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CHAPTER VI

SUMMARY OF THE STUDY, CONCLUSIONS AND SUGGESTIONS

6.1 THE STUDY IN RETROSPECT

The present study has been designed to determine the effectiveness of Information Processing Models over the Conventional Teaching Learning Method in the Teaching of Geography in the Secondary schools of Kerala. A summary of the present study is presented in the concluding chapter. The theoretical basis for adopting Information Processing Models in the Teaching of Geography is given, followed by the presentation of the problem and the objectives of the study.

A brief description of the procedure followed and the analysis of the data are presented in this chapter. The chapter concludes with the major findings, conclusions and suggestions.

6.1.1 Information Processing Models

Considering the multi-dimensional nature of the teaching-learning process, cognitive style and uniqueness of individual learner, the changing needs of the society and the tremendous expansion and explosion of information technology demands to place the learner in the role of an original investigator. Instead of making the learner a passive recipient of information, he must be trained to learn to process information and to incorporate it into his own existing cognitive structure. So information processing can be thought of as the way people gather information from the environment, arrange them and interact with them in an integrative and meaningful manner. The major purpose of teaching in the renewed vision and version
is to increase the capacity to learn instead of acquiring large quantity of information.

The Information Processing Models refers to the information processing capability of the students and the way they can improve their ability to master information. Efficiency in teaching is the increasing mastery of a variety of models of teaching and the ability to use them effectively. It was presumed that the outcome of the study would be of help to the teacher and student in developing new models appropriate for teaching and learning Geography in the Secondary schools of Kerala. Once a teacher masters the basic repertoire of models, he or she can then expand it by learning new models and by combining and transforming the basic ones to create new ones.

6.1.2 The Bases of the Present Problem

The growing need of improving the method of teaching leads to the development of alternate strategies which deviate from the existing and traditional lecture method. The strategies thus become discovery oriented and learner centred. The meta-cognitive aspect of learning has to be stressed in the teaching-learning process. The active participation of students in the learning process must be ensured. The individual and intellectual differences of the student should be taken into consideration in the actual classroom settings. Students in the classroom should be placed in the role of an original investigator. It increases their capacity to learn and makes learning an interesting experience for the learner. The introduction of models of teaching as a strategy for teaching can, to a great extent, increase the capacity to learn and think more effectively in the future. This forms the basis of the present study.
6.1.3 Scheme of the Study

Lesson transcripts based on Information Processing Models of Teaching were prepared by the investigator. The effectiveness of Information Processing Models over the Conventional Method was compared and tested with the scores obtained in the achievement tests. The content for the achievement test was taken from the portions selected for preparing lesson transcripts and teaching from a prescribed text book for standard IX students.

6.2 THE STATEMENT OF THE PROBLEM

The problem of the study is stated as follows. "EFFECT OF INFORMATION PROCESSING MODELS IN TEACHING GEOGRAPHY IN THE SECONDARY SCHOOLS OF KERALA".

6.3 HYPOTHESES

The present study is aimed at finding the effectiveness of Information Processing Models over the Conventional Method in the teaching of Geography in Standard IX. It is assumed that students' achievement in learning Geography depends upon the method of teaching adopted. On the basis of this assumption, the following hypotheses were formulated:

Hypothesis 1

The effectiveness of Information Processing Models of teaching strategy is significantly higher than that of Conventional Method of teaching geography in Secondary school of Kerala.
Hypothesis II

The effectiveness of the three separate models belonging to the Information Processing Models of Teaching is significantly higher than that of Conventional Method of teaching in geography.

Hypothesis III

There is significant difference between immediate and delayed achievement scores of the experimental and control groups.

Hypothesis IV

The main and interaction effects of each independent variable on the dependent variable are significantly higher in the experimental groups than in the control group.

6.4 OBJECTIVES OF THE STUDY

The following specific objectives were formulated for the study:

1. To find out the effectiveness of Information

2. To compare the effectiveness of Information Processing Models of teaching with conventional method of teaching.

3. To compare the effectiveness of three separate model categories belonging to the Information Processing Family with one another and with conventional method of teaching.

