Chapter - V
Results and Generalizations...
RESULTS AND GENERALIZATIONS

In the previous chapters, introduction of the problem, development of the tools, method of the study, and interpretation of the data were discussed. The present chapter has been devoted to the results and generalizations. For providing the background of the findings, a brief description of the purpose, design, and procedure, along with the conclusions and suggestions for the research have been given.

No one denies that the goal of teaching is to foster learning. Mastery learning method has exhibited its potential for maximizing attainments. It envisages that almost all students can learn all that is taught in the school. This strategy also promises effective social development of an individual through its methodology as well as the successful experiences it provides (Clark, Causkey, and Benninga, 1983).

A popular mastery learning model used at the post secondary level is outlined by Bloom, (1968 and 1971). It was further refined and elaborated by Block, (1971, 1973; and Block and Anderson, 1975). Bloom's Mastery Learning Strategy (B-MLS) is primarily Group Based Teacher Paced Approach (GBTP-MLS).

Many articles have been written on mastery learning (Guskey and Piggot, 1988). Despite occasional controversy and criticisms (Groff, 1974; Mueller, 1976; Glickman, 1979), results of the numerous studies have supported the basic philosophy of mastery learning approach. Contributing to the divergence of opinions has been, the format used by many researchers studying mastery learning programmes (Slavin, 1987, 1990). Researchers often establish experimental and control groups without controlling important confounding variables like differences in instructional materials, instructional time, and instructional delivery method (Ritchie, and Thorkildsen, 1994).

In schools today, most of the syllabi are loaded with verbal learning, concept learning, and principle learning. In an effort to sequentially arrange them, a series of complex tasks of sequencing the requirements of Ausubel's Advance Organizer Model within the framework of Bloom's Mastery Learning Strategy (B-MLS) was applied. The use of advance organizers in the form of Mastery Learning with Generalization and Analogy as advance organizers
(ML-GEN and ML-ANAL) led to the development of different kinds of extended and expanded hierarchies for both progressive differentiations and integrative reconciliations. A number of studies have shown that well sequenced instructional materials add to the effectiveness of instructional programme. But, in relation to Mastery Learning Strategy with Generalization and Analogy as advance organizers (ML-GEN and ML-ANAL), more research is needed.

Moreover, in the context of third world countries, quite a few have compared studies on mastery learning strategies and non-mastery approaches. Hence, a need was felt for more comparative studies.

The effectiveness of advance organizer model by stimulating cognitive structure through improving learning and retention was cited by Ausubel, (1960) and (Ausubel and Fitzgevald, (1962). Instruction involves the requirement of the learner to retain the learning capabilities acquired during the instructional stage. Gagne argues that instruction is intended to promote learning and the learning situations need to be arranged to activate support and to maintain the internal processing that constitutes each learning event. Thus, inorder for instructional learning outcomes to be the end product, prediction to learn must be taken into consideration. The learner should structure the body of knowledge for easy understanding. Specification of structured knowledge and sequencing the material must be quite effective for better learning outcomes. It was also planned in the present investigation that the initial instruction in MLS be imparted through advance organizers so that the first experience and instruction becomes more important.

Cognitive style is a broad dimension of individual differences that extends across both perceptual and intellectual activities. Cognition covers various modes of knowing, perceiving, imagining, remembering, conceiving, judging and reasoning. The term style is used because, what is at issue is the characteristic approach the individual brings with him to a wide range of situations. Since cognitive approach covers both perceptual and intellectual activities, it is then referred to as the learner’s cognitive style. Cognitive styles are intimately interwoven with affective, temperamental and motivational structures as part of the total personality. Cognitive styles and learning styles is one thing, which has been used interchangeably by psychologists and educators (Bjorklund, 1989; Woolfolk, 1993). One main example of cognitive style which
may help clarify the factor of these stylistic dimensions and their pervasive involvement in learning, thinking and social interaction is the Field-Dependence and Field-Independence. Accordingly, some examples of cognitive strategies include, the use of organising mediators (such as meaningful groupings in serial learning and use of holist and partist hypotheses testing strategies in concept attainment, (Fredriksen, 1969; Goodenough, 1976). Cognitive strategies are therefore selected, organized and controlled in part as a function of larger-scale, more general cognitive styles and ability patterns, but they are also determined in part as a function of task requirements, problem content and situational constraints. The cognitive functioning of the human mind is the process and the result of the cognitive functioning is the output or product (Hilgard, and Bower, 1986). It is therefore the consistent individual differences that mediate between environmental input and the organismic output. Various researches on cognitive style field dependence/independence have established their influence on learning and student's learning outcomes across academic discipline and at all levels of schooling. Field-Dependent learners generally perform less well than Field-Independent individuals in most instructional environments (Hall, 2000). Apart from Field-Dependent and Field-Independent cognitive styles, other cognitive styles on which researches have been done are: Impulsive and Reflective Cognitive Style, Individualistic vs Non-individualistic, Motivation centred vs. Non-motivation centred, Aural vs. Visual, Environment oriented vs. Environment free, Flexible vs. Non-flexible and Responsible vs. Irresponsible Cognitive Style but not much work has been reported on these dimensions.

