CHAPTER IV

THE TRYOUT AND REVISION OF
THE ITEMS

4.01 : Introduction
4.02 : Selection of the Topics for Item Writing
4.03 : Content Analysis of the Topics
4.04 : Objectives and Specifications of the Items
4.05 : Item Formats
4.06 : Item Writing
4.07 : Administration of the Items
4.08 : Item Analysis
4.09 : Revision of the Items
4.10 : Preparation of the Revised Pool of the Items
4.11 : Salient Features of the Revised Pool of the Items
4.12 : Summary
4.13 : References.
4.01: Introduction:

In the previous chapter a brief description of the procedure of the study undertaken by the researcher has been given. The chapter also contained the theoretical discussion of the statistical techniques used in the study. The present chapter contains the description of the various steps followed by the researcher for item construction. The description of the administration of the pool of items has also been given. This is followed by the description of the points for item revision, considered by the researcher. The chapter ends with the salient features of the revised pool of items.

4.02: Selection of the Topics for Item-Writing:

The first step in the process of item writing was the determination of the topics on which the items were to be based. In order to do this the researcher studied the syllabi prescribed by the following six universities from the State of Maharashtra, for Educational Psychology of the B.Ed. degree course.

1. S.N.D.T. Women's University, Bombay.
2. Marathwada University, Aurangabad.
3. Nagpur University, Nagpur.
5. Shivaji University, Kolhapur.
Common topics were determined through a comparison of the syllabi of different universities with the syllabus of S.N.D.T. Women's University, Bombay. Table 4.1 shows the topics that are included in the syllabus of the S.N.D.T. Women's University. Column 3 to 7 provide the information regarding the syllabi prescribed by the other five universities from the State of Maharashtra.

Table 4.1: Comparative Study of the Syllabus
Prescribed by S.N.D.T. Women's University and those prescribed by other Five Universities:

<table>
<thead>
<tr>
<th>Topic No.</th>
<th>S.N.D.T. Women's University</th>
<th>Marathahada University 2</th>
<th>Nagpur University 3</th>
<th>Pune University 4</th>
<th>Shivaji University 5</th>
<th>University of Bombay 6</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Educational Psychology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>S*</td>
</tr>
<tr>
<td></td>
<td>Educational Psychology as a branch of Psychology</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Its meaning, scope, importance and limitations</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Methods of psychological study</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>introspection</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>observation</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>clinical/case study</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>genetic/developmental</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>2</td>
<td><strong>Human Growth and Development</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heredity and environment</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Stages of growth and development with special reference to later childhood and adolescence</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td>3</td>
<td><strong>Motivation of Human Behaviour</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Main springs of behaviour-drives</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>motives</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>needs motives</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Human Motivation - praise</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>blame</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>rewards</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>punishments</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Achievement Motivation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td><strong>Thinking Process</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sensation/perception</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>concept formation</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>imagination</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>thinking and reasoning</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td>5</td>
<td><strong>Learning</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Meaning and significance of learning</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>Factors affecting learning association</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>interest</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>attention</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>fatigue</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>intelligence motivation</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>Typos of learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>learning by imitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>trial and error</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>conditional reflex</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>operant conditioning</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>learning by insight</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thorndike's laws of learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Measurement of learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>the learning curve</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>and physiological limit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transfer of learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>its implication for teachers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Memory</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Remembering and forgetting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>recall, retention and recognition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>immediate memory span</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effective methods of learning and remembering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>whole vs. part method</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>spaced vs. massed method</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>recitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>review and knowledge of results</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Group Process in Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Social facilitation of behaviour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>imitation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>sympathy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>suggestion</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>conformity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>cooperation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>competition</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>2.</td>
<td>3.</td>
<td>4.</td>
<td>5.</td>
<td>6.</td>
<td>7.</td>
<td>8.</td>
</tr>
<tr>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Dynamics of the group</td>
<td>leadership</td>
<td>democratic and authoritarian</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>8</strong></td>
<td>Personality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>concept of personality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>development of personality</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td><strong>9</strong></td>
<td>Mental Hygiene and Personal Adjustment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>concept and significance of mental hygiene</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>causes and symptoms of deviant behaviour of children at home, in school and in society</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>adjustment mechanisms</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>child guidance clinic - treatment and follow up</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10</strong></td>
<td>Individual Differences</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>nature of individual differences, and their implications</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>the gifted and the slow learner</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>educational and vocational guidance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

* S stands for selected

Observation: From this table it can be observed that the selection of topics for item construction was not guided by any specific principal too strictly. Some topics that were not found in all the syllabi had been selected for item construction because the researcher
thought that those particular topics deserve inclusion in the test. Moreover it was observed that all the syllabi of various universities provided the broad content areas and not the details of the topics. Hence some of the subtopics do not appear in all the syllabi.

4.03 : **Content Analysis of the Topics** :  

The researcher studied the prescribed text books thoroughly and analyzed the contents. The content analysis of the topics formed the basis of item-construction. The content analysis of the topics is as follows :

**Topic 1 : A: Educational Psychology as a branch of Psychology :**

(i) Definition of Psychology  
(ii) Definition of Educational Psychology  
(iii) Problems faced by the teacher in day-to-day teaching.  
(iv) How does Educational Psychology help the teacher to solve those problems?  

**B: Scope, Importance and Limitations of Educational Psychology :**

(i) Human behaviour is not totally controllable and predictable  
(ii) Educational Psychology is not a fully developed science.  
(iii) It cannot define the aims of education but it can judge the aims of education.
C: Methods of Study for Psychology:

Meaning, advantages, disadvantages of and comparison between the following methods:

(a) Introspection
(b) Observation
(c) Experimental
(d) Clinical
(e) Genetic - cross sectional, longitudinal

Topic 2: Human Growth and Development:

A: Heredity and Environment:

(i) Concept of heredity with special reference to Mendel's Law.

(ii) Transmission of genetic traits and non-transmission of acquired traits.

(iii) Research in the field:

(a) Experiments on identical twins and siblings
(b) Goddard's Study

(iv) Meaning of environment

(v) Factors affecting environment

(vi) Research in the field: experiments on rats

(vii) Interaction between heredity and environment

(viii) Educational implications.

