CHAPTER 5

SUMMARY OF FINDINGS, CONCLUSIONS AND SUGGESTIONS

- Study in Retrospect
- Major Findings of the Study
- Tenability of Hypotheses
- Educational Implications Derived
- Suggestions for Further Research
The life of a research lies in its whole procedure. The gist of the entire process is briefed in this chapter. Variables selected, objectives, hypotheses, methodology and procedures, data collection, its statistical analysis and the findings are presented in this chapter so as to get a whole idea of present research.

Educational implications derived from the study as well as the suggestions for further research in this area are also detailed in this session.

**Study in Retrospect**

Present study was conducted to find out the effectiveness of Brain Based Learning Strategy and Circles of Learning Strategy over Activity Oriented Method of Teaching certain Instructional Strategies and to study the main and interaction effect of Instructional Strategies and Learning Styles on Achievement in Mathematics and Self efficacy of Standard VII students. A preliminary study was also conducted on Upper Primary School Mathematics teachers so as to gather the relevant data on prevailing Instructional Strategies adopted in Upper Primary Mathematics classes.

**Restatement of the Problem**

The present study was intended to find out the effect of certain Instructional Strategies and Learning styles on Achievement in Mathematics and Self Efficacy.

The problem of the study is restated as “**Effect of Brain Based Learning Strategy and Circles of Learning Strategy on Achievement in Mathematics and Self Efficacy of Standard VII Students**”.
Variables of the Study

The Independent, Dependent and the Control Variables selected for this present study are the following:

**Independent variables.**

Independent variables selected were

1. Instructional Strategies (Brain Based Learning Strategy, Circles of Learning Strategy and Activity Oriented Method of Teaching)
2. Learning Styles

**Dependent variables.**

Dependent variables used in the study were:

- Achievement in Mathematics and
- Self Efficacy

**Control Variables.**

Variables controlled for this experimental study were:

- Pre-experimental Status in terms of Achievement in Mathematics
- Pre-experimental Status in terms of Self Efficacy
- Verbal Intelligence
- Non-Verbal Intelligence
- Classroom Environment

**Objectives of the Study**

The present study was executed in the light of the following objectives:
follows:
1. To identify the prevailing and innovative Instructional Strategies adopted by Teachers’ to teach Mathematics at Upper Primary School Level.

2. To find out the issues (if any) experienced by the Mathematics Teachers in implementing innovative Instructional Strategies at Upper Primary School Level and to suggest measures (if any) to overcome the constraints in implementing the innovative Instructional Strategies at Upper Primary School Level.

3. To study whether there exists any significant difference in the mean Achievement in Mathematics (Total and Objective wise scores) of the Experimental and Control groups for the Total sample, Boys and Girls.

4. To study whether there exists any significant difference in the mean Gain score of Achievement in Mathematics of the Experimental and Control groups for the Total sample, Boys and Girls.

5. To study whether there exists any significant difference in the mean Self Efficacy of the Experimental and Control groups for the Total sample, Boys and Girls.

6. To study whether there exists any significant difference in the mean Gain score of Self- Efficacy of the Experimental and Control groups for the Total sample, Boys and Girls.

7. To study the effectiveness of Brain Based Learning Strategy (BBLS) over Activity Oriented Method of Teaching (AOMT), if any, in terms of Achievement in Mathematics of standard VII Students.

8. To study the effectiveness of Circles of Learning Strategy (CLS) over Activity Oriented Method of Teaching (AOMT), if any, in terms of Achievement in Mathematics of standard VII Students.
9. To study the effectiveness of Brain Based Learning Strategy (BBLS) over Circles of Learning Strategy (CLS), if any, in terms of Achievement in Mathematics of standard VII Students.

10. To study the effectiveness of Brain Based Learning Strategy (BBLS) over Activity Oriented Method of Teaching (AOMT), if any, in terms of Self-Efficacy of standard VII Students.

11. To study the effectiveness of Circles of Learning Strategy (CLS) over Activity Oriented Method of Teaching (AOMT), if any, in terms of Self-Efficacy of standard VII Students.

12. To study the effectiveness of Brain Based Learning Strategy (BBLS) over Circles of Learning Strategy (CLS), if any, in terms of Self-Efficacy of standard VII Students.

13. To study the main effects of the Instructional Strategies and Learning Styles on Achievement in Mathematics (Total and Objective wise scores) of standard VII Students for the Total sample, Boys and Girls.

14. To study the interaction effect of the Instructional Strategies and Learning Styles on Achievement in Mathematics (Total and Objective wise scores) of standard VII Students for the Total Sample, Boys and Girls.

15. To study the main effects of Instructional Strategies and Learning Styles on Self Efficacy of standard VII Students for the Total sample, Boys and Girls.

16. To study the interaction effect of Instructional Strategies and Learning Styles on Self Efficacy of standard VII Students for the Total sample, Boys and Girls.
Hypotheses of the Study

The present study was designed to test the following hypotheses.

1. There will be no significant difference in the mean Achievement in Mathematics (Total and Objective wise scores) of the Experimental and Control groups for the Total sample, Boys and Girls.

2. There will be no significant difference in the mean Gain score of Achievement in Mathematics of the Experimental and Control groups for the Total sample, Boys and Girls.

3. There will be no significant difference in the mean Self Efficacy of the Experimental and Control groups for the Total sample, Boys and Girls.

4. There will be no significant difference in the mean Gain Score of Self - Efficacy of the Experimental and Control Groups for the Total sample, Boys and Girls.

5. Students taught through Brain Based Learning Strategy (BBLS) will not differ significantly from Students taught through Activity Oriented Method of Teaching (AOMT) in terms of Achievement in Mathematics.

6. Students taught through Circles of Learning Strategy (CLS) will not differ significantly from Students taught through Activity Oriented Method of Teaching (AOMT) in terms of Achievement in Mathematics.

7. Students taught through Brain Based Learning Strategy (BBLS) will not differ significantly from Students taught through Circles of Learning Strategy (CLS) in terms of Achievement in Mathematics.
8. Students taught through Brain Based Learning Strategy (BBLs) will not differ significantly from Students taught through Activity Oriented Method of Teaching (AOMT) in terms of Self-Efficacy.

9. Students taught through Circles of Learning Strategy (CLS) will not differ significantly from Students taught through Activity Oriented Method of Teaching (AOMT) in terms of Self-Efficacy.

