CHAPTER – VI

SUMMARY AND CONCLUSIONS

6.1 INTRODUCTION

Education and its objectives have undergone a tremendous change in the past few years. Consideration of the changes in the nature, and status of science in twenty first century evoked massive reconsiderations of the objectives of science education. As science has come to hold a very important place in our world, our lives and our political considerations, Teaching of science has acquired great social significance. As a result the main purpose of science education is to develop the students' “scientific temper”, a purpose that the traditional science curriculum has failed to fulfill effectively. The new science course put emphasis on the nature and structure of science and on the processes of scientific enquiry.

Since it is understood that a change in materials alone does not automatically lead students to an improved understanding of science, the developers of new courses advocate corresponding changes in teaching technology.

In traditional teaching, lecture by the teacher and reading and recitation by students are the predominant activities, since these instructional techniques are thought to be most efficiently “covering a great deal of text material”. In a typical class there are many differences between learners. It is usually impossible for a teacher to meet all the
needs of each individual student at the same time so he or she must follow a course, which will present the best option for the greatest number. The results of this compromise are that some students find certain lessons proceeding too slowly while others find the same lessons too hard.

Individual differences, which have a marked influence on rate of learning, include differences in intellectual ability; differences in academic background; and differences in manner or style of learning.

Thus in present teaching the focus is to be shifted from teacher centered to student centered keeping in view the individual differences. Hence the teachers have to develop such teaching strategies so that students can learn according to their own cognitive styles and study habits.

6.2 EMERGENCE OF THE PROBLEM

Most of the modern curricular designers for school curriculums have stressed that reasonable portion of the school curriculum should emphasize the development of process skills among students.

Process skills are also sometimes referred to as the scientific process and these are the tools which most rational human beings use. With this tool the problems are unraveled and solutions found. In complex societies the individual will be facing large number of problems and his adjustment will depend upon his capabilities to solve the
problems successfully. The main role of teacher is to provide such opportunities to the students so as to develop process skills among them. By using a process skills approach to classroom instruction the student will become “owner” of his/her content knowledge and will be able to benefit in a “real-life” application of the units of study. Each student will be participating in the construction of the concept being taught and therefore will be in control of level of knowledge he/she gains.

A number of methods of teaching have been developed for teaching different subjects at different levels. The attempts are being made to bring necessary reforms and improvements in the organization of learning experiences at the various level of education in our country as well as abroad. More emphasis is being laid over methods and techniques that may help the students to acquire process skills or problem solving skills instead of merely helping them to acquire knowledge. As a result the method that promote self-learning and discovery are being duly promoted in the teaching learning process.

Traditional education was based on the assumption that knowledge could be transmitted to the learner by a sort of intellectual feeding process. Thus subject was taught according to will of the teacher and little attention was paid to the eagerness, curiosity and the capabilities of the pupils. But soon, this gave way to child centered education due to efforts of progressive educationists. As a result education has become predominantly child centered,
valuing the individual child. Now, in the present era individualized approach is more emphasized. In such an approach significance of individual differences among learners is taken into account. The main goal of individualized instruction is that each child’s learning is self initiated and self directed and he/she should learn to learn at their own pace.

The learning through self-learning modules is one such technique which gives consideration to individual differences, the differences in study habits, intellectual ability, academic background and cognitive styles of the learners have a great impact on the rate of learning. Thus it is obvious that people differ greatly in the way they perceive things. The students having good study habits learn better than those having poor or bad study habits, similarly it has been found that field independent persons, being intrinsically motivated prefer individualized learning and field dependent who are extrinsically motivated, enjoy cooperative learning. Thus, if we want to give new dimensions to the field of education we must develop some alternate self-learning modules suiting to the individual cognitive styles and study habits.

These are some factors, which motivated the investigator to undertake the present study. Moreover, very few researches have been done in the field of self-learning modules to determine their effectiveness. The present study was undertaken to develop self-learning modules in science for IX class students and thereby determine its
effectiveness in acquisition of process skills in relation to their cognitive styles and study habits.

6.3 STATEMENT OF THE PROBLEM

The problem reads as “EFFECTIVENESS OF SELF-LEARNING MODULES IN ACQUISITION OF PROCESS SKILLS IN RELATION TO COGNITIVE STYLES AND STUDY HABITS OF IX CLASS STUDENTS.”

6.4 OBJECTIVES OF THE STUDY

Following are the major objectives of the study:

1. To develop and standardize a process skill test specifically for class IX students

2. To develop self learning modules in selected topics of science for class IX students

3. To find out whether self-learning modules result in better acquisition of process skills as compared to lecture method.

4. Whether cognitive styles have any effect on acquisition of process skills irrespective of teaching strategy.

5. Whether the students with different study habits differ in acquisition of process skills irrespective of teaching strategy.
6. To study the interactional effects of teaching strategies and study habits on acquisition of process skills

7. To study the interactional effects of teaching strategies and cognitive styles on acquisition of process skills

8. To study the interactional effects of study habits and cognitive styles on acquisition of process skills

9. To study the interactional effects of teaching strategies, study habits and cognitive styles on acquisition of process skills

6.5 HYPOTHESES

The present study was conducted to test the following hypotheses:

1. There will be no significant difference in acquisition of process skills between the groups with regards to teaching method.

