CHAPTER VI

SUMMARY, CONCLUSIONS AND SUGGESTIONS

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6.1 Introduction

To say that the intellectual development of the students is basic to the entire teaching enterprise is certainly not to say anything very profound. Yet very little conscious effort is devoted to individualizing instruction so that activities are designated specifically for children with particular capabilities. Although such provisions are often made to some degree at intuitive levels, very seldom are task analysed with respect to the type of thinking required, and to the capability of individual students for such thought. If the teacher should
be a continuing student of the intellectual development of children, such decisions would become more valid and would also be easier to make. The teacher could then communicate more effectively with individuals, could select sequences of experiences better and could place a greater emphasis on the improvement of logical thought processes in students, in short, he or she would become more capable and effective teacher. For understanding the stages and limits of child, Piaget adopted various techniques and to analyse children's classificatory abilities is one of the most important of them.

6.2 Importance and Need of the Problem

Classification is the arrangement of things according to the characters that they have in common. The ability to classify has long been recognized as an important aspect of cognitive development. Various 'intelligence tests', and tests on 'concept formation' involve questions on classification.

The act of classifying lies at concept formation. Knowledge of the concept is demonstrated when new objects are correctly classified with a reasonable degree of consistency. Classification is important for developing
'understanding' in children according to 'RCEM' system developed by Dave. According to Piaget, it is important for the development of number concept. AAAS emphasized for the development of classification in order to cultivate process of scientific inquiry among children. It is considered, a must, for training in 'evaluation' and for strengthening the logical capacity of children.

Classification is important for science because it is prerequisite of all attempts to discover order in the world. According to Gagne and Sund, science develops through successive steps. First phase is observation while second is classification. It is always there in all sciences.

There is fairly extensive literature which deals with the development of classification. Past researches in classification have focused on how children learn; (a) to form one class (Bruner and Olver, 1963), (b) to change their criteria for categorization (Heald and Marzoff 1953), and (c) to compare the size and contents of the different classes (Dodwell 1962, Hyde 1959).
Jean Piaget and collaborators have mainly contributed in the area. They contended that classificatory abilities develop in sequence that is from Resemblance Sorting to Inclusion. The invariant stage sequence given by Piaget is tested and examined by Kofsky (1966), and others. They concluded that stage sequence propounded by Piaget is partially sustained, anyhow, significant positive correlation between age of children and number of successful completions of classificatory tasks was determined by Kofsky. There are many experimental studies carried out in various countries by various persons. A few of them are Hunca (1971), Kiatu (1974), Miao (1970). They concluded that classificatory ability can be developed early and fully, if children are given special instructional programmes or curricular experiences. A few 'Cross cultural studies' also reveal differences in classificatory abilities among the children of various countries. Many studies dealt with various variables like sex, socio-economic status, intelligence, grade and age. Brekke (1973), Nelson (1974), Cechini (1975) found no significant sex differences on classification. Malet (1974), Johnson (1974) and Jan Franks (1972) compared the children of different socio-economic
backgrounds and found no significant differences in classification scores. Some of the investigators contended that classificatory ability is dependent of intellectual levels of the children (Evan 1975, Bhamna, 1975; Chong, 1975) and Omotoso, 1975) determined significant positive correlation between academic achievement and classification scores. The classificatory ability of the children was found dependent of age and standard of the children (Owac 1973; Kofsky 1966). All the above studies provide knowledge about foreign children. No attempt is made to study the Indian children, hence knowledge about Indian child is very poor.

In developed countries like U.K. and U.S.A. most of the science curricula are developed to match the abilities of the children. In India, none of the science curricula is prepared according to the development stages of the children.

There is, however, a growing awareness among the educational researchers and curriculum experts that experiences to be provided to children should have parallel concurrence with their level of intellectual development. The investigator also believes that curricular experiences
for the children should be decided on the basis of research findings. With a view to explore the logical level of Indian children and to study the effect of sex, intelligence and SES, the present study was taken which is stated as 'Classificatory ability of Sex to Ten-year-old children.