4. To estimate the main and interaction effect of each independent variable on the dependent variable.

5. To estimate the main and interaction effect with special reference to the extraneous variables such as intelligence, socio-economic status, learning
environment and attitude of pupil towards by learning Geography and basal variables such as gender, locality and type of management of schools on the dependent variable.

6.5 TOOLS USED IN THE STUDY

The following tools for the experiment and collection of data were used:

1. Lesson Transcripts for teaching Geography in the Information Processing Models (IPM) and conventional method.
2. Standardised Tests of Geography (Immediate and Delayed posttest)
3. Kerala Non-Verbal groups Test of Intelligence
4. Attitude towards Learning Geography Scale
5. Geography Learning Environment Questionnaire
6. Socio-Economic Status Scale

Since teacher's handbook and instructional materials in Geography for standard IX on the topic 'Water in the Atmosphere' were not available, the investigator prepared lesson transcripts and instructional materials for teaching the topic 'Water in the Atmosphere' for standard IX students.

The achievement tests (Form A & Form B) were prepared by the investigator to measure the students' performance in Geography. To measure the intelligence level of the students 'The Kerala Non-Verbal Group Test of Intelligence for Secondary schools' was used. The socio-economic status of the students was measured with the help of Socio-Economic Status Scale. The attitude of the students towards learning Geography and the Learning Environment of the students were also
measured using appropriate tools developed by the investigator. Certain extraneous variables such as gender of the students, locality and type of management of schools were also considered for the study.

**Experimental Design**

The experimental method was followed for the present study. Three separate models of teaching belonging to the Information Processing Models were selected for the study. The investigator conducted experiments in intact unequated classroom groups and then the groups were equated statistically by applying the technique of Analysis of Covariance. The non-equivalent pretest-post test control group design was selected for this study.

### 6.6 VARIABLES SELECTED FOR THE STUDY

1. **Independent variables**

A. **Treatment Variables**

**The instructional Variables**

- (a) Models of Teaching belonging to the Information Processing Models family
- (b) Conventional Teaching-Learning Method

B. **Attribute Variables**

1) **Extraneous Variables**

- (a) Intelligence
- (b) Attitude of pupils towards learning Geography
- (c) Geography Learning Environment
- (d) Socio-economic status
Basal Variables

(a) Sex of the subjects
(b) Rural/Urban Residence
(c) Type of management (government/private)

II Dependent Variables

1. Immediate achievement
2. Immediate retention
3. Immediate transfer
4. Delayed achievement
5. Delayed retention
6. Delayed transfer
7. Achievement difference

The total of the scores of the retention and transfer items in the immediate and delayed tests was used to define the immediate achievement and delayed achievement respectively. The difference in achievement scores between the immediate and delayed scores is also considered for the analysis of the data.

6.7 SAMPLE OF THE STUDY

The students of the experimental and control groups were selected from the Educational District of Pala. Eight schools were selected from among the rural-urban residence of the students, and from government and private sections. Equal importance was given to boys and girls. All the groups belonged to the academic year 1997-98. Students are generally grouped into different class divisions at the time of admission not on the basis of any particular criterion. So the students
selected for the experimental and control groups were considered as quasi-random sample. All the students participated in the experiment were of both the sexes in the age group 13+.

6.7.1 The Experiments Conducted

There were three experimental groups and one control group. Those taught through the Concept Attainment Model (CAM) was treated as the Experimental Group I (Expt I), those through Advance Organizer Model (AOM) was the Experimental Group II (Expt II), and those through Inquiry Training Model (ITM) was treated as the Experimental Group III (Expt III). As has been stated earlier, those taught through the Conventional Teaching Learning Model (CTLM) was formed the Control group. The following procedure was adopted in conducting the experiments:

1. The groups were pretested with Terminal Behaviour Test
2. All the groups were given the Intelligence tests.
3. Attitude towards learning Geography Scale, Geography Learning Environment Questionnaire and SES scale were given to quantify and measure the scores
4. The experimental groups were treated with Information Processing Models and Control group were taught with conventional method of teaching
5. All the groups were post tested after the experiment with the immediate and delayed posttests.
6.8 ANALYSIS OF DATA