B: Growth and Development:

(i) Difference between growth and development

(ii) Stages of development: infancy, childhood and adolescence
Characteristics of development
Educational implications

Topic 3: Motivation:

(i) Intrinsic and Extrinsic Motivation.
(ii) Meaning of drives, motives, urges and incentives
(iii) Maslow’s and Murray’s lists of motivation
(iv) Standard list of motives - dependence, aggression, sex, status, dominance, prestige
(v) Conscious and unconscious motives
(vi) Social Motives: praise, blame, reward, punishment, success-failure
(vii) Psychological motives

B: Achievement Motivation

(i) Mac’clelland’s contribution
(ii) Atkinson’s experiments
(iii) Components of achievement motivation-cognitive, ego-enhancing and affiliative

Topic 4: Thinking Process:

(i) Definitions of the following terms:
sensation, perception, concept formation, imagination, images, thinking and reasoning
(ii) Various sensory modalities
(iii) Distinction between sensation and perception
(iv) Principles governing formation of perception-external and internal factors
(v) Formation of concepts - objects and qualities
(vi) Relation between language and concept formation.
(vii) Types of images
(viii) Process and Types of imagination
(ix) Difference between imagination and perception.
(x) Reasoning and problem-solving
(xi) Educational implications

Learning:

Topic 5: A: Meaning and Significance of Learning:

(i) Meaning and Definition of learning
(ii) Development through maturity
(iii) Development through learning
(iv) Significance of learning

B: Factors affecting learning:

(i) Association: meaning of association, laws of association, educational implications
(ii) Attention and interest: meaning of attention and interest
   Relationship between attention and interest
   Factors affecting attention, kinds of attention, span of attention, division of attention, fluctuation of attention, educational implications

(iii) Fatigue: symptoms of fatigue, physiological and mental fatigue, causes of fatigue, ways to overcome fatigue, educational implications.
(iv) Intelligence: Definition of intelligence
Levels of intelligence,
Intelligence and learning

(v) Motivation: Place of motivation in learning

C. Types of learning:
(i) Learning by imitation - its significance
(ii) Learning by Trial and Error, Thorndike's
Law of learning. Conditions influencing
Trial and Error. Experiments of trial and
error learning. Educational implications.
(iii) Conditioned Reflex: Conditioned Reflex as
a form of associative learning. Pavlov's
experiments, CR-CS. Reinforcement,
Educational implications
(iv) Operant Learning: Skinner's experiments,
distinction between classical and operant
conditioning, uses of principles of operant
conditioning in evolving different methods
of learning.
(v) Learning by insight: Kohler's experiment,
concept of totality in learning by insight,
problem-solving, educational implications.

D. Measurement of learning:
(i) Learning curve and physiological limit
(ii) Interpretation of the learning curve
(iii) Educational implications.
E : Transfer of Learning :
(i) Meaning of transfer
(ii) Theories of transfer of learning
(iii) Educational implications.

Topic 6 : Memory :
A: Remembering and forgetting :
(i) Elements of memory-registration, recognition, retention, recall
(ii) Experiments on memory by Ebbinghaus
(iii) Types of memory - immediate, true, rote
(iv) Characteristics of good memory
(v) Forgetting : Curve of forgetting and retention, causes of forgetting, educational implications

B : Methods of learning and remembering :
(i) Whole V/s. Part
(ii) Spaced V/s. Massed
(iii) Recitation
(iv) Review
(v) Educational implications

Topic 7 : Personality :
(i) Concept of personality
(ii) Development of personality
(iii) Integration of personality
(iv) Educational implications
Topic 8: Mental Hygiene:

(i) Definition and meaning of the term mental hygiene

(ii) Significance of the concept to education

(iii) Causes and symptoms of deviant behaviour

Topic 9: Individual Differences:

(i) Meaning of the term individual differences

(ii) Causes of individual differences

(iii) Educational implications

Topic 10: Guidance and Counselling:

(i) Meaning and definition of the term guidance and counselling

(ii) Uses of guidance and counselling

4.04: Objectives and Specifications of the Items:

After the decision on the selection of topics for item-construction and their analysis, it was essential to consider the objectives and specifications of each content item. This consideration provided the researcher with the guidelines for item-construction.

04.a: The Concept of an Objective:

According to William A. Mehrens and Irvin J. Lehmann, an objective is "a stated desirable outcome of education". They have used the term "goal" in a general sense and the term 'objective' in a more explicit sense. Goals in education enable an educator in which direction educational efforts should be directed.
Objectives also give direction to education. They tell us in which way to head, a decision that is necessary before taking the first step along the path of educational journey. Specifically, objectives help an instructor in instructional planning, guide student learning and provide a criterion for evaluating learning outcomes. There is a circular relationship among objectives, instruction and evaluation. One needs to set tentative objectives, employ an educational strategy to reach those objectives, measure the degree of attainment, and then re-evaluate both objectives and strategy.

In addition to stressing the importance of objectives and how objective, specification and evaluation are cyclical, educational psychologists have suggested certain approaches to the objective-setting decisions and methods of wording educational objectives. They have assisted in specifying goals by constructing taxonomies of educational objectives. These taxonomies have classified the goals of education and are useful as a means of both communicating goals and of understanding some relationship among them. Original plans for one classification system called for the development of taxonomies in three domains - cognitive, affective and psychomotor. The present study includes those items that test the student's achievement in respect of objectives from the cognitive domain and hence the discussion here, is limited to the cognitive domain only.
The cognitive domain includes those objectives which deal with the recall or recognition of knowledge and the development of intellectual abilities and skills. The cognitive taxonomy contains six major classes of objectives arranged in hierarchical order on the basis of complexity of tasks and each of these six classes is subdivided further. William A. Hehrens and Irvin J. Lehmann have given a condensed version of the cognitive domain taxonomy in their book entitled "Measurement and Evaluation in Education and Psychology". This version is presented in Table 4.2.