10. Students taught through Brain Based Learning Strategy (BBLs) will not differ significantly from Students taught through Circles of Learning Strategy (CLS) in terms of Self-Efficacy.

11. There will be no significant main effects of Instructional Strategies and Learning Styles on Achievement in Mathematics (Total and Objective wise scores) of standard VII Students for the Total sample, Boys and Girls.

12. There will be no significant interaction effect of Instructional Strategies and Learning Styles on Achievement in Mathematics (Total and Objective wise scores) of standard VII Students for the Total sample, Boys and Girls.

13. There will be no significant main effects of the Instructional Strategies and Learning Styles on Self-Efficacy of standard VII Students for the Total sample, Boys and Girls.

14. There will be no significant interaction effect of the Instructional Strategies and Learning Styles on Self-Efficacy of standard VII Students for the Total sample, Boys and Girls.
Methodology

The methodology adopted for the experimental study is outlined in this section. The study was conducted in three phases. First phase was a preliminary phase in which the researcher conducted a survey on Upper Primary School Mathematics teachers, so as to gather data on prevailing instructional strategies they are using, constraints (if any) experienced by teachers on adopting those instructional strategies in teaching Mathematics at Upper Primary School level.

In the second phase, the study was found to find out the effectiveness of Brain Based Learning Strategy and Circles of Learning Strategy over Activity Oriented Method of Teaching with regard to Achievement in Mathematics (Total and Objective wise scores) and Self Efficacy of standard VII students.

In the third phase, the investigator tried be find out the main and interaction effects of Instructional Strategies (Brain Based Learning Strategy, Circles of Learning Strategy and Activity Oriented Method of Teaching) and Learning Styles on Achievement in Mathematics and Self Efficacy of standard VII students.

Design of the study.

The study was designed using the Non-equivalent Groups Pre-test Post-test Control and Comparison Group Design. Experimental Group I was taught using Brain Based Learning Strategy (BBLs); Experimental Group II, using Circles of Learning Strategy (CLS) and Control group using Activity Oriented Method of Teaching (AOMT).

Sample for the study.

Students of standard VII studying in Kerala state syllabus schools were the population considered for the Experimental Study. Sample of the study
consisted of three intact classrooms of standard VII consisting 40 students each.

Selection of topics for Treatment.

Selected topics from the prescribed text book of Mathematics for standard VII under Kerala State syllabus for the academic year 2015-2016 were selected as the content to be taught for the experimental and control groups treatments. The curriculum, syllabus, teachers' handbook, text book and other learning materials were studied in detail beforehand. Researcher also consulted teachers concerned and experts for proper guidance. Three chapters were selected according to the feasibility without interrupting the order of the syllabus. Selected topics were ‘Unchanging Relations’, ‘Repeated Multiplication’ and ‘Area of a Triangle’. Selected chapters were properly examined and found amenable for the three instructional strategies selected for the study.

Tools, Techniques and Learning Materials used for the study

For the effective execution of the experiment, researcher used the following Tools; Techniques and Learning Materials. It includes tools developed by the investigator and other tools developed by other authors.

Semi-structured Interview Schedule for Upper Primary School Mathematics Teachers (Hameed & Asha, 2013).

This Semi-Structured Interview Schedule was employed to a selected sample of Upper Primary School Mathematics teachers to obtain the background of the prevailing system of pedagogic transaction in Mathematics in Upper Primary Schools. The Schedule used to understand the diverse Instructional strategies adopted or experimented in teaching Mathematics in Upper Primary Schools, constraints faced by teachers in implementing these
strategies, and suggestions to overcome the constraints and alternative measures to be taken.

Verbal Group Test of Intelligence - VGTI (Kumar, Hameed & Prasanna, 1997).

For the study, Verbal Intelligence, the Confounding variable was measured using the Verbal Group Test of Intelligence (VGTI) developed by Kumar, Hameed, & Prasanna (1997). The test consists five sub tests of twenty multiple choice items (Totally 100 items) belong to five components namely; Verbal Analogy, Verbal classification, Numerical Reasoning, Verbal Reasoning and Comprehension.


Standard Progressive Matrices Test, developed by Raven (1958) was used to measure the Confounding Variable, Non-Verbal Intelligence. The test consists of five subtests of twelve items each and the maximum total score is 60.

General Data Sheet for Assessing Socio-Economic Status (SES).

General Data Sheet was used to collect the information regarding Income, Education and Occupation of parents, each for father and mother and family members.


This Inventory was used to assess the classroom environment of the students. Twelve major areas regarding the classroom situations were mentioned in the Inventory so as to elucidate the students to get a clear picture of the Classroom Environment.
Achievement Test in Mathematics – ATM (Hameed & Asha, 2014).

Achievement Test in Mathematics was developed and standardised by Hameed and Asha (2014) and was used as a Pre-test and Post-test on the topics selected for treatment to measure the Achievement in Mathematics.

Learning Styles Inventory (Hameed & Meharunnisa, 2014).

It is a three point scale with 52 items in the final scale regarding Visual, Auditory and Kinesthetic Learning Styles. Items in the Scale were developed on the basis of classification followed by Dunn & Dunn Model of Learning Style (1999), Fleming (1992) and Reid (1987).

Scale of Self Efficacy (Hameed & Nitha, 2014).

Scale of Self- Efficacy developed by Hameed and Nitha, (2014) was used to measure Self- Efficacy of students’ and the scale included major aspects like Social Self –Efficacy, Self- Efficacy for Self-Learning, Self- Efficacy for Achievement, and Self -Efficacy to meet others’ expectation.

Experimental Process.

Researcher contacted the heads of two schools and got prior permission to conduct the experiments. Considering the feasibility and practicality, the researcher selected Experiment Group I (BBL5) from Govt. Model Higher Secondary School, Calicut University campus, and Experiment Group II (CLS) and Control group from Puthur Pallikkal U. P. School, Malappuram. The three groups were given the same pre-tests to measure the Pre-experimental Status in terms of Achievement in Mathematics and Self-Efficacy which were measured using standardized tools.

Treatment.

- Experiment Group I was taught using Brain Based Learning Strategy.
Twenty class periods each having a time duration of an average 40 minutes was prepared, according to the steps prepared by Johnson, Johnson and Holubec (1994).

- Experiment Group II was taught using Circles of Learning Strategy of Co-operative Learning. Lesson transcripts were prepared according to the seven staged Brain Based Learning Strategy outlined by Jensen, (2008).