The pretest, immediate posttest, delayed posttest and achievement difference between the immediate and delayed posttest of the experimental and control groups were consolidated for statistical analysis along with the independent variable such as Intelligence, Attitude towards Learning Geography, Geography Learning Environment and SES scores. Since the major purpose of the study was to test the effectiveness of Information Processing Models of teaching over the conventional Method of teaching, it was necessary to find out whether there was any significant difference between their mean scores. Since the experiment was conducted in unequaled quasi-random intact groups, the analysis of covariance was the suitable technique which uses the principle of partial correlation with analysis of variance. It enables the researcher to equate the pre-experimental status of the groups and removed the initial difference, if any, with statistical technique. It would be a suitable technique to effect adjustments in final or terminal scores which allow differences in some initial variable. This method is therefore adopted for comparison. It is used to compare the effectiveness of three separate model categories with that of the conventional method. The dependability of sample statistics for the pretest and posttest scores in the achievement of Geography of the experimental and control groups was determined by computing the standard errors of the sample means and establishing the confidence intervals.
6.9 MAJOR CONCLUSIONS OF THE STUDY

The following are the major conclusions that emerged from the results of the analysis of the data collected.

Conclusion I: 'The Information Processing Models of teaching' is more effective than the teacher centred conventional method of teaching in the learning of Geography in standard IX.

The above conclusion is deducted from the following findings

1. Students taught in the Information Processing Models of teaching scored higher in the immediate posttest in Geography than those under the Conventional Teaching Learning method.
   a. The F value obtained from the analysis of covariance (ANCOVA) of the immediate posttest scores of the pupils in the experimental (CAM, AOM & ITM) groups and control (CTCM) group with pretest as covariate is significant at 0.01 level (Fy.x for 4/633 = 57.30, p<0.01). Hence it can be concluded that Information Processing Models of Teaching is superior to conventional method of teaching.
   b. The result of the test of significance of difference between the means of the post test scores (Immediate) of the pupils in the CAM (expt! I) and CTLM (control) groups was significant (C.R. value=3.25, p<0.01).
   c. The result of the immediate posttest scores of the pupils in the AOM (exptl II) and CTLM (control) group was significant (C R. value = 6.72, p<0.01).
d. Students under the Experimental group III (ITM) scored higher in the immediate achievement test in Geography than those under the conventional teaching Learning Method (C.R. value=2.53, p<0.05)

II Students taught in the Information Processing Models of Teaching scored higher in the delayed posttest scores in Geography than those under the Conventional Method of Teaching.

a. The F ratio obtained in the analysis of covariance of the delayed post test scores of the pupils in the experimental (CAM, AOM & ITM) groups and control group (CTLM) with pretest as covariate was significant at 0.01 level (F_{yx} for 4/633=104.69, p<0.01) which may be due to higher achievement scores obtained for the experimental group. It was tested for significance of difference between the means of the posttest scores (Delayed) of the pupils in the experimental Group (CAM, AOM & ITM) with control group (CTLM) and found to be significant.

b. The result of the test of significance of difference between the means of the delayed post test scores of the pupils in the CAM (expt.I) and CTLM (control) group was significant (C.R. Value=7.38, p<0.01).

c. The result of the test of significance of difference between the delayed post test scores of the pupils in the AOM (expt. II) and CTLM (control) group was significant (C.R. value = 15.92, p<0.01)

d. The result of the delayed post test scores of the pupils in the ITM (expt. III) and CTLM (control) group was significant (C.R. Value=9.38, p<0.01).
Students in the Information Processing Models of Teaching scored higher in the difference in achievement scores between the immediate and delayed post test scores in Geography than those under the Conventional Method of teaching. The F value obtained from the analysis of covariance (ANCOVA) of the difference in achievement between the immediate and delayed post test scores of the pupils in the experimental (CAM, AOM & ITM) group and CTLM (control) group with pretest as covariate is significant at 0.01 level ($F_{4/03}$; 15.38, $p<0.01$).

**Conclusion II**: Among the three Information Processing Models of Teaching, Advance Organizer Model (AOM) is more effective than Concept Attainment (CAM) and Inquiry Training Model (ITM) in the teaching of Geography in standard IX in the Secondary schools of Kerala.