<table>
<thead>
<tr>
<th>KNOWLEDGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00 Knowledge</td>
</tr>
<tr>
<td>... involves the recall of specifics and universals, the recall of methods and processes, or the recall of a pattern, structure or setting.</td>
</tr>
<tr>
<td>1.10 Knowledge of specifics</td>
</tr>
<tr>
<td>1.11 Knowledge of terminology</td>
</tr>
<tr>
<td>1.12 Knowledge of specific facts</td>
</tr>
<tr>
<td>1.20 Knowledge of ways and means of dealing with specifics</td>
</tr>
<tr>
<td>1.21 Knowledge of conventions</td>
</tr>
<tr>
<td>1.22 Knowledge of trends and sequences</td>
</tr>
<tr>
<td>1.23 Knowledge of classifications and categories</td>
</tr>
<tr>
<td>1.24 Knowledge of criteria</td>
</tr>
<tr>
<td>1.25 Knowledge of methodology</td>
</tr>
</tbody>
</table>
1.30: Knowledge of the universals and abstractions in a field

1.31 Knowledge of principles and generalizations
1.32 Knowledge of theories and structure

**Intellectual Abilities and Skills**

2.00 Comprehension

... represents the lowest level of understanding.

2.10 Translation
2.20 Interpretation
2.30 Extrapolation

3.00 Application

The use of abstractions in particular and concrete situations

4.00 Analysis

The breakdown of a communication into its constituent elements or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas expressed are made explicit.

4.10 Analysis of elements
4.20 Analysis of relationships
4.30 Analysis of organizational principles

5.00 Synthesis

The putting together of elements and parts so as to form a whole

5.10 Production of a unique communication
5.20 Production of a plan, or proposed set of operations
5.30 Derivation of a set of abstract relations

6.00 Evaluation

Judgements about the value of material and methods for given purposes

6.10 Judgements in terms of internal evidence
6.20 Judgements in terms of external criteria
Observation: From this table it can be concluded that according to Mehrens, W.A. and Lehman I.J., the cognitive domain includes only six categories of objectives, namely, knowledge, comprehension, application, analysis, synthesis and evaluation. These objectives from the cognitive domain can be further analyzed into specifications.

04.c: Instrumentation of the Taxonomy of Educational Objectives:

The same authors have listed out a number of infinitives and direct objects that would be helpful to an evaluator to phrase the specifications that are relevant to his particular testing situation. Table 4.3 shows the instrumentation of the taxonomy of educational objectives as suggested by William A. Mehrens and Irvin J. Lehmann.

Table 4.3: Instrumentation of the Taxonomy of Educational Objectives

<table>
<thead>
<tr>
<th>Cognitive Domain</th>
<th>Taxonomy Classification</th>
<th>Examples of Infinitives</th>
<th>Key Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge</td>
<td>1.00 Knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge of specifics</td>
<td>1.10 Knowledge of specifics</td>
<td>To define, to distinguish, to acquire, to identify, to recall, to recognise</td>
<td>Vocabulary, Terms, terminology, meaning(s), definitions, referents, elements</td>
</tr>
<tr>
<td>Knowledge of terminology</td>
<td>1.11 Knowledge of terminology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.12 Knowledge of specific facts</td>
<td>To recall, to recognize, to acquire, to identify</td>
<td>Facts, figures, information, sources, dates, causes, effects, properties, examples, phenomena</td>
<td></td>
</tr>
<tr>
<td>----------------------------------</td>
<td>---------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1.20 Knowledge of way and means of dealing with specific</td>
<td>To recall, to identify, to recognize, to acquire</td>
<td>Form(s), conventions, uses, usage, rules, ways, devices, symbols, representations, style(s) format(s)</td>
<td></td>
</tr>
<tr>
<td>1.21 Knowledge of conventions</td>
<td>To recall, to identify, to recognize, to acquire</td>
<td>Action(s), processes, conceptual developments, concept(s), set(s), sequence(s), cause(s), relationship(s), forces, influences</td>
<td></td>
</tr>
<tr>
<td>1.22 Knowledge of parts, sequence</td>
<td>To recall, to recognize, to identify</td>
<td>Area(s), type(s), features, class(es), set(s), division(s), arrangement(s), classification(s), category/categories</td>
<td></td>
</tr>
<tr>
<td>1.23 Knowledge of classifications and categories</td>
<td>To recall, to recognize, to acquire, to identify</td>
<td>Criteria, bases, elements</td>
<td></td>
</tr>
<tr>
<td>1.24 Knowledge of criteria</td>
<td>To recall, to recognize, to acquire, to identify</td>
<td>Methods, techniques, approaches, use, procedures, treatments</td>
<td></td>
</tr>
<tr>
<td>1.25 Knowledge of methodology</td>
<td>To recall, to recognize, to acquire, to identify</td>
<td>Knowledge of universal and abstractions in a field</td>
<td></td>
</tr>
<tr>
<td>1.31 Knowledge of principles, generalizations</td>
<td>To recall, to recognize, to acquire, to identify</td>
<td>Principle(s), generalization(s), proposition(s), fundamentals, laws, principal elements, implication(s)</td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>1.32 Knowledge of theories and structures</td>
<td>To recall, to recognize, to acquire, to identify</td>
<td>Theories, bases, interrelations, structure(s), organization(s), formulation(s)</td>
<td></td>
</tr>
<tr>
<td>2.00 Comprehension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.10 Translation</td>
<td>To translate, to transform, to give in own words, to illustrate, to prepare, to read, to represent, to change, to rephrase, to restate</td>
<td>Meaning(s), sample(s), definitions, abstractions, representations, words, phrases</td>
<td></td>
</tr>
<tr>
<td>2.20 Interpretation</td>
<td>To interpret, to reorder, to rearrange, to differentiate, new view(s), to distinguish, qualification, to make, to draw, conclusions, methods, to explain, to demonstrate abstractions</td>
<td>Relevancies, relationships, essentials, aspects, ramifications, consequences, implications, conclusions, methods, theories, factors, meanings, corollaries, effects, probabilities</td>
<td></td>
</tr>
<tr>
<td>2.30 Extrapolation</td>
<td>To estimate, to infer, to conclude, to predict, to differentiate, to determine, to extend, to interpolate, to extrapolate, to fill in, to draw</td>
<td>Consequences, implications, conclusions, factors, ramifications, meanings, corollaries, effects, probabilities</td>
<td></td>
</tr>
<tr>
<td>3.00 Application</td>
<td>To apply, to generalize, to relate, to choose, to develop, to organize, to use, to employ, to transfer, to restructure, to classify</td>
<td>Principles, laws, conclusions, effects, methods, theories, abstractions, situations, generalizations, processes, phenomena, procedures</td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>4.00 Analysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.10 Analysis of</td>
<td>To distinguish, to detect, to identify, to classify, to discriminate, to reorganize, to categorize, to deduce</td>
<td>Elements, hypothesis, conclusions, assumptions, statements of fact, statements of intent, arguments, particulars</td>
<td></td>
</tr>
<tr>
<td>elements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.20 Analysis of</td>
<td>to analyze, to contrast, to compare, to distinguish, to deduce</td>
<td>Relationships, inter-relations, relevance/relevancies, themes, evidence, fallacies, arguments, cause-effect(s), consistency/ consistencies, parts, ideas, assumptions</td>
<td></td>
</tr>
<tr>
<td>relation-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-ships</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.30 Analysis of</td>
<td>To analyze, to relate, to produce, to constitute, to transmit, to originate, to modify, to document</td>
<td>Form(s), pattern(s), purpose(s), point(s), of view(s), techniques, bias(es), structure(s), theme(s), arrangement(s), organization(s)</td>
<td></td>
</tr>
<tr>
<td>organization-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-al principles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.00 Synthesis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.10 Production</td>
<td>To relate, to produce, communication to constitute, to transmit, to originate, to modify, to document</td>
<td>Structure(s), pattern(s), product(s), performance(s), design(s), work(s), communications, effort(s), specifics, composition(s)</td>
<td></td>
</tr>
<tr>
<td>5.20 Production of a plan, or proposed set of operations</td>
<td>To propose, to plan, to produce, to design, to modify, to specify</td>
<td>Plan(s), objectives, specification(s), schematic(s), operations, way(s), solution(s) means</td>
<td></td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>5.30 Derivation of a set of abstract relations</td>
<td>To produce, to derive, to develop, to combine, to organize, to synthesize, to classify, to deduce, to develop, to formulate, to modify</td>
<td>Phenomena, taxonomies, concept(s), scheme(s), theories, relation-ship abstractions, generalizations, hypothesis/hypotheses, perceptions, ways, discoveries</td>
<td></td>
</tr>
<tr>
<td>6.00 Evaluation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.10 Judgements in terms of internal evidence</td>
<td>To judge, to argue, to validate, to assess, to decide</td>
<td>Accuracy/accuracies consistency/consistencies, fallacies, reliability, flaws, errors, precision, exactness</td>
<td></td>
</tr>
<tr>
<td>6.20 Judgements in terms of external criteria</td>
<td>To judge, to argue, to consider, to compare, to constrain, to standardize, to appraise</td>
<td>Ends, means, efficiency, economy/economies, utility, alternatives, courses of action, standards, theories, generalizations</td>
<td></td>
</tr>
</tbody>
</table>