2. There will be no significant difference in acquisition of process skills with regard to study habits.

3. There will be no significant difference in acquisition of process skills of groups having different cognitive styles.

4. There will not be any significant interaction between instructional strategies and study habits.
5. There will not be any significant interaction between instructional strategies and cognitive styles.

6. There will not be any significant interaction between level of cognitive style and study habits.

7. There will not be any significant among teaching strategies x cognitive styles x study habits.

6.6 DESIGN OF THE STUDY

The present investigation was experimental in nature following quasi experimental method with pre-test and post-test non equivalent group design.

This design is often used in classroom when experimental and control groups are such naturally assembled groups as intact classes, which may be similar. Often in educational research, the researcher is not in a position to assign subjects randomly to treatment, while school principals may be willing to make two classes available for testing, they are not likely to permit researchers to break the classes up and reconstitute them; rather, they intend them to be kept as intact groups. Under these circumstances, therefore an experimenter may use pre-assembled groups, such as intact classes, for framing experimental and control groups. However this design mandates the use of a pre-test to demonstrate initial equivalence of the intact groups on the dependent variables. If the pre-tests scores of the groups are not equivalent, the experimenter may proceed with the conduct
of experiment by using the technique of analysis of co-
variance to compensate for this lack of equivalency
between the groups.

The study involved three independent variables
namely, Teaching strategies, Cognitive styles and study
habits and one dependent variable i.e. acquisition of
process skills. To study the main effects and interaction
effects of independent variables of Teaching strategies,
Cognitive styles and study habits on dependent variable of
acquisition of process skills technique of analysis of
variance was employed. The efforts here were directed to
the question, “ In what way and to what extent teaching
strategies, Cognitive styles and study habits with the cross
classifications interact in affecting acquisition of process
skills”. The answer to this question had been sought
through the factorial design of 2x2x2 analysis of variance.

As a requisite of factorial design of 2x2x2 analysis of
variance, Incorporating independent variables of Teaching
strategies, Cognitive styles and study habits, the variables
of teaching strategies was varied at two levels i.e.
traditional (Lecture) method of teaching and teaching with
the help of self-learning modules. Furthermore from each
of these two levels the groups having poor and good study
habits were identified on the basis of median scores. Again
from each of the four groups thus formed Field dependents
and Field independents were identified.
6.7 SAMPLE

In the present study samples was drawn from the population of all IX class students studying in Government Model Senior Secondary Schools of Union Territory of Chandigarh in session 2003-04. Sample was raised through random cluster sampling technique. First of all two schools namely, Government Model senior Secondary school Sector 37 and Government Model Senior secondary School sector 46 were randomly selected from the total population of schools. From each school two sections were randomly selected. Each of these sections was randomly assigned to group I and group II. Initially the sample consisted of 213 subjects, which was gradually reduced to 200 students because 13 students did not take part in the complete experiment. Among the sample of 200 students Group 1 comprised of 100 and group II also comprised of 100 students.

All these students were pursuing the same course of study under Central Board Of Secondary Examination, New Delhi with the same official medium of instruction as English. They also belonged to nearly similar socio-economic status and came from middle income group families

All of them were domiciles of Chandigarh; they were urban students. The school environment and school resources were also same for both the groups as all the subjects for study were selected from the Government
Model senior secondary schools of Union territory of Chandigarh.

Randomization in selection of the sample, condition of a true experimental design, could not be met, as is there in educational researches involving so many human beings. It is not desirable to disturb the classes because changing the placement in different sections would create other difficulties. Besides thus, during the experiment students should not be subjected to a new or changed condition(s) as that may in any way effect them psychologically. Making the children conscious too can effect environmental conditions. Thus, the placement of students is rather kept intact. Keeping in view the availability, feasibility and objectives of the experiment intact sections of class IX were selected for the study in natural settings.

6.8 TOOLS USED

As per objectives of the study, to measure the subjects during pre-test and post-test on dependent variable and independent variable following tools were used:

1. Group embedded figure test (Philip K. Ottman, Herman A. Witkin and Elyn Ruskin – 1971) was used to measure cognitive styles

2. Study Habit Inventory by N.S Yadav was employed to measure study habits

3. Self-learning modules developed by the investigator.
4. An achievement test to measure acquisition of process skills developed by the investigator was used as pre-test and post test

6.9 PROCEDURE

The following procedure was adopted to conduct the experiment:

*Phase – I (Pre Test Phase)*

In this phase process skills test, study habits and cognitive styles test were administered to the whole sample. Both these groups were administered these tests one by one. The administration of these tests was carried one by one as per norms and instructions contained in their manuals.