The consequences of cognitive style differences have not been thoroughly pursued by geography educators (Hall, 2000), and field dependent learners are generally disadvantaged.

Various researches conducted have shown that individuals are more confident of their behaviour, see themselves as more competent, and are more optimistic of favourable results from situations in which they find themselves (Maslow, 1939; Stagner, 1948; Bodaken, 1975; Sarah, 1977; Levy, 1993; Greenberg and Baron, 1999). A research conducted by (Marsh, 1990) revealed that students with higher self-esteem are somewhat more likely to be successful in schools although the strength of the relationship varies greatly depending on the characteristics of the students and the research methods used (Hansford
and Hattie, 1982; Marsh and Holmes, 1990). The present generation is living in very complex times. This is the age of discontinuity and disbelief of ambiguity and ambivalence. The school’s role as a social agency is meant to contribute to the general health and well being of young people (Mecca, Smelser and Cornellos, 1989; Beane, 1993). As difficult as it is for so many adults to find anything to hang on to, we can only imagine what this age looks like through the eyes of young people who typically lack the resources that are available to most adults. The litany of statistics about self-destructive tendencies such as substance abuse, crime, and suicide must surely be seen as a signal from young people that many do not find much about themselves to like. The idea of enhancing self-esteem becomes a moral imperative for schools, especially in a time when other social institutions and agencies seem unwilling or unable to provide support and encouragement in the process of growing-up. Inside the school itself, the growing collection of studies on self-esteem indicates that there is a persistent correlation between it and such school concerns as participation, completion, self-direction and various types of achievements (Purkey, 1970; Rosenberg, 1979, Beane and Lipka, 1986). The correlation between self-esteem and achievement is the driving force in the growing interest in self-esteem. Teachers intuitively know that when students feel better about themselves, they do better in school. More and more students have low levels of self-esteem because youngsters today, are not receiving enough positive, nurturing attention from adults, either at home or at school. One aspect of esteem is self-esteem, which is positive when we meet our standards for achievement. We feel good about ourselves when we are confident that we can master our chosen tasks in life. We also feel good when we gain the respect of others for what we do. We rely on others for prestige, status, recognition, and reputation. However, when we cannot fulfil our esteem needs, we feel a sense of inferiority, helplessness, and discouraged (Sarah, 1977). A sense of competence is the result of repeated experiences of positive feedback (Sarah, 1977).

When the learner is subjected to a learning situation, he undergoes certain experiences, which include some perception; manipulation of ideas; feelings; and some motor activity. These are referred to as learning outcomes (Wingo and Morse, 1970). In any learning situation, there must be the learner
having the attributes of past experiences; present abilities, needs; and feelings (Wingo and Morse, 1970). All these bring in changes in the learner’s ways of perceiving, thinking, feeling, and doing things. Both learning and performance are almost intricately inter-locked. Performance is the gauge of results, which has come about as a result of behaviour change in learning. It occurs when the stimulus situation together with the contents of memory affect the learner in such a way that his performance changes from a time before being in that situation to a time after being in it. The change in performance leads to the conclusion that learning has occurred (Melvin, 1969). The change may be an increased capacity of performance, an altered disposition of attitude and interest or value (Gagne, 1977) and the change must be capable of being permanently retained over some period of time (Lewin, 1948). Gagne (1977) found a hierarchical principle useful for moving from learning principles to the other sequencing of instruction by making hierarchy the basis of approach to a theory of instruction through a desirable sequence characteristics associated with five types of learning outcomes (Gagne, 1977; Gagne and Briggs 1974). The types of learning outcomes which Gagne, called varieties of learning capabilities must be observed as human performance behaving characteristics with varying specific details (Gagne and Briggs, 1974). These varieties of learning outcomes are:

♦ Intellectual skills,
♦ Cognitive strategy,
♦ Verbal information
♦ Attitudes and
♦ Motor skills

In today’s competitive world, the impact of academic self-esteem cannot be ignored. Self-esteem is an inevitable part of human life and no one can escape it. The study on academic self-esteem also assumes a great significance in predicting the students’ personality development and achievement. But the interaction of self-esteem with instructional strategies is yet to be explored further.

So, the present study entitled Mastery Learning Situations With Generalization and Analogy as Advance Organizers and their Impact On Learning Outcomes Of High School Students In Relation To Their
Cognitive Style was undertaken with a view to investigate the efficacy of the two instructional strategies (ML-GEN and ML-ANAL) on achievement and self-esteem in relation to cognitive style.

OBJECTIVES

The present study has been designed to attain the following objectives:

1) To develop instructional material based upon Mastery Learning with Generalization and Analogy as advance organizers (ML-GEN and ML-ANAL).
2) To study the effectiveness of ML-GEN and ML-ANAL in comparison to Conventional Group Learning (CGL) in respect of academic achievement.
3) To study the achievement of IX graders in relation to cognitive style.
4) To study the two order interaction effects of ML instructional strategies and cognitive style on academic achievement.
5) To study the effectiveness of ML-GEN and ML-ANAL in relation to self-esteem.
6) To study the impact of cognitive style on self-esteem of IX graders.
7) To examine the effectiveness of the above-mentioned treatments (ML-GEN; ML-ANAL; and CGL), on self esteem in relation to cognitive style.