Observation: This list consists of the various examples of infinitives and direct objects. The researcher, in the present study, had used this list for writing the specifications of the objectives. These specifications helped the researcher in providing the guidelines for item-writing.
Table 4.4 shows the various types of specifications that appear in this study.

Table 4.4: Specifications of Items

| The student recognizes the appropriate sequence. (Knowledge) |
| The student chooses the appropriate law of learning. (Application) |
| The student identifies the principle which is appropriate to the new situation. (Application) |
| The student identifies the basic principle that underlies Goddard's studies. (Knowledge) |
| The student discriminates between the relevant and irrelevant factors. (Analysis) |
| The student classifies the internal and external factors that affect an individual's perception. (Analysis) |

O 4.4: Specimen items for the Objectives in the Cognitive Domain:

The researcher tried to construct items that would test the particular objectives. Here are given some of the items that are purported to test the particular objectives.

(1) Knowledge: According to Bloom, "the phrase "knowledge objectives" ....... implies recall or recognition of specific elements in a subject area."
Knowledge of terminology, principles and rules form important part of the behaviour content objectives. Terminology, conventions, and criteria can each be substance of knowledge. During the instruction period it is important for the teacher to test "knowledge". He needs to have evidence of whether the student can recall certain terms, facts, or methods in order to make inferences about his level of achievement. Table 4.5 shows a specimen item constructed for the knowledge objective.

Table 4.5: Specimen Item Testing Knowledge Objective:

<table>
<thead>
<tr>
<th>Objective: Knowledge</th>
<th>Specification: The student recognizes the appropriate sequence.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Directions: Choose the correct response from the following:</td>
<td></td>
</tr>
<tr>
<td>In what sequence does an individual grow?</td>
<td></td>
</tr>
<tr>
<td>(1) childhood</td>
<td></td>
</tr>
<tr>
<td>(2) adolescence</td>
<td></td>
</tr>
<tr>
<td>(3) infancy</td>
<td></td>
</tr>
<tr>
<td>(a) 1, 2, 3.</td>
<td></td>
</tr>
<tr>
<td>(b) 3, 2, 1.</td>
<td></td>
</tr>
<tr>
<td>(c) 3, 1, 2.</td>
<td></td>
</tr>
<tr>
<td>(d) 2, 3, 1.</td>
<td></td>
</tr>
<tr>
<td>(e) 1, 3, 2.</td>
<td></td>
</tr>
</tbody>
</table>
This item tests whether the student recognizes the appropriate sequence of growth of a child.

(2) **Comprehension**: As Bloom writes: "Comprehension ... suggests that the learner 'understands' - or internalizes and systematizes the 'knowledges'". In the Taxonomy of Educational Objectives, the category called "comprehension" is the first level beyond the category of "knowledge". Comprehension is described in terms of three different operations. The lowest order is that of "translation", in which the known concept or message is put in different words or changed from one kind of symbology to another. The second level of comprehension is interpretation, in which a student goes beyond recognizing the separate parts of a communication - and sees the interrelations among the parts. The third level of comprehension is extrapolation. In this category the student is expected to go beyond the literal communication itself and draws inferences about consequences or perceptibly extend the time dimensions, the sample, or the topic. These three subcategories are highly interrelated. Table 4.6 shows the specimen of an item which has been constructed to test the "comprehension" objective.
Objective: Comprehension

Specification: The student differentiates between the external and internal factors affecting individual's perception.