This conclusion is substantiated by the following findings

1. Students under the Advance Organizer Model (AOM) scored higher in the immediate achievement than those under the Concept Attainment Model (CAM) and Inquiry Training Model (ITM).

   a. The result of the test of significance of difference between the means of the immediate posttest scores of the pupils in the AOM (exptl.II) and CAM (exptl.I) group was significant ($C.R.\text{ Value} = 3.74$, $p<0.01$).

   b. The result of the test of significance of difference between the means of the immediate post test scores of the pupils in the AOM (exptl.II) and ITM (exptl.III) group was significant ($C.R.\text{ Value}=2.91$, $p<0.01$).
2. Students under the Advance Organiser Model (AOM) scored higher in the delayed achievement scores than those under the CTLM (control) and CAM (exptl) groups.

   a. The result of the test of significance of difference between the means of delayed post test scores of the pupils in the AOM (exptl II) and CTLM (control) group was significant (C.R. Value = 15.92, p<0.01)

   b. The result of the test of significance of difference between the means of the delayed post test scores of the pupils in the AOM (exptl II) and CAM (exptl I) group was significant (C.R. Value = 7.45, p<0.01).

Conclusion III: The Information Processing Models of Teaching is more effective than the teacher centred (Conventional Teaching Learning Method) in the learning of Geography in standard IX for students of the secondary schools of Kerala with special reference to the intelligence of the students.

The above conclusion is supported by the following findings:

1. Students belonging to the Information Processing Models of Teaching scored higher in the immediate post test in Geography than those under the conventional Teaching Learning (CTLM) group.

   a. The F ratio obtained from the analysis of covariance (ANCOVA) of the immediate post test scores of the pupils in the experimental (CAM, AOM & ITM) group and Control (CTLM) group with intelligence as covariate is significant at 0.01 level (Fy.x for 4/633 = 57.04, p<0.01). Hence it can be concluded that 'Information Processing Models of Teaching' is superior to conventional Method of Teaching.
Students in the Information Processing Models of Teaching scored higher in the delayed posttest scores in Geography than those under the conventional method of teaching with special reference to the intelligence of the students.

The F ratio obtained in the analysis of covariance of the delayed posttest scores of the pupils in the experimental (CAM, AOM & ITM) groups and (control) CTLM group with intelligence as covariate is significant at 0.01 Level ($F_{1,4/633} = 90.37$, $p < 0.01$).

Students belonging to the Information Processing Models of Teaching scored higher in the difference in achievement scores between the immediate and delayed post test scores in Geography than those under the conventional Method of Teaching with special reference to the intelligence of the students.

The F ratio obtained in the analysis of covariance (ANCOVA) of the difference in achievement scores of the pupils in the experimental (CAM, AOM & ITM) groups and (control) CTLM group with intelligence as covariate is significant at 0.01 level ($F_{1,4/633} = 18.63$, $p < 0.01$). Hence it can be concluded that 'Information Processing Models of Teaching' is superior to Conventional Method of teaching after making adjustments in the intelligence scores of the students.

**Conclusion IV** 'The Information Processing Models of Teaching' is more effective than the teacher centred conventional method of teaching of Geography in standard IX in the secondary schools of Kerala with special reference to the attitude of the students towards learning Geography. The above conclusion is supported by the following findings.
I. Students belonging to the Information Processing Models of Teaching scored higher in the immediate posttest in Geography than those under the Conventional Teaching Learning Method (CTLM) group.

The F ratio obtained from the analysis of covariance (ANCOVA) of the immediate posttest scores of the pupils in the experimental (CAM, AOM & ITM) group and control (CTLM) group with attitude as covariate is significant at 0.01 level ($F_{4/633} = 12.23, p<0.01$).

II. Students taught in the Information Processing Models of Teaching scored higher in the delayed posttest scores in Geography than those under the conventional method of teaching with special reference to the attitude of the students towards learning Geography.

The F ratio obtained from the analysis of covariance (ANCOVA) of the delayed posttest scores of the pupils in the experimental (CAM, AOM & ITM) group and control (CTLM) group with attitude as covariate is significant at 0.01 level ($F_{4/633} = 58.27, p<0.01$).

III. Students belonging to the Information processing Models of Teaching scored higher in the difference in achievement between the immediate and delayed posttest scores in Geography than those under the conventional method of teaching with special reference to attitude of the pupil towards learning Geography.