*Phase – II (Experimental Phase)*

In this phase, assignment of strategy of instruction was done randomly Group I was taught through traditional method i.e. lecture method and Group II through self-learning modules. The lessons based on these methods of teaching were planned from their course of study in science at class IX level. Often the importance of content matter or the subject is underplayed in research, yet it is not to be lost sight of. The content dealt with during teaching learning process is of central importance. Hence, care was taken of this fact also. Same topics were taught to both groups. The treatment was conducted by the
investigator herself in both the groups so as to avoid teacher variable and to maximize precision.

*Phase – III (Post Test Phase)*

Immediately after the treatment was over the subjects were administered the acquisition of process skills test (which was used in pre test) as posttest.

**6.10 DATA COLLECTION**

First of all Group Embedded Figure Test was administered however before the actual administration of the test instructions were read out to students as given in the manual. Since this is a speed test so time limit of the test was taken care of with the help of stopwatch

Test of acquisition of process skills developed by the investigator was administered twice as pre test and post test to measure the acquisition of process skills

Study habits inventory constructed by N.S.Yadav was administered to whole sample to measure the study habits of the subjects

The data thus collected comprised the following sets of scores;

- Cognitive styles raw scores
- Study habits raw scores
- Pre-test scores of acquisition of process skills
- Post-test scores of acquisition of process skills
6.11 SCORING OF TESTS

Scoring was done strictly according to the manual in case of cognitive styles test and inventory of study habits and in accordance with the key prepared by the investigator in case of acquisition of process skills test.

6.12 STATISTICAL ANALYSIS OF DATA

The following statistical techniques were used to analyse the data

1. Descriptive statistics namely, mean, median and standard deviation, skewness and Kurtosis were worked out to ascertain the nature of distribution of scores on dependent variable of acquisition of process skills test and independent variables of study habits and cognitive styles

2. t-test was employed to see the individual effectiveness of methods of teaching on acquisition of process skills.

3. Analysis of variance (2X2X2) was employed to study the main effects as well as interaction effects

4. t-ratios were also calculated in those cases where F-ratios were found to be significant

5. Graphical representations wherever necessary were done.
6.13 FINDINGS AND CONCLUSIONS

On the basis of the analysis of the data following conclusions were drawn:

1. Significant differences were found in acquisition of process skills between the groups with regards to teaching methods. The higher mean scores of group II (Taught through self learning modules) shows that group II scored higher than group I (Taught through lecture method). Thus we can say that self-learning modules are more effective in acquisition of process skills as compared to traditional method of teaching.

2. Significant differences in acquisition of process skills with regards to study habits were found. The higher mean scores of group having good study habits shows that the group having good study habits gains more in process skills as compared to the group having poor study habits.

3. There were significant difference in terms of acquisition of process skills with regard to cognitive style. The higher mean scores of field independent group indicate that the field independent students gain more in process skills as compared to the field dependent.

4. Teaching strategy and study habits did not interact in acquisition of process skills.
5. Teaching strategy and cognitive styles interact significantly in acquisition of process skills.

6. There is no interaction between different types of study habits (i.e. poor and good) and cognitive styles (i.e. field dependent & field independent) on acquisition of process skills.

7. Teaching strategy, study habits and cognitive styles did not interact in acquisition of process skills

6.14 EDUCATIONAL IMPLICATIONS AND SIGNIFICANCE OF THE STUDY

In the present days, with a rapidly changing educational scenario, the role of teacher and teaching are changing fast wherein he is enshrined with the responsibility of promoting fruitful learning and stimulating the students by adopting appropriate strategies. Process skills are finding a prominent place in the system, encroaching in the whole education system touching all disciplines.

The findings of the present study have many important implications for improving the quality of instructions in the acquisition of process skills. The study is of great significance for teachers, teacher educators, administrators, research workers, curriculum developers and not the least, the students. Some of the implications are presented here:
1. The teachers must be provided pre service as well as in service training about the assessment of process skills. They must be made aware of the concept, importance and methods of developing process skills among the students during their training.

2. In the present study teaching through self learning modules has been found to be more effective in acquisition of process skills so schools must shift emphasis from teacher dominated classroom to child centered teaching.

3. In the present study the self-learning modules have been found to be effective in acquisition of process skills as compared to lecture method, thus, teachers must be trained in development and utilization of self learning modules.

4. The present study implies that books can be written on the directions of self-learning modules.

5. The findings of the present study will help the teacher to adjust their strategies of teaching keeping in view the type of class and the type of educational objectives to be attained by the students.

6.15 SUGGESTIONS FOR FURTHER RESEARCH

The present study opens up fresh areas for further research.
1. Comparison of effectiveness of self-learning modules can be done with other strategies of teaching.

2. The present study may be conducted in other subjects at different levels.

3. Effectiveness of the study may be seen by involving more variables such as intelligence, personality, self concept, climate of the classroom etc.

4. For arriving at results having wider applicability the present study may be replicated on a large sample.