Directions: Each set of the following consists of five factors affecting the individual's perception. One of which does not belong to the other four. You are to select the factor which does not so belong. Indicate your choice by placing a check mark in the answer space.

<table>
<thead>
<tr>
<th>Set 1</th>
<th>Set 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. preparatory set</td>
<td>1. past experience</td>
</tr>
<tr>
<td>2. attention</td>
<td>2. proximity</td>
</tr>
<tr>
<td>3. interest</td>
<td>3. closure</td>
</tr>
<tr>
<td>4. past experience</td>
<td>4. continuity</td>
</tr>
<tr>
<td>5. organisation</td>
<td>5. similarity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Set 3</th>
<th>Set 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. needs and values</td>
<td>1. figure and ground</td>
</tr>
<tr>
<td>2. physical state of the sense organ</td>
<td>2. interest</td>
</tr>
<tr>
<td>3. preparatory set</td>
<td>3. closure</td>
</tr>
<tr>
<td>4. patternizing</td>
<td>4. proximity</td>
</tr>
<tr>
<td>5. past experience</td>
<td>5. continuity</td>
</tr>
</tbody>
</table>
In this item the student differentiates between the external and internal factors that affect the individual's perception.

(3) **Application**: According to Bloom:

Application is "the use of abstractions in particular and concrete situations". The abstractions may be in the form of general ideas, rules of procedures, or generalized methods. The abstractions may also be technical principles, ideas, and theories which must be remembered and applied.

(Bloom, 1956, P.205)

The ability to apply implies that with appropriate training, practice, and other kinds of help the student becomes able to apply principles and generalizations in solving problems that are new to him. Table 4.7 shows a specimen item which has been constructed to test the 'Application Objective'. It tests the student's ability to apply a known principle to a new situation.

**Table 4.7 : Specimen Item Testing Application Objective** 

<table>
<thead>
<tr>
<th>Objective : Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification : The student chooses the appropriate law of learning.</td>
</tr>
<tr>
<td>Directions : Choose the correct response from the following :</td>
</tr>
</tbody>
</table>
An experiment was made to study learning in human newborns, 5 to 7 days old. When a puff of air was blown on the eye the natural response was to blink. A tone was sounded immediately before the air puff. The new born soon learnt to associate the tone with the air puff and blinked on hearing the tone alone.

This is an example of
(1) Classical conditioning
(2) Operant conditioning

In this item the student applies the principle of classical conditioning to a new situation (presuming that he has not studied this situation before).

(4) Analysis: According to Bloom,

Analysis is the breakdown of a communication into its constituent element or parts such that the relative hierarchy of ideas is made clear and/or the relations between the ideas expressed are made explicit. Such analyses are intended to clarify the communication, to indicate how the communication is organised, and the way in which it manages to convey its effects, as well as its basis and arrangement.13

The ability to analyse a problem, communication, or approach to attacking a problem is a complex ability which makes use of knowledge, comprehension and application but goes beyond them.
Table 4.8 shows the specimen item which has been constructed for testing the 'analysis' objective.

**Table 4.8: A Specimen Item Testing Analysis Objective**

<table>
<thead>
<tr>
<th>Objective:</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification:</td>
<td>The student compares the characteristics of various methods.</td>
</tr>
<tr>
<td>Directions:</td>
<td>Rearrange the following methods of study in terms of their objectivity from the lowest to the highest. Place a checkmark in the answerspace under No. 1 opposite the least objective method, and in the answerspace under No. 2 opposite the more objective method and in the answerspace under No. 3 opposite the most objective method.</td>
</tr>
<tr>
<td></td>
<td>(a) Observation method</td>
</tr>
<tr>
<td></td>
<td>(b) Experimental method</td>
</tr>
<tr>
<td></td>
<td>(c) Introspection method</td>
</tr>
</tbody>
</table>

This item tests the student's ability to analyse the characteristics of each of the three methods. On the basis of this analysis he is to decide the relative degree of objectivity of these methods.
(5) **Synthesis**: According to Bloom,

Synthesis is the putting together of elements and parts so as to form a whole. This involves the process of working with pieces, parts, elements, etc., and arranging and combining them in such a way as to constitute a pattern or structure not clearly there before (Bloom, 1956, p. 206).

Synthesis is a type of divergent thinking in that it is unlikely that the right solution to a problem can be set in advance. In synthesis each student may provide a unique response to the questions and problems posed, and it is the task of the teacher or evaluator to determine the merits of the responses in terms of the process exhibited, the quality of the product, or the quality of the evidence and arguments supporting the synthetic work.

Since the researcher thought that this objective can be best tested by short answer type or essay type questions, it was not attempted to construct objective type items to test this objective.

(6) **Evaluation**: Bloom has defined the term 'evaluation' as follows:

Evaluation is defined as the making of judgements about the value, for some purpose, of ideas, works, solutions, methods, material, etc. It involves the use of criteria as well as standards for appraising the extent to which particulars are accurate, effective, economical, or satisfying. The judgements may be either quantitative or qualitative, and the criteria may be either those determined by the student or those which are given to him (Bloom, 1956, p. 185).
In the Taxonomy of Educational Objectives, evaluation is placed as the last category of objectives. Implicit in this placement of evaluation in the cognitive domain is the assumption that objectives in this category require some competence in all the previous categories - Knowledge, Comprehension, Application, Analysis and Synthesis. Evaluation, however, goes beyond these in that the student is presumably required to make judgements about something he knows, analyzes, synthe- and so forth on the basis of criteria which can be made explicit.

It was thought that this objective can be well tested through essay tests and hence the researcher decided not to construct objective type items to test this objective.

4.05 : Item Formats :

After having given due consideration to the purpose of the item-construction and what should be measured - both in terms of the objectives and contents- the researcher decided the best way of measuring the instructional objectives. For example, if the objective is to obtain evidence of the pupil's factual recall of names, places, dates and events, it would not be efficient to use lengthy essay questions. Every item format has its advantages and limitations. In objective tests, True/False, Matching and Multiple-Choice items
are often used. Here are given the characteristics of each of the three types of items along with an example of each.