- Control group was taught using the Prevailing Activity Oriented Method of Teaching.

The topics selected and the time span was same for all the three groups selected.

During the course of the experiment, data on other variables such as Pre experimental status in terms of Achievement in Mathematics and Self Efficacy, Verbal Intelligence, Non-Verbal Intelligence, Learning Styles, Classroom Environment, and Socio-Economic status were collected from all the three groups using valid tools. Post Tests on Achievement test in Mathematics and Self Efficacy were conducted after the treatments in the respective groups.

After the data collection procedures, all the response sheets were scored in accordance with respective test manuals and scoring keys separately for each group. Scores of each tool were tabulated so as to do the analysis procedure.

**Statistical Techniques Used for the Study.**

The investigator followed both descriptive and inferential statistical techniques so as to reach the findings of the present study. The major statistical techniques used for the analysis were,
- *Percentage Analysis* was used to find the views of Upper Primary School Mathematics teachers regarding the Instructional Strategies.

- *Major Descriptive Statistics* like Mean, Median, Mode, Standard Deviation, Skewness and Kurtosis as preliminary analysis on the data.

- *One Way Factorial ANOVA* was used to compare the relevant variables between the Experimental Groups and the Control group. This statistical technique was employed to study whether significant difference exists between the Experimental Group I, Experimental Group II and Control group in case of mean scores and gain scores of Achievement in Mathematics and, Self Efficacy scores without controlling the effects of covariates. It was also used in equating the Experimental Group I, Experimental Group II and the Control Group in terms of Pre Experimental status of Achievement in Mathematics and Self-Efficacy, Verbal Intelligence, Non-Verbal Intelligence, Classroom Environment and Socio Economic Status.

- *Graphical representations* are also made suitably to compare the individual post test scores and gain scores of the three groups.

- *Effect size* was employed to find how much the effect of Instructional Strategies on Achievement and Self Efficacy is.

- *Two-Way Factorial ANCOVA* procedure was employed with four Covariates (Pre-experimental Status in terms of Achievement in Mathematics and Self Efficacy, Verbal Intelligence, Non-Verbal Intelligence and Classroom Environment) to find out the effectiveness of BBLS and CLS over AOMT, even after controlling the covariates singly and in combination.
Two Way ANOVA with 3 x 3 Factorial Design was employed to find out the main and interaction effects of Instructional Strategies and Learning Styles on Achievement in Mathematics and Self Efficacy. In the Two Way ANOVA procedure, three levels of Instructional Strategies (BBLS, CLS, and AOMT) and three levels of Learning Styles (Visual, Auditory and kinesthetic) were utilized.

Scheffe’ Test of Post-hoc Comparison was used after each ANCOVA so as to compare the adjusted criterion means of the two Experimental Group I, Experimental Group II and the Control Group, and after each One Way ANOVA and Two Way ANOVA procedure to study the group difference.

Major Findings of the Study

Major and relevant findings of the present study are summarized in this section. Results are presented in two heads; Findings of Preliminary Analysis and Major Findings.

Findings of Preliminary Survey.

Preliminary analysis was done at the initial stage of the research so as to find the views of Upper Primary School Mathematics teachers on prevailing strategies used for Mathematics instruction.

Prevailing Strategies used by Upper Primary School Mathematics teachers.

A semi structured interview was conducted on Upper Primary School Mathematics teachers during the initial stage of the study. Study revealed that majority of the teachers was aware of prevailing strategies in Mathematics Classrooms.
It was revealed that problem solving method, assignments and projects and Activity Oriented Method of Teaching are the most used strategies by Upper Primary School Mathematics teachers. Team teaching and Brain Based Learning Strategy are the least used strategies in classrooms.

From the interview, it was noted that teachers are well aware of the expected outcomes of different strategies like logical thinking, reasoning, technological advancement, sharing of knowledge, and ideas. But majority of the teachers show reluctance in adopting such strategies in normal classroom.

**Constrains faced by Upper Primary School Mathematics teachers in Implementing Strategies.**

Although the teachers are aware of varied strategies in imparting education, they face some impediments in implementing the strategies. The obstacles they face are:

- Time constraint
- Difficulty in class management
- Unwanted discussions in group activity
- Difficulty in evaluating the activities
- Lack of infrastructure facility
- Disinterest of students

Due to the above mentioned constraints, teachers are reluctant to implement innovative strategies.

**Measures suggested by Upper Primary School Mathematics teachers' to overcome the constraints in adopting Innovative Instructional Strategies.**

From the interview it was revealed that, teachers like the use effective strategies in their classrooms and they put forward the following measures to overcome the constraints they experience. They are:
• Training on new instructional strategies.
• Use of more learning aids & ICT, work books and better classroom infrastructure.
• Simplification of the context.
• Increase the class duration of Mathematics period or club two periods for successful promotion of innovative strategies.
• Restrict the class strength to 1:30 and whole promotion policy has to be avoided.

Findings of the Experimental Process

A concise discussion of the major findings of the study is presented in this section of the report. One Way ANOVA followed by Effect Size, Two Way Factorial ANCOVA and Two Way ANOVA were employed for different purposes. In Two Way Factorial ANCOVA, Pre Experimental Status in case of Achievement in Mathematics and Self Efficacy, Verbal Intelligence and Non-Verbal Intelligence and Classroom Environment as Covariates singly and in combination of the four at a time is used. In addition to the Covariance Analysis, Two way ANOVA were undertaken to examine the main and interaction effects of Instructional Strategies and Learning Styles on Achievement in Mathematics (Total and Objective wise scores) and Self Efficacy for Total Sample, Boys and Girls.

Results of One Way ANOVA.

One Way ANOVA was done to find whether there exist any significant difference between Experimental Group I (BCLS), Experimental Group II (CLS), and the Control group (Total sample, Boys and girls) in case of Achievement in Mathematics and Self- Efficacy, in terms of their Mean scores and Gain Scores without controlling the covariates. Scheffe’ Test of Post-hoc Comparison was used as a follow-up analysis, wherever the
Independent Variables (Instructional Strategies and Learning Styles) have significant effect on Achievement. Scheffe’ Test was employed to determine the group, which caused the group difference in terms of the Dependent Variable (Achievement in Mathematics –Total and Objective wise).