The F ratio obtained in the analysis of covariance (ANCOVA) of the difference in achievement scores of the pupils in the experimental (CAM, AOM & ITM) group and CTLM (control) group with attitude as covariate is significant at 0.01 level ($F_{4/633} = 12.93, p<0.01$).
Conclusion V  The Information Processing Models of Teaching is more effective than the teacher centred conventional Method of teaching of Geography in standard IX in the secondary schools of Kerala with special reference to the Socio-Economic status of the students. The above conclusion is supported by the following findings:

1. Students belonging to the Information Processing Models of Teaching scored higher in the immediate posttest in Geography than those under the Conventional Teaching Learning Method (CTLM) group. The F ratio obtained from the analysis of covariance (ANCOVA) of the immediate posttest scores of the pupils in the experimental (CAM, AOM & ITM) group and control (CTLM) group with socio-economic status as covariate is significant at 0.01 level (F = 23.78, p < 0.01). Hence it can be concluded that Information Processing Models of Teaching is superior to Conventional Method of teaching.

2. Students in the Information Processing Models of Teaching scored higher in the delayed posttest scores in Geography than those under the conventional method of teaching with special reference to SES of the students. The F ratio obtained in the analysis of covariance of the delayed post test scores of the pupils in the experimental (CAM, AOM & ITM) group and CTLM (control) group with SES as covariate is significant at 0.01 level (F = 13.19, p < 0.01).

Conclusion VI  'The Information Processing Models of Teaching' is more effective than the teacher centred conventional method of teaching of Geography in standard IX in the secondary schools of Kerala with special reference to the Geography
Learning Environment of the students. The above conclusion is supported by the following findings.

1. Students belonging to the Information Processing Models of Teaching scored higher in the immediate posttest scores of the students in Geography than those under the conventional Teaching Learning Model (CTLM) group.

The F ratio obtained from the analysis of covariance (ANCOVA) of the immediate posttest scores of the pupils in the experimental (CAM, AOM & ITM) group and (control) CTLM group with Learning Environment as covariate is significant at 0.01 level \((F_{46.3} = 13.71, p < 0.01)\).

2. Students in the Information Processing Models of Teaching scored higher in the delayed posttest scores in Geography than those under the Conventional Teaching Learning Method (CTLM) group.

The F ratio obtained from the analysis of covariance (ANOVA) of the delayed posttest scores of the pupils in the experimental (CAM, AOM & ITM) group and control group (CTLM) group with Learning Environment of students as covariate is significant at 0.01 level \((F_{46.3} = 63.33, p < 0.01)\).

3. Students belonging to the Information Processing Models of Teaching scored higher in the difference in achievement between the immediate and delayed posttest scores in Geography than those under the conventional method of teaching with special reference to Geography Learning Environment of students.

The F ratio obtained in the analysis of covariance (ANOVA) of the difference in achievement scores of the pupils in the experimental (CAM, AOM & ITM)
group and (Control) CTLM group with attitude as covariate is significant at 0.01 level (Fy.x for 4/633 = 13.25, p < 0.01).

Conclusion VII: The Information Processing Models of Teaching is more effective than the teacher centred conventional method of teaching Geography in standard IX in the secondary school of Kerala with special reference to the combined influence of model categories, region and gender with pretest as covariate on the achievement of students. The above conclusion is supported by the following findings:

1. Students belonging to the Information Processing Models of Teaching scored higher in the immediate posttest in Geography than those under the conventional Teaching Learning Method (CTLM) group.

The F ratio obtained from the analysis of covariance (ANCOVA) of the immediate posttest scores of the pupils in the experimental (CAM, AOM & ITM) group and Control (CTLM) group by considering the combined influence of model categories, region and gender with pretest as covariate is significant at 0.01 level (Fy.x for 16/621 = 20.70, p < 0.01).

II. Students belonging to the Information Processing Models of Teaching scored higher in the delayed posttest scores in Geography than those under the Conventional Teaching Learning Method (CTLM) influence of model categories, region and gender with pretest as covariate is significant at 0.01 level (Fy.x for 16/621 = 36.58, p < 0.01).