(1) **True/False Type**:

The True/False or the alternate response item is essentially a two-response multiple-choice item in which only one proposition (answer) is presented and the student judges the truth or falsity of the statement. The probability of getting the right response by mere guessing in this type of item is more than that in the multiple choice type. They are, therefore, seldom used in standardised tests and most authors of measurement tests speak disparagingly of them. But Ebel is one of the few who favours the true/false item.

He suggested that many of the weaknesses of this item format are not inherent in the form of the item; rather, the weaknesses are due to misuse and lack of skill on the part of the item-writer.

Ebel, in defence of using true/false tests, writes:

> Acquisition of command of knowledge is ..... the central purpose of education. All knowledge is knowledge of propositions ..... The essential purpose of logical reasoning is to test the truth or falsity of deductive propositions. Propositions are expressed in sentences. These sentences may be true or false. This is the stuff of which human knowledge (and true/false tests) are made. 16
The researcher constructed a few True/False items.

(2) **Matching Type**

The matching exercise consists of the questions or problems to be answered (premises) in one column, and, the other column contains the answer (responses). The respondent is presented with the two lists and is required to establish some sort of association between each premise and each response. He pairs off the corresponding elements and records his answers.

The matching exercise is well-suited to those situations where one is interested in testing the knowledge of terms, definitions, dates, events and other similar matter involving simple relationships. It is well-suited to the 'who', 'what', 'when', 'where' types of learning. It requires relatively little reading time. This, then affords an opportunity to have a larger sampling of content. This type of items can be scored more efficiently. Table 4.9 shows the specimen of a matching type item constructed by the researcher.
### Table 4.9: A Specimen of a Matching

**Type Item:**

**Objective:** Comprehension

**Specification:** The student determines the principle that is appropriate to the figure.

**Directions:** In part 'P' some of the principles that govern the formation of perception are listed and in part Q some of the figures are drawn. You have to match the principle with the figure by placing a checkmark in the answer space.

<table>
<thead>
<tr>
<th>P</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Closure</td>
<td>(1)</td>
</tr>
<tr>
<td>(b) Continuity</td>
<td>(2)</td>
</tr>
<tr>
<td>(c) Proximity</td>
<td>(3)</td>
</tr>
<tr>
<td>(d) Similarity</td>
<td>(4)</td>
</tr>
<tr>
<td></td>
<td>(5)</td>
</tr>
<tr>
<td></td>
<td>(6)</td>
</tr>
</tbody>
</table>
Observation: This item consists of two parts. Part P contains the answer (responses) and part Q contains the problems (premises) to be answered. While answering this item the student is required to find out the appropriate principle for each of the figures given in part Q from those given in part P.

(3) Multiple Choice Type: The multiple choice item consists of two parts: (1) the stem, which contains the problem, and (2) a list of suggested answers (responses or options). The incorrect responses are often called foils or distractors; the correct response, the key. The stem may be stated as a direct question or an incomplete statement. From the list of responses provided, the student selects the one that is correct (or best).

While commenting on the multiple-choice items Robert L. Ebel writes:

Multiple-choice items are currently the most highly regarded and widely used form of objective test item. They are adaptable to the measurement of most important educational outcomes - knowledge, understanding, and judgement; ability to solve problems, to recommend appropriate action, to make predictions. Almost any understanding or ability that can be tested by means of any other item form - short answer, completion, true-false, matching, or essay - can be tested by means of multiple-choice test items.

The form of the multiple-choice item, with the stem asking or implying a direct question, provides a realistic, naturally appropriate setting for testing student achievement. There tend to be less indirectness or artifice in multiple choice than in some other item forms. Students often find multiple-choice questions less ambiguous than completion or true-false items. Instructors find it easier to defend the correct answers to them.
Finally, multiple choice items seem to both instructors and students to be less susceptible to chance errors resulting from guessing than true-false items. It is easy to exaggerate the harm done by guessing, and to place too much emphasis on the need to limit the amount of guessing students do. But however little the harm done by guessing, it does less harm in multiple choice than in true-false tests.\textsuperscript{17}

Multiple-choice items are most popular and flexible of the objective type selection items. Often multiple-choice tests are criticized as being able to reward the poorer student and to penalize the abler one. Even the least knowledgeable student can score 25\% by mere guessing on a multiple-choice test with items having four alternatives each. On the other hand, the more knowledgeable student, in an effort to attain a true score, does not resort to guessing and may suffer thereby. However, this criticism is not supported by empirical evidence. The multiple-choice item is ideally suited for measuring the higher mental processes. It is best suited for interpretative exercises. Table 4.10 shows a specimen of a multiple-choice item.

Table 4.10 : A Specimen of a Multiple-Choice Item :

<table>
<thead>
<tr>
<th>Objective</th>
<th>Comprehension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specification</td>
<td>The student recognizes the cause-effect relationship.</td>
</tr>
<tr>
<td>Directions</td>
<td>Choose the best response from the following :</td>
</tr>
</tbody>
</table>
A modern psychologist cannot accept the definition of psychology as a science of mind because -
(a) mind is not visible.
(b) mind cannot be studied objectively.
(c) formation of mind is not known.

Observation: In this item the respondent is given three alternatives and is asked to choose only one alternative.

During the preparation of the first draft of the items, the researcher tried to write items according to different formats. The items were either of true/false, matching and multiple choice type, the last type being largest in number.

4.06: Item Writing:

By taking into consideration the characteristics of various types of item-formats, the researcher constructed a number of items. Each of the items consisted either one or more subitems. For example, a specimen of a matching type item from table 4.9 consisted of 6 (1 to 6) subitems which is in fact counted as 1 item. Thus the original pool of items consisted of 138 items. These items included 400 subitems. The items were written in Marathi.
All the 136 items, consisting of 400 subitems were constructed in Marathi as the sample for administration was chosen from Marathi medium students. Some of the items have been rendered into English for the purpose of comments, discussion, giving examples etc. in this chapter. (See Appendix A).

06.a : **Formatwise Distribution of Items and Subitems**:

The items were either of True/False, matching or of multiple choice type. Table 4.11 shows the formatwise distribution of the items and subitems.