**One Way Analysis of Variance for Achievement in Mathematics (Total and Objective wise Score).**

Results of One Way Analysis of Variance, executed to find out the difference between three groups of Instructional Strategies (BBLS, CLS and AOMT) with regard to Achievement in Mathematics (Total and Objective wise scores) and to compare the three groups based on Instructional Strategies for Total Sample, Boys and Girls are presented in the following order.

1) **Comparison of the Mean Achievement in Mathematics (Total and Objective wise scores) of the Experimental Group I, Experimental Group II and the Control Group -Total Sample.**

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Mean Achievement in Mathematics (Total and Objective wise-except Creating) of VII standard students is significant \((p<.01)\) and for objective- Creating at \((p<.05)\) for the Total Sample. Mean Achievement in Mathematics (Total score and Objective wise scores) differ significantly among BBLS, CLS, and AOMT groups.

**Total Score**

i) BBLS group shows significantly higher levels of Achievement in Mathematics than CLS and Control group \((p<.01)\).

ii) CLS group shows significantly higher levels of Achievement in Mathematics than Control group \((p<.01)\).
**Objective - Remembering**

iii) BBLs and CLS groups show significantly higher levels of Achievement in Mathematics (Remembering) than Control group ($p<.01$).

iv) But, BBLs and CLS groups did not differ significantly on Achievement in Mathematics (Remembering) ($p = \text{n.s}$) for the Total Sample.

**Objective - Understanding**

v) BBLs group shows significantly higher levels of Achievement in Mathematics (Understanding) than CLS and Control groups ($p<.01$).

vi) CLS and Control groups did not differ significantly on Achievement in Mathematics (Understanding) ($p = \text{n.s}$) for the Total Sample.

**Objective – Applying**

vii) BBLs and CLS groups show significantly higher levels of Achievement in Mathematics (Understanding) than Control group ($p<.01$).

viii) But, BBLs and CLS groups did not differ significantly on Achievement in Mathematics (Applying) ($p = \text{n.s}$) for the Total Sample.

**Objective – Analysing**

ix) BBLs group shows significantly higher levels of Achievement in Mathematics (Analyzing) than CLS and Control groups ($p<.01$).
x) But, CLS and Control groups did not differ significantly on Achievement in Mathematics (Analyzing) \((p = n.s)\) for the Total Sample.

**Objective – Creating**

xi) BBLs group shows significantly higher levels of Achievement in Mathematics (Creating) than Control group \((p < .01)\).

xii) CLS and Control groups did not differ significantly on Achievement in Mathematics (Analyzing) \((p = n.s)\). Also, BBLs and CLS groups did not differ significantly on Achievement in Mathematics (Analyzing) \((p = n.s)\) for the Total Sample.

**Objective- Evaluating**

xiii) BBLs and CLS group shows significantly higher levels of Achievement in Mathematics (Evaluating) than Control group \((p < .01)\).

xiv) BBLs and CLS groups did not differ significantly on Achievement in Mathematics (Evaluating) \((p = n.s)\) for the Total Sample.

2) **Comparison of the Mean Achievement in Mathematics (Total score and Objective wise) of the Experimental Group I, Experimental Group II and Control Group - Boys.**

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Mean Achievement in Mathematics (Total and Objective wise scores- except Applying) of VII standard students is significant \((p < .01)\) and for objective- Applying \(F\) value is significant \((p < .05)\) for the Boys. Mean Achievement in Mathematics (Total score) differ significantly among BBLs, CLS, and AOMT groups.
**Total Score**

i) BBL5 and CLS groups shows significantly higher levels of Achievement in Mathematics Control group \((p<.01)\).

ii) BBL5 group shows significantly higher levels of Achievement in Mathematics than CLS group \((p<.01)\).

**Objective – Remembering**

iii) BBL5 and CLS group shows significantly higher levels of Achievement in Mathematics (Remembering) than Control group \((p<.01)\).

iv) But, BBL5 and CLS groups did not differ significantly on Achievement in Mathematics (Remembering) \((p = n.s)\) for Boys.

**Objective - Understanding**

v) BBL5 group shows significantly higher levels of Achievement in Mathematics (Understanding) than Control and CLS groups \((p<.01)\).

vi) But, CLS and Control groups did not differ significantly on Achievement in Mathematics (Understanding) \((p = n.s)\) for Boys.

**Objective – Applying**

vii) BBL5 and CLS groups shows significantly higher levels of Achievement in Mathematics (Understanding) than the Control group \((p<.05)\).

viii) BBL5 and CLS groups did not differ significantly on Achievement in Mathematics (Applying) \((p = n.s)\) for Boys.
Objective - Analysing

ix) BBLs group shows significantly higher levels of Achievement in Mathematics (Analyzing) than CLS group ($p<.05$) and Control group ($p<.01$).

x) But, CLS and Control groups did not differ significantly on Achievement in Mathematics (Analyzing) ($p = n.s$) for Boys.

Objective - Creating

xi) BBLs and CLS group shows significantly higher levels of Achievement in Mathematics (Creating) than Control group at ($p<.01$) and ($p<.05$) respectively.

xii) But, BBLs and CLS groups did not differ significantly on Achievement in Mathematics (Creating) ($p = n.s$) for Boys.

Objective - Evaluating

xiii) BBLs and CLS groups show significantly higher levels of Achievement in Mathematics (Evaluating) than Control group ($p<.01$).

xiv) But, BBLs and CLS groups did not differ significantly on Achievement in Mathematics (Evaluating) ($p = n.s$) for Boys.

3) Comparison of the Mean Achievement in Mathematics (Total score and Objective wise) of the Experimental Group I, Experimental Group II and Control Group –Girls.

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Mean Achievement Scores in Mathematics (Total Score and Objective wise except Remembering and Creating) of VII standard students is significant ($p<.01$) for the Girls. Mean Achievement Scores in Mathematics
for Objectives Remembering and Creating does not show any significance difference \( (F = n.s) \). Mean Achievement in Mathematics (Total score and Objective wise except Remembering and Creating) differ significantly among BBLS, CLS, and AOMT groups.

**Total Score**

i) BBLS group shows significantly higher levels of Achievement in Mathematics than CLS and Control groups \( (p<.01) \).

ii) CLS and Control groups did not differ significantly on Achievement in Mathematics \( (p = n.s.) \) for Girls for Total Score.