HYPOTHESES

➢ Ho1: There is significant difference in the means of Standard Progressive Matrices (SPM) scores of IX grade students.

➢ Ho2: There is significant difference in the means of high, average, and low groups on Entry Behaviour (EB) scores of IX grade students.
  ♦ Ho2(a): High and average groups are different on EB scores.
  ♦ Ho2(b): High and Low groups are different on EB scores.
  ♦ Ho2(c): Mean scores on EB of Average and Low groups are different

➢ Ho3: Levels of pre-criterion scores of students are equal.
  ♦ Ho3(a): High and Average groups are not different on pre-criterion percentage (PCTP) scores.
  ♦ Ho3(b): High and Low groups are not different on the basis of pre-criterion percentage (PCTP) scores.
Ho3(c): Mean scores of pre-criterion test of Average and Low groups are not different.

Ho4: There is significant difference in the means of Entry Behaviour scores classified on the basis of their cognitive styles.

Ho4(a): FD and FI groups exhibit different means on cognitive scores.

Ho4(b): There was sufficient representation of both types of cognitive style Field-Dependent and Field-Independent (FD/FI) in the three treatment groups (ML-GEN, ML-ANAL and CGL).

Ho5: The instructional treatments yield equal level of learning outcomes as measured by achievement scores.

Ho5(a): ML-GEN groups and ML-ANAL groups yield comparable achievement gain scores.

Ho5(b): ML-GEN groups and CGL groups yield comparable achievement gain scores.

Ho5(c): ML-ANAL groups and CGL groups yield comparable achievement gain scores.

Ho6: The different cognitive styles, Field-Dependent and Field-Independent (FD/FI) result in equal levels of learning outcomes as measured by achievement scores.

Ho7: The differences in learning outcomes as measured by achievement gain scores through ML-GEN; ML-ANAL; and CGL are not qualified by levels of cognitive style;

For Instructional Treatments: (ML-GEN, ML-ANAL and CGL):

Ho7(a): Through ML-GEN: Field-Dependent and Field-Independent (FD/FI) cognitive styles yield almost equal gain means on achievement scores;

Ho7(b): Through ML-ANAL: Field-Dependent and Field-Independent (FD/FI) cognitive style yield almost equal gain means on achievement scores.

Ho7(c): Through CGL: Field-Dependent and Field-Independent (FD/FI) cognitive style yield almost equal gain means on achievement scores.
Result & Generalizations

➢ For Cognitive Style Field-Dependent / Field-Independent (FD/FI) Groups:
  ◆ Ho7(d): For Field-Dependent (FD), Learners gain means for:
    ◆ ML-GEN and ML-ANAL are not different;
    ◆ ML-ANAL and CGL are not different;
    ◆ ML-GEN and CGL are not different.
  ◆ Ho7(e): For Field-Independent (FI), Learners gain means for:
    ◆ ML-ANAL and ML-GEN are not different;
    ◆ ML-ANAL and CGL are not different;
    ◆ ML-GEN and CGL are not different.

➢ Ho8: The three instructional treatment (ML-GEN, ML-ANAL and CGL) yield equal level of learning outcomes as measured by gain scores of self-esteem.
  ◆ Ho8(a): (ML-GEN), and (ML-ANAL) exhibit equal level of self-esteem gain scores;
  ◆ Ho8(b): (ML-GEN), and (CGL) exhibit equal level of self-esteem gain scores;
  ◆ Ho8(c): (ML-ANAL), and (CGL) exhibit equal level of self-esteem gain scores;

➢ Ho9: Two cognitive styles Field-Dependent / Field-Independent (FD/FI) do not result in equal levels in learning outcomes as measured by self-esteem scores.

➢ Ho10: Cognitive style and instructional modes do not interact with each other to yield significant different learning outcomes.

➢ For Instructional Treatment: (ML-GEN; ML-ANAL and CGL):
  ◆ Ho10(a): Through ML-GEN: The two cognitive style groups Field-Dependent and Field-Independent (FD/FI) yield almost equal gain means on self-esteem scores;
  ◆ Ho10(b): Through ML-ANAL: Two cognitive styles Field-Dependent and Field-Independent (FD/FI) do not differ in their gain means on self-esteem scores;
  ◆ Ho10(c): Through Conventional Group Learning (CGL): Field-Dependent and Field-Independent (FD/FI) yield equal gain means on self-esteem scores.
Result & Generalizations

For Cognitive Style Field-Dependent/Field-Independent (FD/FI) groups:
- **Ho10(d):** For Field-Dependent (FD) learners gain means for:
  - ML-GEN and ML-ANAL are not different;
  - ML-ANAL and CGL are not different;
  - ML-GEN and CGL are not different.
- **Ho10(e):** For Field-Independent (FI) learners gain means for:
  - ML-ANAL and ML-GEN are not different;
  - ML-ANAL and CGL are not different;
  - ML-GEN and CGL are not different.