6.3 Objectives

In the light of the questions addressed to the study, the following points are envisaged as the objectives:

1. To explore the classificatory ability of six to ten year old Rajasthani rural children.

2. To observe the effect of Sex, SES, Intelligence, Age and Standard on classificatory ability.

3. To study the invariant stage sequence in the development of classification skills.

4. To predict the difficulty level of each task for Rajasthani children.

5. To find out the relationship between the scores on classification and scores on SES scale, intelligence test, and academic achievement in various subjects.

6. To factor analyse the various variables of study. (Only eleven classification tasks)
6.4 Hypotheses

With a view to test the objectives framed, following hypotheses were tested in the study:

1. No significant sex differences exist in classificatory abilities of six to ten year old children.

2. No significant differences exist between the children of different socio-economic backgrounds on classificatory ability. (ies).

3. Significant differences exist between the children of different intellectual levels on classificatory ability. (ies).

4. Significant differences exist between the children of ages six to ten years on classificatory ability.

5. Children of different standards (grades) differ significantly on classificatory ability.

6. Significant positive correlation exists between the classification scores and scores on:
   (A) Intelligence test
   (B) SES Scale, and
   (C) Academic achievement in various subjects.

6.5 Methodology

For data collection following steps were followed:
6.5.1 Sample

Since the study was aimed at finding the classificatory ability of six to ten year old Rajasthani rural children, the schools and subjects were randomly selected from six districts of the state which were advanced, industrial, backward, average and desert, representing the entire state. Only those schools running in village Panchayat area were selected from each district. Admission and class registers were consulted for the dates of birth of the children. Only subjects whose date of birth fell within ± one month to six, seven, eight, nine, and ten years were selected for the study. A total 400 children, 200 boys and 200 girls, 80 at each age level participated in the study but in final analysis of data, however, only 311 children's responses were taken into account for the varieties of reasons.

6.5.2 Tools

Following tests and tools were used for data collection:

(A) Intelligence Test:

'Draw-A-Man Test for Indian Children' by Dr. (Mrs.) Pramila Phatak was used for determining the intellectual levels.
(B) SES Scale:

Socio-economic Status scale by Dr. Udai Pareek and G. Trivedi for rural was used for the assessment of SES of children.

(C) Classificatory Ability Test:

Tasks were developed that require to demonstrate their understanding of each of the 'Classificatory operations' by correctly manipulating a set geometrical blocks. The blocks were one inch thick and had a plane surface of approximately four square inches in area. The plain surface was either square, circular or triangular and the colours of blocks were usually blue, red, green, and yellow. Each child was individually interviewed for each task. Task construction and scoring criteria employed in this study were same as used by Kofsky (1966).

6.5.3 Data Collection

Subjects were selected on the basis of dates of birth given in admission and class registered from each age group, and from each grade that is from standard (First to Fifth). All the selected subjects from each school were given answer-
sheets and a pencil and made to sit in a specially arranged room. They were asked to draw a picture of a man. The drawings of children were later scored by investigator as given in manual to obtain scores. Informations regarding SES of children were collected by contacting each child, his class teacher and his parents. To test the classificatory ability, rapport was established. Each subject was trained for colour and figure identification, and then interviewed individually in a specially arranged room. Tasks were constructed before the subject and administered in a random order. The responses on each task were written down and later scored by investigator. The testing session lasted approximately from one half to three fourth of an hour. Students were questioned either in Hindi or in their regional language. Academic Achievement Scores of whole year were collected from examination registers of the schools.

6.5.4 Analysis of Data

The scores obtained by 311 cases on intelligence test, on SES scale and on each of the classificatory ability were systematically tabulated. Calculations were done through
the computer of Physical Research Laboratory, Ahmedabad. 

Analysis computed for: (A) Univariate frequency distributions of all the 37 variables (5 independent and 32 dependent variables), (B) 't' test (significance of difference between means of 32 variables), (C) intercorrelation matrix for 32 dependent variables and (D) factor analysis by principal component method for all the classification tasks. Computed results were systematically tabulated to test the various hypotheses of the study.