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Item Format</th>
<th>No. of Items</th>
<th>No. of Subitems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>True/False Type</td>
<td>16</td>
<td>66</td>
</tr>
<tr>
<td>2</td>
<td>Matching Type</td>
<td>10</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>Multiple-Choice Type</td>
<td>112</td>
<td>291</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>138</strong></td>
<td><strong>400</strong></td>
</tr>
</tbody>
</table>

Observation: From this table it can be observed that majority of the items are of multiple-choice type. There are only 16 true/false type and 10 matching type items.

06.b : **Topicwise Distribution of Items and Subitems**:

The researcher constructed 138 items based on the selected topics. These items consisted of 400
subitems. The topicwise distribution of the items and subitems is shown in Table 4.12.

Table 4.12: Topicwise Distribution of Items and Subitems:

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Topic</th>
<th>No. of Items</th>
<th>No. of Subitems</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Educational Psychology; meaning, scope and limitations; Methods for study of psychology</td>
<td>10</td>
<td>31</td>
</tr>
<tr>
<td>2</td>
<td>Human Growth and Development; heredity and environment</td>
<td>18</td>
<td>65</td>
</tr>
<tr>
<td>3</td>
<td>Human Motivation</td>
<td>23</td>
<td>56</td>
</tr>
<tr>
<td>4</td>
<td>Thinking Process</td>
<td>22</td>
<td>78</td>
</tr>
<tr>
<td>5</td>
<td>Learning</td>
<td>24</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>Memory</td>
<td>14</td>
<td>46</td>
</tr>
<tr>
<td>7</td>
<td>Personality</td>
<td>10</td>
<td>23</td>
</tr>
<tr>
<td>8</td>
<td>Mental Hygiene</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>9</td>
<td>Individual Differences</td>
<td>7</td>
<td>33</td>
</tr>
<tr>
<td>10</td>
<td>Educational and Vocational Guidance</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>138</strong></td>
<td><strong>400</strong></td>
</tr>
</tbody>
</table>

Observation: From this table it can be observed that the number of items and subitems vary from topic to topic. Only 5 subitems had been constructed for the last topic, i.e. "Educational and Vocational Guidance" and as many as 78 subitems had been constructed for the fourth topic, i.e. "Thinking Process". This
variation was due to the varying content coverage in the various topics and varying number of teaching points in them.

06.e: **Division of Items into Subtests:**

The pool of 138 items had then been divided into 2 subtests. This division was done for the sake of ease in administration. Subtest 1 consisted of 74 items and subtest 2 consisted of 64 items. Table 5.13 shows the topics covered in each of the two subtests and the number of items and subitems in them.

**Table 4.13: Topics covered and number of Items and Subitems in Subtest 1 and Subtest 2:**

<table>
<thead>
<tr>
<th>Subtest No.</th>
<th>Topics Covered</th>
<th>No. of items</th>
<th>Total</th>
<th>No. of sub-items</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Educational Psychology; meaning, scope and limitations. Methods of study of psychology. Human Growth and Development, heredity and environment Thinking Process Learning Memory</td>
<td>10 18 8 24 14</td>
<td>3 4 5 6 74</td>
<td>31 65 29 50 46</td>
<td>221</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>-----</td>
</tr>
<tr>
<td>2</td>
<td>Human Motivation</td>
<td>23</td>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Thinking Process</td>
<td>14</td>
<td>49</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Personality</td>
<td>10</td>
<td>23</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mental Hygiene</td>
<td>5</td>
<td>13</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Individual Differences</td>
<td>7</td>
<td>33</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Educational and Vocational Guidance</td>
<td>5</td>
<td>64</td>
<td>5</td>
<td>179</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>138</td>
<td></td>
<td>400</td>
<td></td>
</tr>
</tbody>
</table>

Observation: From this table it can be observed that subtest 1 is longer one than subtest 2 in that it contains 10 more items and 42 more subitems. The items based on the topic 'Thinking Process' appear in both the tests.

4.07: Administration of the Items:

The items were cyclostyled and the separate answer sheets for recording the responses were supplied to the students along with the cyclostyled copies to record their responses.

The pool of items was administered to the students studying in the following Colleges of Education during the academic year 1977-78.

(1) S.N.D.T. College of Education for Women, Pune.

(2) P.V.D.T. College of Education for Women, Bombay.
(3) Adarsh Comprehensive College of Education and Research, Pune.
(4) Tilak College of Education, Pune.

The first two Colleges are affiliated to the S.N.D.T. Women's University and the rest to the University of Poona, Pune. From among the students in those Colleges the students were selected at random for taking the tests. Every fourth student on roll was selected, and it was made obligatory by the principals of those colleges on their part to take these tests. Still the number of students taking each test varied from test to test as either the researcher or the authorities of the colleges had no control over the presence of the students in the respective college at the time of testing programme. As many as 162 students from the four colleges took subtest 1 and 122 students from the same colleges took subtest 2. Table 4.14 shows the collegewise number of students taking each of the two subtests.

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Name of the College</th>
<th>No. of students present for Subtest 1</th>
<th>No. of students present for Subtest 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S.N.D.T. College of Education for Women, Pune</td>
<td>36</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>P.V.D.T. College of Education for Women, Bombay</td>
<td>35</td>
<td>32</td>
</tr>
</tbody>
</table>
Observation: From this table it can be observed that
the number of students taking each of the two subtests
vary from college to college. For subtest 1 the largest
number of students from Adarsha Comprehensive College
of Education was present. On the other hand, for
subtest 2, the largest number of students from Tilak
College of Education was present.

The two subtests were administered separately
in each of the four Colleges of Education. Table 4.15
shows the dates of administration of the two subtests
in each of the four Colleges of Education.

Table 4.15: Dates of Administration of Subtests
in Colleges of Education:

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Name of the College</th>
<th>Date of administration of Subtest 1</th>
<th>Date of administration of Subtest 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>S.N.D.T. College of Education for Women,</td>
<td>16-1-78</td>
<td>27-2-78</td>
</tr>
<tr>
<td></td>
<td>Pune</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Observation: From the table it can be observed that the two subtests had been administered in each of the four Colleges of Education with varying gap of time in between them.