TOOLS

The following tools were used for the purpose of data collection:

i) Mastery learning instructional packages consisting of: ML-GEN and ML-ANAL. (Developed and validated by the investigator),

ii) Entry behaviours test (developed and validated by the investigator),

iii) Formative unit tests developed and validated by the investigator,

iv) Criterion test (developed and validated by the investigator),

v) Standard Progressive Matrices (SPM) sets A B C D and E (Raven, 1960),

vi) Group Embedded Figures Test (GEFT) of cognitive style (FD/FI) developed and standardised by Witkin et al. (1971), and


SAMPLE

The sample was selected at two levels: school sample and student sample.

- **School sample** the students were selected from English medium secondary schools of Chandigarh. Out of the list of such schools, affiliated to Central Board of Secondary Education (CBSE), four schools were selected randomly.

- For the **student sample**, randomly intact sections of IX grade were selected from each of these four schools and again randomly allocated to the experimental treatment. The research investigation was carried out on the students of IX grade with age ranging between 13 to 16 years. The
sample was selected from the representative of English medium secondary schools of Chandigarh. The final sample comprised of 509 students, fifty percent of them were male students. The 130 students from ML-GEN, 148 students from ML-ANAL and 231 students from the control group were selected for the final sample.

DESIGN OF THE STUDY

The present investigation was an experimental study employing a 3X2 factorial design in which cognitive style and instructional treatments were two independent variables. Dependent variable was learning outcomes, which was measured by specifically developed achievement test. Two factors from cognitive (academic achievement) and affective domains (self-esteem) were identified and two separate analyses were done. Firstly, a Two-way ANOVA was applied on academic achievement gain scores employing a 3x2 factorial design. Secondly, a similar ANOVA was applied on gain scores of self-esteem.

In a 3 x 2 factorial design, the three instructional treatments (ML-GEN, ML-ANAL and CGL) and two levels of cognitive style Field-Dependent and Field-Independent (FD/FI) were studied.

PROCEDURE

The experiment was conducted in two stages:

1. Selecting the sample.
2. Conducting the experiment.

Stage 1: Selecting the sample:

The sample was selected at two levels. The school level and the student level. The process of sample selection has been discussed into details under the heading the student sample selection. The selected sample was subjected to different treatments. The school sample was drawn from the representative secondary schools wherein the medium of instruction was English.

Stage 2: Conducting the Experiment:

The experiment was conducted in four phases:

Phase 1: Matching the groups: Administration of the Entry Behaviour (EB) Test, Intelligence Test, and cognitive style Test.
Identification and control of relevant variables are two of the most critical tasks confronting most researchers (D’Amato, 1970). Most control measures fall into one of the three general types of control techniques: Matching, Randomization, and Counterbalancing. Matching of the groups was one control wherein all the relevant variables were controlled. The groups were matched on all the relevant variables like intelligence, age, gender, socio-economic status, and Entry Behaviour of the learners etc. This was essential also because; three instructional treatments were administered in three different schools to avoid contamination. The control of this experimental variable was also exercised by assigning the same teacher to all the treatment groups. Hence Pre-tests, Post-tests and instructions were imparted under similar conditions of classroom environment and instructions.

Before implementing the Mastery Learning Instructional Packages, the tools for matching the groups were administered viz: Test for Entry Behaviour (E.B.), Standard Progressive Matrices for intelligence and information for family income for S.E.S. Before starting the instructional programme, all the selected students were given an entry behaviour test. Scores of this test were used to determine whether or not the students had the adequate entry behaviour required for the instructional treatments. Incase where the students did not fulfill the condition of entry behaviour, they were provided orientation before entering into the instructional programme. Although students’ cognitive style was one of the independent variables, the Group Embedded Figures Test (GEFT) was used to identify Field-Dependent and Field-Independent (FD/FI) subjects. The test was administered during its first phase so that it is scored in advance. And check that all the four school sub-samples had adequate number of Field-Dependent/Field-Independent students.

**Phase II: Administration of pre-test:** Criterion test and Self-esteem Inventory Test. Since the final analysis was done on the gain scores of the two dependent variables viz: Academic Achievement and Self-Esteem, Self-esteem Inventory and Criterion tests were administered to all the selected groups. Separate answer sheets were provided for criterion test. Scoring was done to obtain the information regarding knowledge of the students on the topics to be taught through the experimental treatment. No time limit was imposed for
completing pre-test so that a clear and exact level of students regarding instructional content is assessed. Time limit would have forced the learners to leave the test even if they knew the content. The sequence of the test was the same in all the four schools.

**Phase III:** Implementing the instructional programme: In Mastery Learning Strategy (MLS), the acquisition of the subject matter involves a chain of learning in a way that no single link could be broken out without all the subsequent links being lost (Torshen, 1977). The organizers are some frames of references that give students conceptual frameworks into which lessons, ideas, concepts, and facts, can be placed in an organized fashion. Thus, two formats of Advance organizers (Ausubel's Model, 1960) viz: Generalization and Analogy have been incorporated in the Mastery Learning Strategy (MLS) by the investigator. The resultant combinations were:

- One treatment group was taught through Mastery Learning Strategy (MLS) with Generalization as Advance Organizer (ML – GEN.),
- The second treatment group was taught through Mastery Learning Strategy (MLS) with Analogy as Advance Organizer (ML- ANAL), and
- The Control Group was taught by their regular (Geography) teachers in the conventional way.