6.6 Conclusions

Following conclusions are drawn from the study:

1. Classificatory ability is independent of sex. Boys and girls do not differ in most of the classification tasks. However, boys were found better on a few tasks.

2. Children of high, low and average socio-economic backgrounds do not differ with each other on classificatory ability. Thus, classificatory ability is independent of SES.
3. Significant differences exist between the children of high, low and average intellectual levels on classificatory ability. Thus, classificatory ability is dependent of intellectual levels. Children of higher intellectual level are significantly better than the children of lower intellectual level.

4. Classificatory ability of children is related with age because the children of higher chronological age did better in comparison to the children of lower chronological age.

5. Children studying in higher grade (standard) are better than the children of lower grade. It is found true for standard 5th, 4th, 3rd, 2nd and 1st. Thus, classificatory ability is significantly affected by grade.

6. Classificatory ability scores of the children are having significant positive correlation with following scores:

(A) Scores on intelligence test
(B) Scores on SES Scale
(C) Academic achievement scores in Hindi, Science, Mathematics and overall subjects.

7. Invariant stage sequence contended by Piaget is partially sustained because children failed in simple tasks, sometimes passed in logically complex tasks.
8. The predicted difficulty level of the tasks is different from Piaget (1964) and Kofsky (1966), as only 7.40 percent subjects passed inclusion task and 8.04 percent subjects passed whole is the sum of its parts task. Multiple Class Membership task is found third in difficulty level as 10.29 percent passed it.

9. Majority of the children sorted the objects on the basis of colour (254 subjects out of 311). Only 13 out of 311 sorted on the basis of size.

10. Large number of children preferred red and blue colour instead of green and yellow. Only 35 children liked yellow while red and blue were liked by 126 and 117 out of 311 children.

11. On factor analysing all eleven classificatory abilities only three factors were extracted. The factors were named as: (1) Multiple Class Membership (2) Some and All and Sorting, and (3) Inclusion factor.

6.7 Suggestions for Further Study

The present investigation was an attempt to explore a new field and there is scope for an immense amount of pioneering work. Though the study has given some interesting findings, it has raised several thought provoking questions which require further research. The following topics further
research can be taken:

(A) 1. The invariant stage sequence requires further testing with a large number of children. 'The scalogram analysis of classificatory development' should be conducted in order to test Piagetian theory.

2. The study can be replicated by replacing geometrical blocks with other objects which are of interest to children as toys, pictures, flowers etc.

3. For a single logical 'Classification ability', varieties of tasks can be constructed to test the children. Each ability requires further testing with various tasks including different materials and questions.

4. Rural and urban comparisons of children on classificatory ability can be done.

5. Effect of schooling on classification ability can be seen by comparing schooled and unschooled children.

6. The same study can be replicated in other states also, in order to get the logical level of an Indian child.

7. More detailed on conservation and inclusion can be taken as both occupies central role in broadening logical thinking.
Some experimental studies must be conducted in order to see the effect of special instruction programmes in the development of classification skills.

Special curricula can be developed for primary school children to increase their classificatory abilities.

Existing mathematics and science curricula can be evaluated in order to see the involvement of classification skills in them.

Questions given in text books can be categorized in various logical categories and can be seen, how much they are including classification skills.

The question asked by primary school teachers can be analyzed pertaining to their classification level.

Development of special instructional material for children to accelerate their classificatory ability is required.

Children attended kindergarten classes can be compared with those who have not attended preparatory classes.

Comparison of middle, secondary and college students on classification tasks can be done.
9. Efficacy of audio visual instruments in increasing classificatory ability can be tested.

10. Classificatory ability of primary school teachers can be determined. If they do not possess this ability, one cannot expect from them that the same they can develop in their students. Special workshops can be arranged to train them in classification skills.

11. Relationship between reading and speaking ability of language and classificatory ability can be determined.

Looking to the nil research in the area, the investigator would like to say that this study is the beginning of an end and an end of a beginning in India. It is upto the future researchers to pick up the thread from the study, to strengthen educational system.