III. Students belonging to the Information Processing Models of Teaching scored higher in the achievement difference between the immediate and delayed posttest scores in Geography than those under the conventional Teaching Learning
method (CTLM) group considering the combined influence of model categories, region and gender with pretest as covariate.

The F ratio obtained from the analysis of covariance (ANCOVA) of the difference in achievement scores of the pupils in the experimental (CAM, AOM & ITM) group and (Control) CTLM group by considering the combined influence of model categories, region and gender with pretest as covariate is significant at 0.01 level (Fy. x for 16/62 = 8.03, p < 0.01).

**Conclusion VIII** The Information Processing Models of Teaching is more effective than the teacher centred conventional method of teaching Geography in the secondary schools of Kerala with special reference to the combined influence of model categories, region and gender with intelligence as covariate on the achievement of the students. The above conclusion is supported by the following findings:

1. Students belonging to the Information Processing Models of teaching scored higher in the immediate posttests in Geography than those under the conventional Teaching Learning Method (CTLM) group.

   The F ratio obtained in the analysis of covariance (ANOVA) of the immediate post test scores of the pupils in the experimental (CAM, AOM & ITM) group and control (CTLM) group by considering with intelligence as covariate is significant at 0.01 level (Fy. x for 16/62 = 35.20, p = 0.01).

2. Students belonging to the Information Processing Models of Teaching of the immediate and delayed posttest scores in Geography than those under the Conventional Teaching Learning Method (CTLM) group by considering the
combined influence of model categories, region and gender with intelligence as covariate.

The F ratio obtained from the analysis of covariance (ANCOVA) of the difference in achievement scores of the pupils in the experimental (CAM, AOM & ITM) group and (Control) CTLM group by considering the combined influence of model categories, region and gender with intelligence as covariate is significant at 0.01 level ($F_{16/621} = 8.28, p < 0.01$).

**Conclusion IX** 'The Information Processing Models of Teaching' is more effective than the teacher centred conventional method of teaching Geography in the secondary schools of Kerala with special reference to the combined influence of model categories, region and gender with Socio-Economic Status of the students (SES) as covariate on achievement of the students. The above conclusion is supported by the following findings:

1. Students belonging to the Information Processing Models of Teaching scored higher in the immediate posttest in Geography than those under the Conventional Teaching Learning Method (CTLM) group.

The F ratio obtained in the analysis of covariance (ANCOVA) of the immediate posttest scores of the pupils in the experimental (CAM, AOM & ITM) group and Control (CTLM) group by considering the combined influence of model categories, region and gender with SES as covariate is significant at 0.01 level ($F_{4/633} = 23.78, p < 0.01$).

2. Students belonging to the Information Processing Models of Teaching scored higher in the delayed posttest scores in Geography than those under the
Conventional Teaching Learning Method (CTLM) group by considering the combined influence of model categories, region and gender with SES as covariate is significant at 0.01 (F value = 10.80; p = 0.01)

III Students belonging to the Information Processing Models of Teaching scored higher in the difference in achievement scores of the immediate and delayed posttest scores in Geography than those under the Conventional Teaching Learning Method (CTLM) group by considering the combined influence of model categories, region and gender with SES as covariate.

The F ratio obtained from the analysis of covariance (ANCOVA) of the difference in achievement scores of the pupils in the experimental (CAM, AOM & ITM) group and the control (CTLM) group by considering the combined influence of model categories, region and gender with SES as covariate is significant at 0.01 level (F value for 4/633 = 13.19, p = 0.01).

**Conclusion X:** 'The Information Processing Models of Teaching' is more effective than the teacher centred conventional method of teaching Geography in the secondary schools of Kerala with special reference to the combined influence of model categories, region and gender with attitude of the pupil towards Geography as covariate. The above conclusion is supported by the following findings:

1. Students belonging to the Information Processing Models of Teaching scored higher in the immediate post test in Geography than those under the conventional Teaching Learning Method (CTLM) group

   The F ratio obtained in the analysis of covariance (ANCOVA) of the immediate post test scores of the pupils in the experimental (CAM, AOM & ITM)
group and control (CTLM) group by considering the combined influence of model categories, region and gender with attitude as covariate is significant at 0.01 level (Fy.x for 16/621 = 7.35, p < 0.01).