Both the treatment groups (ML-GEN), and (ML-ANAL) were taught by the investigator himself so that a finer strategic differences could be taken care of. The sequence of events through these two combined strategies of mastery learning as well as conventional group learning have been discussed into details in this study.

**Phase IV:** Administration of the posttest: A criterion test-post-test and Self-Esteem Inventory. After completion of all the twelve lesson units, the criterion test was administered to all the students. Answer sheets were scored and converted into percentages. Time limit was one-hour. Similarly, Self-esteem Inventory was administered to analyse the gain scores on Self-Esteem as a result of experimental treatment. Students, the Subject Teachers and Block Wing Master(s) and Mistress(es) were thanked for their cooperation during the entire period of the experiment.
STATISTICAL TECHNIQUES

The following statistical techniques were employed to analyze the data obtained from the experiment in order to test the hypotheses:

I. Graphical representations: Bar diagrams, line graphs, and frequency curves were drawn,

II. Error Analysis through Scalogram,

III. Descriptive statistics like mean, S.D.s. on intelligence, cognitive style, achievement and self-esteem were used,

IV. One-way ANOVA on Entry Behaviour (EB), Standard Progressive Matrices (SPM), Group Embedded Figures Test (GEFT), and Pretest,

V. Two-way ANOVA on gain scores of: achievement and self-esteem and

VI. Effect sizes due to treatments were computed for instructional treatments.

FINDINGS

PART - A

In the light of the analyses and interpretation of the data, as reported in Parts A of the preceding chapter, the following findings were drawn on the analyses related with the Entry Behaviour (EB) status of the students.

A One-way ANOVA was applied to match the groups on the basis of the scores of Standard Progressive Matrices (SPM), Entry Behaviour (EB), Pre-requisite Skills, and analysis to classify various EB groups according to their cognitive styles Field-Dependent and Field-Independent (FD/FI).

Conclusions Drawn on the Basis of the Scores on Standard Progressive Matrices (SPM):

➢ The difference in mean intelligence scores among the sample sub-groups was not found to be significant suggesting that the students under investigation were not different on intelligence. The scores of intelligence were found normally distributed suggesting that the sample groups had adequate representation of high, average and low intelligence students.

Conclusions Drawn on Entry Behaviour Scores (Pre-requisite Skills):

➢ The means of High, Average, and Low groups on pre-requisite skills scores were found significantly different.
♦ High EB group scored high on pre-requisite skills as compared to average group.
♦ High EB group scored high on pre-requisite skills as compared to Low EB group.
♦ Mean scores on EB of Average EB group were higher than that of Low EB group.

Conclusion Based on Pre-test Scores of Students:

- It was found that the means of high, average and low groups of pre-criterion percentage test scores were found different.
- High EB group scored higher on pre-criterion test as compared to average group.
- High EB group scored higher on pre-criterion test as compared to their counterpart in the low group.
- Average EB group out performed Low EB group on pre-criterion test.
- Distribution of pre-criterion test scores on a frequency curve showed that the curve was not normally distributed rather, it was highly positively skewed indicating that most of the students did not know much about the topic to be taught and were found to be quite low on pre-criterion test.

Conclusions Based on the Representations of Cognitive Style in the Three Treatment Groups:

- In order to ensure that both Field-Dependent and Field-Independent learners have their representation in the three treatment groups, a table of sample distribution on the basis of the two independent variables was drawn. The table revealed that although the number of Field-Dependent and Field-Independent (FD/FI) students varied in the three groups viz: ML-GEN, ML-ANAL and CGL, still there was sufficient representation of both types of cognitive style in each treatment group.
- The groups were matched on intelligence and after ascertaining the entry status of each student on the basis of pre-requisite skills and pre-tests, it was made sure that each group had an adequate number of students with Field-Dependent and Field-Independent (FD/FI) cognitive styles.
PART – B

Part B, focuses on the findings drawn from the analyses related with the experimental treatment and its impact on learning outcomes. In the light of the interpretation of results of the present study, the following findings were drawn.

i) Conclusion Based on Performance Criterion:

- The frequency Polygon drawn on the gain scores of Conventional Group Learning (CGL) was a unimodal and bell shaped and appears to be symmetrical about the ordinate at the score X=4.5. The curve also appears to be normally distributed;
- The frequency polygon drawn on the criterion gain scores of the ML-GEN was also unimodal and approximately bell shaped curve. The curve was also normally distributed and the modal value of the distribution falls on the scores of 44.5 percent marks;
- The frequency Polygon drawn on criterion gain scores of the ML-ANAL was unimodal and resembles bell shaped curve. The curve was also normally distributed. The distribution of the scores appear to be massed at the Lower End of the Scale (the left-end) and spread out gradually toward Right Hand (High-Values). The modal value of the distribution falls on the scores of 54.5 percent marks.
- About fifty percent of the control group gained nine percent or more marks. The same percentage of ML-GEN group gained forty-five percent or more marks and that of ML-ANAL group gained fifty-nine percent marks;
- About seventy five percent of the control group gained five percent or more marks. The same percentage of ML-GEN group gained thirty-nine point five percent marks or more, and that of ML-ANAL gained fifty-three point four percent marks.