**Objective- Understanding**

iii) BBLS group shows significantly higher levels of Achievement in Mathematics (Understanding) than CLS and Control groups \( (p<.01) \).

iv) CLS and Control groups did not differ significantly on Achievement in Mathematics (Understanding) \( (p = n.s) \) for the Girls.

**Objective- Applying**

v) BBLS and CLS groups show significantly higher levels of Achievement in Mathematics (Applying) than Control group \( (p<.01) \).

vi) But BBLS and CLS group show similar Achievement in Mathematics (Applying) \( (p- n.s) \) for girls.

**Objective- Analysing**

vii) BBLS group shows significantly higher levels of Achievement in Mathematics (Analysing) than CLS and Control groups \( (p<.01) \).
viii) CLS group shows significantly higher levels of Achievement in Mathematics (Analyzing) than Control group ($p<.05$).

**Objective- Evaluating**

ix) BBLSS and CLS groups shows significantly higher levels of Achievement in Mathematics (Evaluating) than Control group ($p<.05$) and ($p<.01$) respectively.

x) BBLSS and CLS groups did not differ significantly on Achievement in Mathematics (Evaluating) ($p = n.s$) for the Girls.

4) **Comparison of the Mean Gain Scores on Achievement (Total Score) of the Experimental Group I, Experimental Group II and Control Group – Total Sample**

The effect of Instructional Strategies (BBLSS, CLS and Control -AOMT) on Mean Gain Scores of Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Mean Gain scores in Mathematics differ significantly among BBLSS, CLS, and AOMT groups.

i) BBLSS group shows significantly higher levels of Achievement in Mathematics than CLS and Control groups ($p<.01$).

ii) CLS group shows significantly higher levels of Achievement in Mathematics than Control group ($p<.05$) for the total Sample.

5) **Comparison of the Mean gain Scores on Achievement of the Experimental Group I, Experimental Group II and Control Group – Boys**

The effect of Instructional Strategies (BBLSS, CLS and Control -AOMT) on Mean Gain Scores of Achievement in Mathematics of VII
standard students is significant \((p<.01)\) for the Boys. Mean Gain scores in Mathematics differ significantly among BBLS, CLS, and AOMT groups.

i) BBLS group shows significantly higher levels of Gain scores in Achievement in Mathematics than CLS and Control groups \((p<.05)\) and \((p<.01)\) respectively.

ii) CLS group shows significantly higher levels of Achievement in Mathematics than Control group \((p<.05)\).

6) Comparison of the Mean gain Scores on Achievement of the Experimental Group I, Experimental Group II and Control Group – Girls

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Mean Gain Scores of Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Girls. Mean Gain scores in Mathematics differ significantly among BBLS, CLS, and AOMT groups.

i) BBLS group shows significantly higher levels of Gain scores in Achievement in Mathematics than CLS and Control group \((p<.01)\).

ii) CLS and Control group groups did not differ significantly on Gain score of Achievement in Mathematics \((p = n.s)\) for the Girls.

One Way Analysis of Variance for Self Efficacy

The One Way Analysis of Variance was executed to find the effect of Instructional Strategies (BBLS, CLS and AOMT) on Self Efficacy and to compare the three groups based on Instructional Strategies for Total Sample, Boys and Girls and it is presented in the following order.
7) *Comparison of the mean Self Efficacy of the Experimental Group I, Experimental Group II and Control Group - Total sample*

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on mean Self Efficacy Scores of VII standard students is significant (p<.01) for the Total Sample. Mean Self Efficacy Scores differ significantly among BBLs, CLS, and AOMT groups.

i) BBLs group shows significantly higher levels of Self Efficacy than Control and CLS groups (p<.01).

ii) CLS group do not differ significantly in Mean Self Efficacy scores than Control group (p = n.s).

8) *Comparison of the Mean Self Efficacy of the Experimental Group I, Experimental Group II and Control Group - Boys*

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Mean Self Efficacy Scores of VII standard students is significant (p<.01) for the Boys. Mean Self Efficacy Scores differ significantly among BBLs, CLS, and AOMT groups.

i) BBLs group shows significantly higher levels of Self Efficacy than Control and CLS groups (p<.01).

ii) CLS group do not differ significantly in Mean Self Efficacy scores than Control group (p = n.s) for Boys.

9) *Comparison of the Mean Self Efficacy of the Experimental Group I, Experimental Group II and Control Group - Girls*

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Mean Self Efficacy Scores of VII standard students is significant
(p<0.05) for Girls. Mean Self Efficacy Scores differ significantly among BBLS, CLS, and AOMT groups.

i) BBLS group do not differ significantly in Mean Self Efficacy scores than Control group (p = n.s).

ii) CLS group shows significantly higher levels of Self Efficacy than Control group (p<0.05).

iii) BBLS group shows significantly higher levels of Self Efficacy than CLS group (p<.05) for Girls.

10) Comparison of the Gain scores of Self Efficacy of the Experimental Group I, Experimental Group II and Control Group - Total sample

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on mean Self Efficacy Scores of VII standard students is significant (p<.01) for the Total Sample. Gain Self Efficacy Scores differ significantly among BBLS, CLS, and AOMT groups.

i) BBLS group shows significantly higher levels of Self Efficacy than CLS and Control groups (p<.01).

ii) CLS group shows significantly higher levels of Self Efficacy than Control group (p<.01).

11) Comparison of the Gain scores of Self Efficacy of the Experimental Group I, Experimental Group II and Control Group - Boys

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Mean Self Efficacy Scores of VII standard students is significant (p<.01) for the Boys. Gain Self Efficacy Scores differ significantly among BBLS, CLS, and AOMT groups.
i) BBLs group shows significantly higher levels of Self Efficacy than Control group \( (p<.01) \) and CLS group \( (p<.05) \) respectively.

ii) CLS group shows significantly higher levels of Self Efficacy than Control group \( (p<.01) \) for Boys.

12) Comparison of the Gain scores of Self Efficacy of the Experimental Group I, Experimental Group II and Control Group - Girls

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Gain Self Efficacy Scores of VII standard students is significant \( (p<.01) \) for the Girls. Mean Self Efficacy Scores differ significantly among BBLs, CLS, and AOMT groups.

i. BBLs and CLS groups shows significantly higher levels of Self Efficacy than Control group \( (p<.05) \) and \( (p<.01) \) respectively.

ii. BBLs group do not show significant difference in Mean Gain Scores of Self Efficacy than CLS group \( (p= n.s) \) for Girls.

