Chapter III

PROCEDURE

This Chapter includes descriptions of the subjects, course content, course objectives, teaching methodology, construction of test questions, administration of tests and collection of data, and analysis of data.

Subjects

Subjects for this study were 20 first semester master's degree students of the Lakshmibai National College of Physical Education, Gwalior. Average age of the subjects was 22 years, ranging from 20 years to 24 years. All the subjects were residing in the hostels of the college and had similar course requirements, class timings, and available study time. Thus, in these respects they constituted a single homogeneous group.

On the other hand, the academic performance of the subjects in the first semester of master's degree course varied considerably, ranging from 51 per cent to 67 per cent marks scored in the semester. Appendix 1 presents the age and academic performance of the subjects.
Course Content

The course content for the study was the prescribed syllabus for Research (Process) at the College. The major content area topics in the syllabus were Meaning of Research; Types of Research; Formulation and Development of the Research Problem; Survey of Related Literature; Philosophical Research; Historical Research; Surveys and Case Studies; and Experimental Research. Course details are presented in Appendix 2.

Course Objectives

Using the topics listed in the Research (Process) syllabus as content material, course objectives were formulated in accordance with the guidelines provided in the Taxonomy of Educational Objectives. Care was taken to keep the objectives within the capability of the subjects. Appendix 3 presents the detailed objectives of the course.

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1 Bloom, Taxonomy of Educational Objectives.
Teaching Methodology

The course in Research (Process) was taught to the subjects by the scholar himself. Having taught the same course to four previous classes, he was fairly experienced and was familiar with the course content.

By supplementing lectures with group discussions, reading and writing assignments, and note handouts, all possible efforts were made to enable the students learn the course area well and consequently attain the objectives. The course was taught in units according to the syllabus specifications.

Construction of Test Questions

Questions for each of the units in the syllabus were constructed so as to evaluate the attainment of the objectives by the subjects. Thus, the course content as well as the Taxonomy were covered adequately. Most of the questions were objective type (recall, recognition, true-false, or multiple choice) while some short essay type questions were also used to measure ability in Synthesis. Graphs and figures were also used to measure ability in some of the categories.
Adequate explanatory instructions were given for answering each question so as to help the students understand what was being asked of them and how they were to express their responses. Appendix 4 presents the questions used in the study along with the taxonomical category and content area which the questions represented.

Administration of Tests and Collection of Data

After instruction in a single unit of the content area was over, the test comprising of questions for that unit was administered to the subjects. Speed was not a factor in the study and therefore generous time allotment was made for the tests, ranging from one to two hours.

Each testing session was supervised by the scholar. Inasmuch as the purpose of the tests was to measure the attainment of course objectives by the students independently, consultations among the subjects were not permitted during the test sessions. The subjects, however, could consult the scholar for clarification of questions.
Scoring of Data

After completion of the test, answers were scored, each out of a maximum of 10 marks. At the completion of all the tests, the answers were re-grouped according to taxonomical categories and subcategories represented by them. Marks obtained by each subject in the questions for each subcategory were summed and converted into per cent scores.

Following this, the sub-category scores for each subject were summed to obtain category scores which also were converted into per cent scores. As there is no subdivision of the Application category in the Taxonomy and as the number of questions in the subcategories of evaluation was very small, these two did not have any subcategory scores. The conversion from raw scores to per cent scores was made to facilitate communication of the findings and the discussion of findings since the prevalent scoring system in India uses per cent scores. Appendix 5 presents the per cent scores.

Analysis of Data

The data, comprising of per cent marks scored by the subjects in the categories and subcategories, was analysed by the following methods to test the hypotheses and to draw conclusions.
1. Spearman – Brown Prophecy Formula for establishing the reliability of data. The 89 questions used in the study were divided into two halves by the odd-even method and the scores for questions in each half were summed for each subject. The relationship between the two sets of scores was obtained by the Pearson Product Moment Method. The half-length test reliability coefficient was then converted into full length test reliability coefficient using the Spearman-Brown Prophecy Formula.

2. Pearson Product Moment Correlation Method to obtain intercorrelations among scores in the six taxonomical categories, as well as the 12 subcategories and the two categories of Application and Evaluation. Two correlation matrices were thus obtained, a 6x6 matrix for the categories and a 14x14 Matrix for the subcategories, Application, and Evaluation.

3. The Hierarchical Syndrome Analysis proposed by McQuitty to test the hypothesis of hierarchical order of the categories and the subcategories of the Taxonomy. Two separate analyses were
made using this method.\textsuperscript{2}

Hierarchical Syndrome Analysis starts with a correlation matrix and proceeds to identify "types" or "categories" represented by the scores, that is, statistically defined types are isolated on the basis of evidence provided by the data.

4. A One Way Analysis of Variance to test the hypothesis of increasing complexity of the taxonomical categories and subcategories. Since the scores for the subjects in the categories as well as the subcategories were used for making comparisons, a Within Groups Method for Analysis of variance was utilized. This was followed by analytical comparisons between adjacent categories and subcategories of the Taxonomy.

\textsuperscript{2}Louis L. McQuitty, "Improved Hierarchical Syndrome Analysis of Discrete and Continuous Data," \textit{Educational and Psychological Measurement} 26 (1966): 577-82.