ii) Conclusions Based on Error Analyses:

- An over view of the Error Scalogram in respect of ML-GEN and ML-ANAL shows that the density of errors increases as one moves from unit I to XII and from high scoring students to low scoring students;
- Similarly, the scatter diagram of ML-GEN shows less error densities as compared to other units. It may be explained in the light of the comparative nature of the units, which repeat the content taught earlier.
For both treatment groups, (ML-GEN and ML-ANAL) error density for Right Lower Half (Low Scoring and High Difficulty) markedly surpasses the corresponding error density of Left Upper Half (High Scoring and Low Difficulty) for units I to XII.

FINDINGS BASED ON TWO-WAY ANOVA ON GAIN ACHIEVEMENT SCORES:

For the main effect of ML-Instructional Treatment:

➢ It was found that: Instructional Treatments do not yield equal levels of learning outcomes as measured by achievement scores.

➢ The three instructional treatment modes ML–GEN; ML–ANAL and CGL were not found equal in respect of the gain means yielded by them.

➢ Both ML–GEN and ML–ANAL yielded higher gain means than CGL. An examination of the means suggested that ML-ANAL yielded higher gain means than the ML-GEN group.

➢ The difference between gain means of ML–GEN and CGL was also found significant suggesting that ML-GEN yielded higher gain means than CGL group.

➢ The difference between the gain means of ML–ANAL and CGL was also found significant suggesting that ML-ANAL yielded higher gain means than CGL group.

For the main effect of Cognitive Style:

➢ The gain means exhibited by the two levels of cognitive style Field-Dependent and Field-Independent (FD/FI) were found to be statistically different. An examination of the gain means of Field-Dependent and Field-Independent (FD/FI) groups clearly indicates that the achievement gain means of Field-Independent group was higher as compared to that of Field-Dependent group.

For the interaction effect of Instructional Treatment and Cognitive Style:

➢ The interaction between the two levels of cognitive styles and instructional treatments was found to be marginally significant suggesting that the differences in performance as measured by achievement scores through ML-GEN, ML-ANAL and CGL are not independent of cognitive style.
i) **For Instructional Treatment: (ML-GEN, ML-ANAL and CGL)**
   - For ML-ANAL: Field-Independent group yielded higher gain means as compared to Field-Dependent group.
   - With ML-GEN: The achievement gain scores Field-Independent group was significantly higher than that of Field-Dependent group.
   - Through CGL: The achievement gain scores of Field-Independent group were higher as compared to gain means of Field-Dependent group.

ii) **For Cognitive Styles: (For Field-Dependent Groups)**
   - ML-ANAL was higher as compared to ML-GEN group;
   - ML-GEN was higher as compared to CGL; and
   - ML-ANAL was higher than CGL group.

iii) **For Field-Independent Groups:**
   - ML-ANAL was higher than ML-GEN;
   - ML-ANAL was higher than CGL; and
   - ML-GEN was higher than CGL.

**CONCLUSIONS BASED ON ANALYSIS OF VARIANCE ON SELF ESTEEM SCORES**

For the main effect of Instructional Tretments:
   - It may be concluded that the three instructional groups (ML-GEN, ML-ANAL and CGL were not found equal in respect of self-esteem gain means yielded by them.
     - ML-GEN exhibited higher self-esteem gain mean scores than ML-ANAL group.
     - ML-GEN exhibited higher gain mean than CGL suggesting that both groups were not equal in respect of the gain means exhibited by them. It was found that ML-GEN exhibited higher gain means than CGL group.
     - Similarly, ML-ANAL exhibited almost twice more gain means than the CGL group.

For the Main Effect of Cognitive Style:
   - The gain means of self-esteem scores were not found to be significantly different for Field-Dependent and Field-Independent groups of children.
For the instruction between Instructional Treatment and Cognitive Style:

For Instructional Treatment (ML-GEN, ML-ANAL and CGL):

- With ML-GEN: The gain means of Field-Independent group was found higher than that of Field-Independent group.
  - Through ML-ANAL: The two cognitive style groups Field-Dependent and Field-Independent (FD/FI) were not found different.
  - With CGL: Field-Dependent and Field-Independent (FD/FI) were not found different.

For Field-Dependent (FD):

- ML-ANAL and ML-GEN did not yield different self-esteem gain means;
- ML-ANAL and CGL did not yield different self-esteem gain means;
- ML-GEN and CGL did not yield different self-esteem gain means.