13) Effect Size of Brain Based Learning Strategy and Circles of Learning Strategy on Achievement in Mathematics

i) Brain Based Learning Strategy showed strong effect on Achievement in Mathematics when compared to Control group.

ii) Brain Based Learning strategy also has moderate effect on Achievement in Mathematics when compared to Circles of Learning Strategy.

iii) Circles of Learning Strategy has moderate effect on Achievement in Mathematics when compared to Control Group. It is clear that Brain Based Learning strategy proves more effect than Circles of Learning and Activity Oriented method of Teaching.
14) **Effect Size of Brain Based Learning Strategy and Circles of Learning Strategy on Self Efficacy**

i) Brain Based Learning Strategy showed moderate effect on Self Efficacy when compared to Control group.

ii) Brain Based Learning Strategy also has moderate effect Self Efficacy when compared to Circles of Learning Strategy.

iii) Circles of Learning Strategy has weak effect on Self Efficacy when compared to Control group. It is clear that Brain Based Learning strategy proves more effect than Circles of Learning and Activity Oriented method of Teaching.

**Results of the Two Way Factorial ANCOVA for Achievement in Mathematics.**

ANOVA was done to find out the effectiveness of Brain Based Learning Strategy and Circles of Learning Strategy over Activity Oriented Method of Teaching, in case of Achievement in Mathematics (Total and Objective wise) after controlling the Covariates (Pre Experimental Status in terms of Achievement, Verbal Intelligence, Non Verbal Intelligence and Classroom Environment) singly and in Combination for the Total Sample is presented in this part.

15) **Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Total Score) – Pre Experimental Status in terms of Achievement as Covariate.**

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics (Total score and Objective wise) for the Total sample, were statistically significant at (p < .01) when the effect of Pre Experimental Status in terms of Achievement removed singly. From the
Scheffe Test of Post-hoc Comparison, Achievement in Mathematics scores differ significantly among BBLS, CLS, and AOMT groups even after controlling the Pre Experimental Status in Achievement in Mathematics.

i) BBLS group is more effective for higher levels of Achievement in Mathematics than Control group ($p<.01$).

ii) CLS group shows significantly higher levels of Achievement than Control group ($p<.05$).

iii) BBLS group do not show significant difference than CLS group ($p = n.s$) for Total Sample.

16) Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Remembering) – Pre Experimental Status in Achievement as Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Achievement in Mathematics scores (Remembering) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Pre Experimental Status in terms of Achievement removed singly.

i) BBLS group shows significantly higher levels of Achievement than Control group ($p<.01$).

ii) CLS group shows significantly higher levels of Achievement than Control group ($p<.05$).

iii) BBLS group do not show significant difference than CLS group ($p = n.s$) for Total Sample.
17) **Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Understanding) – Pre Experimental Status in Achievement as Covariate**

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Understanding) differ significantly among BBLs, CLS, and AOMT groups even, when the effect of Pre Experimental Status in terms of Achievement is removed singly.

i) BBLs group shows significantly higher levels of Achievement in Mathematics than Control group (p<.01)

ii) CLS group do not show significant difference than Control group (p = n.s).

iii) BBLs group shows significantly higher levels of Achievement than CLS group (p<.05) for Total Sample.

18) **Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Applying) – Pre Experimental Status in Achievement as covariate**

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Applying) differ significantly among BBLs, CLS, and AOMT groups even, when the effect of Pre Experimental Status in terms of Achievement is removed singly.

i) BBLs and CLS groups show significantly higher levels of Achievement than Control group (p<.01)
ii) BBLS group do not show significant difference than CLS group 
\( p = n.s. \).

19) **Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Analyzing) – Pre Experimental Status in Achievement as Covariate**

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \( p<.01 \) for the Total Sample. Achievement in Mathematics scores (Analyzing) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Pre Experimental Status in terms of Achievement removed singly.

i) BBLS group shows significantly higher levels of Achievement than CLS and Control groups \( p<.01 \)

ii) CLS group do not show significant difference than Control group \( p = n.s. \).

20) **Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Creating) – Pre Experimental Status in Achievement as Covariate**

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \( p<.01 \) for the Total Sample. Achievement in Mathematics scores (Creating) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Pre Experimental Status in terms of Achievement removed singly.

i) BBLS group shows significantly higher levels of Achievement than Control group \( p<.01 \)
ii) CLS group do not show significant difference than Control group
\((p = \text{n.s})\)

iii) BBLS group do not show significantly difference than CLS group
\((p = \text{n.s})\) for Total Sample.

21) Effectiveness of BBLS and CLS over Control in case of
Achievement in Mathematics (Evaluating) – Pre Experimental Status
in Achievement as Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores (Evaluating) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Pre Experimental Status in terms of Achievement removed singly.

i) BBLS and CLS groups show significantly higher levels of
Achievement than Control group \((p<.01)\) and \((p<.05)\) respectively.

ii) BBLS group do not show significant difference than CLS group
\((p = \text{n.s})\) for Total Sample.

22) Effectiveness of BBLS and CLS over Control in case of
Achievement in Mathematics (Total Score) – Verbal Intelligence as
Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores differ significantly among BBLS, CLS, and AOMT groups even when the effect of Verbal Intelligence removed singly.
i) BBLs group shows significantly higher levels of Achievement than Control group ($p<.01$)

iv) CLS group shows significantly higher levels of Achievement than Control group ($p<.05$).

v) BBLs group shows significantly higher levels of Achievement than CLS group ($p<.05$) for Total Sample.

23) Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Remembering) – Verbal Intelligence as Covariate

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Achievement in Mathematics scores (Remembering) differ significantly among BBLs, CLS, and AOMT groups even when the effect of Verbal Intelligence removed singly.

i) BBLs group shows significantly higher levels of Achievement than Control group ($p<.01$)

ii) CLS group shows significantly higher levels of Achievement than Control group ($p<.05$).

iii) BBLs group do not show significant difference than CLS group ($p = n.s$) for Total Sample.

24) Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Understanding) – Verbal Intelligence as Covariate

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Achievement in Mathematics scores
(Understanding) differ significantly among BBLs, CLS, and AOMT groups when the effect of Verbal Intelligence removed singly.

i) BBLs group shows significantly higher levels of Achievement than Control group ($p<.01$)

ii) CLS group do not show significant difference than Control group ($p = n.s$).

iii) BBLs group shows significantly higher levels of Achievement than CLS group ($p<.01$) for Total Sample.