11 Students belonging to the Information Processing Models of Teaching scored higher in the difference in achievement scores of the immediate and delayed posttest scores in Geography than those under the Conventional Teaching Learning Method (CTLM) group by considering the combined influence of model categories, region and gender with attitude as covariate.

The F ratio obtained from the analysis of covariance (ANCOVA) of the difference in achievement scores of the immediate and delayed post test scores of the pupils in the experimental and Control group by considering the combined influence of model categories, region and gender with attitude as covariate is significant at 0.01 level (Fy. x for 16/621 = 7.10, p < 0.01).

**Conclusion XI** The Information Processing Models of Teaching is more effective than the teacher centred conventional method of teaching Geography in the secondary schools of Kerala with special reference to the combined influence of model categories, region and gender with Geography Learning Environment of the students as covariate. The above conclusion is supported by the following findings:

1 Students belonging to the Information processing Models of Teaching scored higher in the immediate posttest in Geography than those under the conventional method of Teaching Geography for the control group.

The F ratio obtained in the analysis of covariance (ANCOVA) of the immediate posttest scores of the pupils in the experimental and control group
by considering the combined influence of model categories, region and gender with learning environment as covariate is significant at 0.01 level (Fy x for 4/633 = 13.71, p < 0.01).

II. Students belonging to the Information Processing Models of Teaching scored higher in the delayed post test scores in Geography than those under the Conventional Teaching Learning Method (control group) by considering the combined influence of model categories, region and gender with Learning Environment as covariate is significant at 0.01 level (Fy x for 4/633 = 63.33, p < 0.01).

III. Students belonging to the Information Processing Models of Teaching scored higher in the difference in achievement scores between the immediate and delayed post test in Geography than those under the Conventional Teaching Learning Method (CTLM) group by considering the combined influence of model categories, region and gender with Learning Environment as covariate.

The F ratio obtained from the analysis of covariance (ANCOVA) of the difference in achievement scores of pupils between the immediate and delayed posttest scores of the experimental and the conventional (CTLM) group by considering the combined influence of model categories, region and gender with Learning Environment as covariate is significant at 0.01 level (Fy x for 4/633 = 13.25, p < 0.01).
6.10 SUGGESTIONS FOR IMPLEMENTATION

The findings of the present study reveal that 'Information Processing Models of Teaching' is superior to the Conventional Teaching Learning Method. Hence teachers must be encouraged to apply this model in the actual classroom situations.

In order to make the theory of the models of teaching more operational, in-service and pre-service programmes should be organised to train teachers and would-be teachers.

The literature related to models of teaching must be made available to the school teachers.

Model lesson transcripts based on selected lesson units from various disciplines may be developed by an expert team at the state level and they are to be given as model lessons in work shops, or project works to prepare handbooks and other instructional materials based on models of teaching.

Model demonstration classes can be conducted on subject basis by expert, trained personnel.

Findings of the study clearly indicate that from among the three separate models taken from the Information Processing family for the present study, Advance Organizer Model was found more effective for teaching Geography in the Secondary classes. The retention effect of Advance Organizer model was greater than that of the other two methods. This is clearly revealed from the fact that pupils belonging to the Advance Organizer Model group score high marks in the immediate and delayed posttests. In Advance Organizer Model, ideas are better organised
through the use of inter-related and inter-connected conceptual systems. This type of hierarchically organized ideas provide better ideational anchors. It will strengthen the cognitive structure of the students. The retention and transfer effect of such learning is high. These are often viewed as intellectual or cognitive process and it is believed that through these processes pupils try to comprehend and interact with the environment in a better manner. The findings of the study establish this fact beyond doubt.