For Field-Independent group (FI):

- ML-ANAL and ML-GEN were not found to yield different results;
- ML-ANAL and CGL were not found to yield different results;
- ML-GEN and CGL were not found to yield different results;

Effect Sizes Due to Mastery Learning and CGL (Achievement Scores):

i). Gain Means:

- To conclude, the treatment groups (ML-GEN and ML-ANAL) outperformed the CGL in terms of their gain mean scores. Thus, suggesting that both ML-GEN and ML-ANAL achieved higher gain means as compared to the control group.
- For the effect sizes due to MLS; the gain means of ML-GEN and ML-ANAL reveals that the group which was taught through ML-ANAL gained 30.79 percent more whereas ML-GEN group gained a mean score of 13.22 percent. This suggests that ML-ANAL group achieved significantly higher gain means than the ML-GEN group.
- ML-ANAL gain and CGL gain suggests that the group which was taught through ML-ANAL gained more than twice the group taught through CGL.
- The group that was taught through ML-GEN achieved significantly higher gain means than the CGL group.
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Effect Sizes due to Mastery Learning and CGL (Self-Esteem Scores):

- To conclude, the treatment groups (ML-GEN and ML-ANAL) outperformed the CGL in terms of their gain means scores. Thus, suggesting that both ML-GEN and ML-ANAL achieved higher gain means as compared to the control group.

- For the effect sizes due to MLS; the gain means of ML-GEN and ML-ANAL reveals that the group, which was taught through ML-GEN gained 0.26 percent more whereas ML-ANAL group gained a mean score of 0.21 percent. This suggests that ML-GEN group achieved significantly higher gain mean than the ML-ANAL group.

- ML-ANAL gain and CGL gain suggests that the group, which was taught through ML-ANAL gained higher means than the CGL group.

- The group that was taught through ML-GEN achieved significantly higher gain mean than the CGL group.

ii). Effect Sizes for ML-GEN, ML-ANAL, and CGL (Achievement Scores):

- To conclude, Mastery Learning Strategy with Generalization and Analogy as advance organizers (ML-GEN and ML-ANAL) was more effective than the Conventional Group Learning (CGL).

- On the average, the experimental groups ML-GEN (effect size = 2.14) and ML-ANAL (effect size = 3.31) far exceeded the control group (effect size = 0.49) by 2.14 and 3.31 Standard Deviations. The group taught through ML-ANAL had a larger standard deviation followed by ML-GEN group and lastly CGL, which had the least effect size with respect to achievement gain scores.

- The Mastery Learning Strategies (ML-GEN and ML-ANAL) had large effect sizes and are therefore the best differentiating factors between the experimental and control groups.

- Similarly, the overall effect size of the two experimental groups (ML-GEN and ML-ANAL) was 7.39 suggesting that on the average, the experimental groups performed better than the control group by 7.39 standard deviations.
Effect Sizes for ML-GEN; ML-ANAL and CGL (Self-Esteem Scores):

- On the average, the experimental groups, ML-GEN (effect size=2.39) and ML-ANAL (effect size=1.21) far exceeded the control group (effect size=0.37) by 2.39 and 1.21 standard deviations.

- The group taught through ML-GEN had a larger standard deviation followed by ML-ANAL and lastly CGL, which had the least effect size with respect to self-esteem gain scores.

- The Mastery Learning Strategies had large effect sizes and are therefore the best differentiating factors between the experimental and control groups.

- The overall effect size of the two experimental groups exceeded the control group by 5.09 standard deviation to 0.37 for the control group.

- Mastery Learning Strategy (MLS) was found to be more effective than the Conventional Group Learning (CGL).

Educational Implications of the Findings:

- The results of the present study indicate that the Mastery Learning Strategies viz: ML-GEN and ML-ANAL may be used to enhance the performance of the students in the subject social studies (Geography) at the secondary level as compared to the traditional method of teaching. It is evident from these results that if teachers switch over to these strategies, learning outcomes and academic achievement of students can improve. ML-ANAL was found more effective as compared to ML-GEN and CGL. It may be suggested that teachers should be given orientation in the development of instructional material in the form of study guides, which will help them deal effectively with heterogeneous groups.

- Mastery learning is built on the assumption that majority of students, ninety five percent, can become equal in their ability to learn standard school tasks (Blooms, 1981). The research literature reveals that entry behaviour of the learners has always been taken as sum total of background ability and prior learning of the learners (De Cecco, 1986). But, the individuals has preferred ways of organizing all that he sees, remembers and thinks about. This is called as his cognitive style. These styles represent consistencies in the manner or form of cognition or level of skills displayed in the cognitive performance. One
main example of cognitive style which help clarify the factor of these stylistic dimensions and their pervasive involvement in learning, thinking and social interaction is the Field-Dependent and Field-Independent.

Witkin et al., 1954 and Karp, 1963, stated that Field-Independent group achieved a higher level of differentiation than Field-Dependent groups as identified by Embedded Figures Test (EFT) and Rod and Frame Test (RFT). Tolman (1932) stated that cognitive style is a potential variable affecting the students academic choices and vocational preferences, his continuing academic development, how students learn, how teachers teach and how students and teachers interact in the classroom. This study reveals that the difference between the means of two levels of cognitive style FD/FI groups was found to be significant suggesting that the two groups were significantly different on their achievement gain means. However, interaction between the two levels of cognitive style and instructional treatments was found to be marginally significant revealing that both cognitive style and instructional treatments do not operate independent of each other.