07.a: Procedure of Testing:

The researcher administered the two subtests personally in each of the four Colleges of Education. In order to establish rapport, she introduced herself to the students in the beginning. In order to develop positive attitude towards the testing program in the respondents, the researcher explained to them the purpose and nature of the study undertaken by her. Their hearty cooperation had been solicited.

(1) Instructions given to the Students:

The following instructions had been given to the students orally:

(i) Write down all the necessary personal information on the answer sheet before you begin to answer the test.
(ii) Read each item carefully, select the appropriate response and place a checkmark (√) in the appropriate space left on the answer sheet.

(iii) Each correct response carries one mark and an incorrect or omitted one carries none.

(iv) Try to answer all the items.

(v) Take as much time as you would require to answer all the items.

(2) Seating Arrangement:

The students were requested to occupy seats with proper distance between them in order to avoid the use of unfair means by them.

(3) Supervision:

The researcher supervised the class carefully so that the students could not see each other's responses.

(4) Reactions of the Students:

The researcher noted down the reactions of the students by observation during the test and by questioning them after the test.

(5) Collection and Scoring of Answer sheets:

The answer sheets duly filled in by the students in the respective colleges had been collected and scored by the researcher.
4.08: Item Analysis:

Item analysis was done by following the standard procedures discussed in details in the previous chapter. The difficulty value and discriminating power were calculated by using the formulae that appeared in the abovementioned chapter. The effectiveness of the distractors had also been given due consideration.

The results of the item analysis formed the basis for item revision.

4.09: Revision of the Items:

After the administration of the first draft of the items and the item analysis, the items had been revised. The revision of the items had been made by taking into consideration the following points:

09.a: Reactions of the students who took the subtests;

09.b: Reactions of the administrators and teachers teaching the subject in the colleges where the subtests had been administered;

09.c: Difficulties faced by the researcher at the time of administration of the items; and,

09.d: Item analysis results.

* See Chapter XII for detailed discussion of the procedure of item analysis.*
Reactions of Students who took the Subtests:

The researcher noted the reactions of the students who took the subtests. The reactions were as given below:

1. We welcome this idea of responding to objectivetype items.
2. Such tests would help us in understanding the subject better as we would readily get the teaching points of the subject matter from these tests.
3. We would like to have copies of these tests for our personal use.
4. It is difficult for us to read the items from the booklet and write the responses on a separate answer sheet. This procedure is cumbersome and time consuming.
5. As the item is allotted a letter instead of a serial number, and the alternatives are allotted another set of letters, it is difficult to remember both the letters at the time of writing our response.
6. Though the test is good, it is too lengthy. We are too busy to answer so many items at a time.
7. Please provide us with the tests in printed form.
(8) We would like to know the scores obtained by us and the correct answers to each of the items.

The researcher later on made suitable changes in the test based on these reactions.

09.9 : Reactions of the Administrators and Teachers of Colleges of Education:

The researcher noted down the reactions of the administrators and the teachers of the Colleges of Education where the tests had been administered. They were as under:

1. The subtests are too lengthy.
2. It is not possible to administer the test to the students in one day due to the heavy work schedule in the college.
3. It would be better if the test would be divided into smaller subtests and these subtests administered periodically throughout the academic year.

These reactions were given due consideration while revising the test.

09.c : Difficulties faced by the Researcher at the time of Administration of the Items:

The researcher faced many difficulties at the time of administration of the items. The most significant one was that of getting suitable dates from
colleges for administration of the tests. As the B.Ed. students had a heavy time schedule it had become very difficult to get enough time. Hence it was decided to divide the two subtests into 2 subtests and administer them, one at a time. This facilitated the administration of the tests.

09.d : Item-Analysis Results:

After the administration of the items into the four Colleges of Education the item analysis was done in order to ascertain the difficulty value and discriminating power of the items. The effectiveness of the distractors was given due consideration at the time of item-revision.

4.10 : Preparation of the Revised Pool of the Items:

The modifications carried out in the original draft of the items were as under:

(1) The pool of items was divided into 2 subtests instead of 2. This was done by taking into consideration the reactions of the students, teachers and administrators.

(2) Answerspace was provided in the question paper itself, thus eliminating the necessity of separate answer sheet.

(3) The items were numbered as 2.1, 4.17, 8.30 etc., the first digit standing for the subtest number followed by the item number with a point between the two.
(4) In the original draft some of the 138 items consisted of more than 1 subitems. The system of numbering the subitems with the alphabets was dropped. In the revised draft all the subitems in each subtest were serially numbered. Thus each of the subitems became an independent item. Because of this the total number of items stood at 213. These 213 items were grouped into 8 subtests. In short, the revised pool included 213 items instead of 138 items (consisting of 400 subitems) in the original draft.

(5) The number of alternatives was generally made at least 4 per item.

(6) The alternatives were labelled as a, b, c, d, etc. throughout. This was done for the sake of convenience of the students.

(7) Some of the items in the tests had been omitted, some revised and some written afresh on the basis of the experiences gained at the tryout.

4.11: Salient Features of the Revised Pool of Items

The salient features of the revised pool of items are as under:

(1) It consists of items constructed in Marathi.
(2) It consists of 213 items.
(3) It is divided into 8 subtests.
(4) Answerspace is provided along with the text of items.

(5) The items are numbered as 2.1, 3.3, 7.10 etc., the first digit standing for the subtest number, followed by the item number with a point between the two.

(6) Each item has at least 4 alternatives.

(7) The alternatives are labelled as a, b, c, d etc. throughout. (See Appendix A)

4.12: Summary

This chapter began with the description of the procedure followed for the selection of the items. Then the content analysis of the topics had been presented. This had been succeeded by the discussion of the various objectives and specifications. Further, the various item-formats had been dealt with. After the process of writing the items had been described, the researcher had explained the procedure followed for the administration of the items. Item analysis results and revision of the items had been given due place in the chapter. It concludes with enumeration of the salient features of the revised pool of items. The items are then ready for the final administration on a large sample. The next chapter begins with the procedure of administration of the revised pool of items.
4.13: References


4. Poona University, "Courses for the Degree of Bachelor of Education", (Pune: Poona University), pp. 5-7.


11. Ibid.

12. Ibid., p. 159.

13. Ibid., p. 177.


15. Ibid., p. 204.