Applying Information Processing Model as an instructional strategy, pupils get training in actual encoding, transforming, and storing information and through these processes students get masterly knowledge in various process skills such as categorising, labelling, identifying, observing, defining operationally, interpreting data, formulating hypothesis, organising data collected, identifying relationships, interpreting relationships, formulating conclusions based on the interrelationship and applying conclusions to new situations. All types of cognitive skills are to be emphasised in Information Processing Models because they represent a group of processes by which the organisms obtain knowledge, transform this knowledge into somewhat meaningful codes, recollect it when needed, make its effective use in solving wide range of problems. It also gives more emphasis to the meta-cognition aspect of learning—i.e., how humans learn to think. The last phase of each model selected from the Information Processing Family reveals the meta-cognitive element of the Information Processing Models of teaching. The proponents of Models of teaching assert that we cannot analyse and improve our thinking unless we are consciously aware of it.
The Information Processing Models make the learners self-sufficient problem solvers and discoverers. It increases the learning capacity of the students. It also helps students learn to construct knowledge. The assumption behind this inference is that if students construct knowledge, their learning will be both richer and more enduring than the traditional teacher-oriented lecture method. The findings of the present study also reveal the retention and transfer effect of Information Processing models.

The present study has convincingly and conclusively revealed that the Geography curriculum should be modernised by giving stress on the ability to process information more powerfully and meaningfully. The central idea behind Information Processing Models of teaching is to help students think about the nature of learning and develop conscious control over tools for learning. The results of the study indicate that while we make the learner an insider to the learning process it may increase his capacity for learning. So each model coming under the Information Processing Models Family is designed to increase certain aspects of the ability to learn-increase intelligence of particular kinds.

6.11 SUGGESTIONS FOR FURTHER RESEARCH

The present study was mainly confined to test the effectiveness of Information Processing Models in the Teaching of Geography in the secondary schools of Kerala. The sample was selected from the educational District of Pala. Only eight schools were selected for the experimental study. It is not much comprehensive and exhaustive due to the limitations of a doctoral work. The full
implication of the study can be ascertained only if it is supplemented by other studies which take other dimensions of the problem concerned.

The proponents of the models of teaching provided a separate list of instructional and nurturant effects of each model coming under various families. Most of the research studies are mainly confined to the instructional effects of the said model. No effective tools are available at present for testing the efficacy of nurturant effect of the models of teaching.

A comprehensive battery of tests for measuring the nurturant effects standardised with appropriate norms. It will be useful for further research studies on models of teaching.

Though 'the models of teaching' is included in the syllabus of universities outside Kerala, it is particularly new to the students and teachers of Kerala. So it is worthwhile for curriculum constructors and educational practitioners to take active steps to include models of teaching in the pre-service syllabus for teacher trainees in the primary, secondary and higher secondary levels.

Most of the teachers in Kerala are not familiar with the theoretical aspect of the models of teaching. Project works, special enrichment programmes, and workshops can be arranged for teachers as a part of in-service programme to make the theoretical aspect of models of teaching more operational. The effectiveness of models of teaching can be studied either through surveys or through experimental studies undertaken by experienced secondary or higher secondary school teachers. Instructional material and teacher's handbook can also be prepared in the light of the research studies.
Certain teaching models can be prepared for teaching Geography at school level by making use of the indigenous environmental resources. The effectiveness of the models can be tested through appropriate statistical techniques.

Comparative study of the effectiveness of models of teaching through experimental research designs by taking the learning style preference, personality variables, sociological variables, affective variables, higher instructional objectives etc., as independent variables for the study.

Evaluation of the differential effectiveness of expository and guided discovery methods that come under the models of teaching can be carried out through adopting appropriate research designs.

New psychometric techniques can be developed to quantify and measure the affective dimensions of models of teaching.

The study can be replicated on a large sample by giving adequate coverage to different variables like gender, locality, management, intelligence, socio-economic variables and affective variables on a state-wise or nation-wise basis. Efficiency in teaching increases with the mastery of a variety of models of teaching and the ability to use them effectively.

By taking into account the socio-economic and cultural background of the learners in the Indian classrooms, the curriculum constructors and academic instructors may take initiative in giving training to class teachers to develop suitable models of teaching for various school subjects and the researchers have to undertake studies on the effectiveness of these models.
As cognition and cognitive process are emphasised in the Information Processing models of teaching, an experimental study can be conducted to test the effectiveness of Information Processing Models in the development of process skills in various social science subjects. The process element has taken much prominence in science teaching for the last decades of the 20th century whereas social science subjects give more emphasis on the information aspect of the subject. It is a felt need of the time to give importance on the process aspect of learning social science subjects. The proponents of process approach, however, hold that initiation into processes is an essential pre-requisite to a meaningful understanding of the information provided in select content material.