The difference among the gain means of the three instructional treatment groups ML-GEN, ML-ANAL and CGL as measured by self-esteem scores was found significant suggesting that the three instructional groups were not equal in respect of the gain means yielded as measured by self-esteem scores. But the difference between the two levels of cognitive style (FD/FI) was not found significant as measured by self-esteem scores. This suggests that the two groups of students on cognitive style were not different on the self-esteem gain means. The interaction between instructional modes and cognitive style was also not found to be significant suggesting that the gain means due to interaction on achievement and cognitive style were not different from each other as measured by self-esteem scores. Hence, cognitive style Field-Dependent and Field-Independent (FD/FI) do not interact with each other to yield significantly different learning outcomes as measured by self-esteem scores. It may therefore be presumed that since both variables belong to affective domain and may require a larger time to interact to bring about significant changes, change in self-esteem scores due to cognitive style too may be expected to yield learning outcomes. Teachers may plan their instructional plans to achieve mastery levels, which in turn may boost self-esteem of the children.
SUGGESTIONS FOR FURTHER STUDY:

On the basis of the experiences and findings of the present study, the following suggestions are made for further research in this area.

- Relative effectiveness of the two treatments (ML-GEN and ML-ANAL) may be researched further at macro level for learners of different age groups, subject areas ability levels, Learning Disabilities (LDs), and socio-economic status.

- Further studies may be conducted involving other affective variables like achievement motivation, study habits, self-concept, self-efficacy, creativity, level of aspiration, test anxiety and other personality traits. Moreover, psychomotor variables may also be included.

- Further researches should be conducted involving instructional strategies that enhance self-esteem and their impact be studied not only on to academic achievement but also in other areas like substance abuse, antisocial acts, adolescent pregnancy, suicide, HIV Aids awareness and other self-destructive behaviours at school, college, and university levels. In other schools in USA and Africa, including Kenya, school children indulge themselves into antisocial activities leading to self-destructive elements like deaths, maiming and rape. These are positive signs of low self-esteem at school level, which must be transformed into positive and healthy images through Mastery Learning Strategies. The idea is that students will not hurt themselves if they like themselves. Moreover, if they have self-confidence, they are more likely to do well at whatever thing they try to do. Not only achievement but their self-esteem also increases due to the inbuilt motivation of Mastery Learning Strategies. These findings may prove relevant and important especially for our Kenyan Schools.

- As students mature, self-esteem tends to increase, until students adjust to the new demands of high school workload, they may experience a decrease in self-esteem leading to riots, indiscipline and sometimes deaths, as has been witness in other countries recently. School is a place where children develop or fail to develop a variety of competencies that come to define self and ability, where friendships with peers are nurtured and where the role of the community members is played out, all during a
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highly formative period of development. Therefore, the building up of self-esteem, interpersonal competence, social problem solving and leadership becomes important in its own right. Teachers should intuitively know that when students feel better about themselves, they do better in school. It is therefore the duty of teachers to ensure that students feel wanted in the school. This is because more and more students have a tendency to have low self-esteem because youngsters today, are not receiving enough positive, nurturing attention from adults, either at home or at school level. If teachers have low self-esteem, they are likely to pass it on to their students. Hence, teacher student interactions must be positive, validating, affirming and encouraging. This will increase student self-esteem hence improve their prospects for success.

➢ School administrators, guidance and counseling workers, teachers and students can take cues from the results of the present study regarding the effect of the variables of intelligence, cognitive style, and self-esteem on academic achievement and consider systemizing them in conjoint situations so that the findings may be used with advantage for ensuring better academic achievement infavour of the learners.

➢ The present study may also be replicated on a larger population for greater validation of results.

➢ The studies may be planned and conducted by involving more organismic and environmental variables.

➢ Studies may be undertaken to investigate the effect of different components of Mastery Learning Strategies (MLS) viz: perseverance, aptitude, rate of learning, different modes of feedback or alternate material in relation to advance organizers model.

➢ More studies should be undertaken to investigate the effect of different dimensions of advance organizers viz: Meaningful reception learning i.e. Derivative Subsumption, Correlative Subsumption, Superordinate Learning and Combinatorial Learning in relations to schema theory i.e. Accretion, Tuning, and Restructuring: Metaphor, Simile, Analogy, Imagery, Mnemonics, and Rehearsal) in relation to Mastery Learning Strategies.
In order to enhance the evolution of cognitism, the following observations should be taken into consideration. In the past, instructional designers traditionally focused on overt behaviours of breaking down instructions into parts. But today, new perspectives and visions for the future in the field of education have emerged. It is therefore recommended that:

- Instructional designers should emphasize more on the internal representations of instruction and the active intellectual processing, which must occur if learning is to take place. Educational administrators, managers, instructional designers, curriculum developers / implementers, and teachers should begin with the whole rather than always break instruction into component parts.