25) **Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Applying) – Verbal Intelligence as Covariate**

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p=.01$) for the Total Sample. Achievement in Mathematics scores (Applying) differ significantly among BBLs, CLS, and AOMT groups even when the effect of Verbal Intelligence removed singly.

i) BBLs group shows significantly higher levels of Achievement than Control group ($p<.01$)

ii) CLS group shows significantly higher levels of Achievement than Control group ($p<.01$)

iii) BBLs group do not show significantly difference than CLS group ($p = n.s$) for Total Sample.

26) **Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Analyzing) – Verbal Intelligence as Covariate**
The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Analyzing) differ significantly among BBLs, CLS, and AOMT groups even when the effect of Verbal Intelligence removed singly.

i) BBLs group shows significantly higher levels of Achievement than Control group (p<.01)

ii) CLS group do not show significant difference than Control group (p = n.s).

iii) BBLs group shows significantly higher levels of Achievement than CLS group (p<.01) for Total Sample.

27) Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Creating) – Verbal Intelligence as Covariate

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Creating) differ significantly among BBLs, CLS, and AOMT groups even when the effect of Verbal Intelligence removed singly.

i) BBLs group shows significantly higher levels of Achievement than Control group (p<.01)

ii) CLS group do not show significant difference than Control group (p = n.s)

iii) BBLs group do not show significantly difference than CLS group (p = n.s) for Total Sample.
28) **Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Evaluating) – Verbal Intelligence as Covariate**

The effect of Instructional Strategies (BBLS, CLS and Control -AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Evaluating) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Verbal Intelligence removed singly.

i) BBLS group shows significantly higher levels of Achievement than Control group (p<.01)

ii) CLS group shows significantly higher levels of Achievement than Control group (p<.05)

iii) BBLS group do not show significant difference than CLS group (p = n.s) for Total Sample.

29) **Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Total Score) – Non Verbal Intelligence as Covariate**

The effect of Instructional Strategies (BBLS, CLS and Control -AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores differ significantly among BBLS, CLS, and AOMT groups even when the effect of Non Verbal Intelligence removed singly.

i. BBLS group shows significantly higher levels of Achievement than Control group (p<.01)

ii. CLS group shows significantly higher levels of Achievement than Control group (p<.05).
iii. BBLS group shows significantly higher levels of Achievement than CLS group \( (p<.05) \) for Total Sample.

30) Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Remembering) – Non Verbal Intelligence as Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \( (p<.01) \) for the Total Sample. Achievement in Mathematics scores (Remembering) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Non Verbal Intelligence removed singly.

i. BBLS group shows significantly higher levels of Achievement than Control group \( (p<.01) \)

ii. CLS group shows significantly higher levels of Achievement than Control group \( (p<.05) \).

iii. BBLS group do not show significant difference than CLS group \( (p = n.s) \) for Total Sample.

31) Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Understanding) – Non Verbal Intelligence Controlled

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \( (p<.01) \) for the Total Sample. Achievement in Mathematics scores (Understanding) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Non Verbal Intelligence removed singly.
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i. BBLSS group shows significantly higher levels of Achievement than Control group ($p<.01$)

ii. CLS group do not show significantly difference than Control group ($p = n.s$).

iii. BBLSS group shows significantly higher levels of Achievement than CLS group ($p<.01$) for Total Sample.

32) Effectiveness of BBLSS and CLS over Control in case of Achievement in Mathematics (Applying) – Non Verbal Intelligence as Covariate

The effect of Instructional Strategies (BBLSS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Achievement in Mathematics scores (Applying) differ significantly among BBLSS, CLS, and AOMT groups even when the effect of Non Verbal Intelligence removed singly.

i) BBLSS group shows significantly higher levels of Achievement than Control group ($p<.01$)

ii) CLS group shows significantly higher levels of Achievement than Control group ($p<.05$)

iii) BBLSS group do not show significant difference than CLS group ($p = n.s$) for Total Sample.

33) Effectiveness of BBLSS and CLS over Control in case of Achievement in Mathematics (Analyzing) – Non Verbal Intelligence as Covariate

The effect of Instructional Strategies (BBLSS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Achievement in Mathematics
(Analyzing) differ significantly among BBLs, CLS, and AOMT groups even when the effect of Non Verbal Intelligence removed singly.

i) BBLs group shows significantly higher levels of Achievement than Control group \((p<.01)\)

ii) CLS group do not show significant difference than Control group \((p = n.s)\).

iii) BBLs shows significantly higher levels of Achievement than CLS group \((p<.01)\) for Total Sample.

**34) Effectiveness of Instructional Strategies on Achievement in Mathematics (Creating) – Non Verbal Intelligence as Covariate**

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores (Creating) differ significantly among BBLs, CLS, and AOMT groups even when the effect of Non Verbal Intelligence removed singly.

i. BBLs group shows significantly higher levels of Achievement than Control group \((p<.01)\)

ii. CLS group do not show significant difference than Control group \((p = n.s)\)

iii. BBLs group do not show significant difference than CLS group \((p = n.s)\) for Total Sample.

**35) Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Evaluating) – Non Verbal Intelligence as Covariate**

The effect of Instructional Strategies (BBLs, CLS and Control -
AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores (Evaluating) differ significantly among BBLS, CLS, and AOMT groups even after controlling the Non Verbal Intelligence.

i) BBLS group shows significantly higher levels of Achievement than Control group \((p<.01)\)

ii) CLS group shows significantly higher levels of Achievement than Control group \((p<.05)\)

iii) BBLS group do not show significant difference than CLS group \((p = \text{n.s})\) for Total Sample.

36) Effectiveness BBLS and CLS over Control in case of Achievement in Mathematics (Total Score) – Classroom Environment as Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores differ significantly among BBLS, CLS, and AOMT groups even when the effect of Classroom Environment removed singly.

i) BBLS group shows significantly higher levels of Achievement than Control group \((p<.01)\)

ii) CLS group shows significantly higher levels of Achievement than Control group \((p<.05)\).

iii) BBLS group do not show significant difference than CLS group \((p = \text{n.s})\) for Total Sample.
37) Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Remembering) – Classroom Environment as Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Remembering) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Classroom Environment removed singly.

i) BBLS group shows significantly higher levels of Achievement than Control group (p<.01)

ii) CLS group shows significantly higher levels of Achievement than Control group (p<.05).

iii) BBLS group do not show significantly difference than CLS group (p = n.s) for Total Sample.

38) Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Understanding) – Classroom Environment as Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Understanding) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Classroom Environment removed singly.

i) BBLS group shows significantly higher levels of Achievement than Control group (p<.01)

ii) CLS group do not show significantly difference than Control group (p = n.s).
iii) BBLs group shows significant higher levels of Achievement than CLS group \((p<.05)\) for Total Sample.

39) Effectiveness of Instructional Strategies on Achievement in Mathematics (Applying) – Classroom Environment as Covariate

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores (Applying) differ significantly among BBLs, CLS, and AOMT groups even when the effect of Classroom Environment removed singly.

i) BBLs group shows significantly higher levels of Achievement than Control group \((p<.01)\)

ii) CLS group shows significantly higher levels of Achievement than Control group \((p<.01)\)

iii) BBLs group do not show significant difference than CLS group \((p = n.s)\) for Total Sample.

40) Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Analyzing) – Classroom Environment as Covariate

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores (Analyzing) differ significantly among BBLs, CLS, and AOMT groups even when the effect of Classroom Environment removed singly.

i) BBLs group shows significantly higher levels of Achievement than Control group \((p<.01)\)

ii) CLS group do not show significant difference than Control group \((p = n.s)\).
iii) BBLS group shows significantly higher levels of Achievement than CLS group \((p<.01)\) for Total Sample.

41) Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Creating) – Classroom Environment as Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores (Creating) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Classroom Environment removed singly.

i) BBLS group shows significantly higher levels of Achievement than Control group \((p<.01)\)

ii) CLS group do not show significantly difference than Control group \((p = \text{n.s})\)

iii) BBLS group do not show significantly difference than CLS group \((p = \text{n.s})\) for Total Sample.

42) Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Evaluating) – Classroom Environment as Covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores (Evaluating) differ significantly among BBLS, CLS, and AOMT groups even when the effect of Classroom Environment removed singly.

i) BBLS group shows significantly higher levels of Achievement than Control group \((p<.01)\)
Summary

ii) CLS group shows significantly higher levels of Achievement than Control group \((p<.01)\)

iii) BBL S group do not show significant difference than CLS group \((p = \text{n.s})\) for Total Sample.

43) Effectiveness of BBL S and CLS over Control in case of Achievement in Mathematics (Total Score) – Pre Experimental Status of Achievement in Mathematics, Verbal Intelligence, Non-Verbal Intelligence Classroom Environment as Covariates in Combination.

The effect of Instructional Strategies (BBL S, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores differ significantly among BBL S, CLS, and AOMT groups even when the effect of four Covariates are removed in combination.

i) BBL S group shows significantly higher levels of Achievement than Control group \((p<.01)\).

ii) CLS group do not show significant difference than Control group \((p = \text{n.s})\).

iii) BBL S group shows significantly higher levels of Achievement than CLS group \((p<.05)\) for Total Sample.

44) Effectiveness of BBL S and CLS over Control in case of Achievement in Mathematics (Remembering) – Covariates in Combination

The effect of Instructional Strategies (BBL S, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant \((p<.01)\) for the Total Sample. Achievement in Mathematics scores (Remembering) differ significantly among BBL S, CLS, and AOMT groups even after controlling the Covariates in Combination.
i) BBLs group shows significantly higher levels of Achievement than Control group ($p<.01$) 

ii) CLS group shows significantly higher levels of Achievement than Control group ($p<.05$).

iii) BBLs group do not show significant difference than CLS group ($p = n.s$) for Total Sample.

45) Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Understanding) – Covariates in Combination

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Achievement in Mathematics scores (Understanding) differ significantly among BBLs, CLS, and AOMT groups even when the effect of four covariates are removed in combination.

i) BBLs group shows significantly higher levels of Achievement than Control group ($p<.01$).

ii) CLS group do not show significant difference than Control group ($p = n.s$).

iii) BBLs group shows significantly higher levels of Achievement than CLS group ($p<.01$) for Total Sample.

46) Effectiveness of BBLs and CLS over Control in case of Achievement in Mathematics (Applying) – Covariates in Combination

The effect of Instructional Strategies (BBLs, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Achievement in Mathematics scores
(Applying) differ significantly among BBLS, CLS, and AOMT groups even when the effect of four covariates are removed in combination.

i) BBLS group shows significantly higher levels of Achievement than Control group ($p<.01$)

ii) CLS group shows significantly higher levels of Achievement than Control group ($p<.05$)

iii) BBLS group do not show significantly difference than CLS group ($p = n.s$) for Total Sample.

47) **Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Analyzing) – Covariates in Combination**

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant ($p<.01$) for the Total Sample. Achievement in Mathematics scores (Analyzing) differ significantly among BBLS, CLS, and AOMT groups even when the effect of four covariates are removed in combination.

i) BBLS group shows significantly higher levels of Achievement than Control group ($p<.01$)

ii) CLS group do not show significant difference than Control group ($p = n.s$).

iii) BBLS group shows significantly higher levels of Achievement than CLS group ($p<.01$) for Total Sample.

48) **Effectiveness of BBLS and CLS over Control in case of Achievement in Mathematics (Creating) – Covariates in Combination**

The effect of Instructional Strategies (BBLS, CLS and Control -
AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Creating) differ significantly among BCLS, CLS, and AOMT groups even when the effect of four covariates are removed in combination.

i) BCLS group shows significantly higher levels of Achievement than Control group (p<.01).

ii) CLS group do not show significantly difference than Control group (p = n.s)

iii) BCLS group do not show significant difference than CLS group (p = n.s) for Total Sample.

49) Effectiveness of BCLS and CLS over Control in case of Achievement in Mathematics (Evaluating) – Covariates in Combination

The effect of Instructional Strategies (BCLS, CLS and Control - AOMT) on Achievement in Mathematics of VII standard students is significant (p<.01) for the Total Sample. Achievement in Mathematics scores (Evaluating) differ significantly among BCLS, CLS, and AOMT groups even when the effect of four covariates are removed in combination.

i) BCLS group shows significantly higher levels of Achievement than Control group (p<.01)

ii) CLS group shows significantly higher levels of Achievement than Control group (p<.05)

iii) BCLS group do not show significantly difference than CLS group (p = n.s) for Total Sample.
Results of the Two Way Factorial ANCOVA for Self Efficacy

ANCOVA done to find out the effectiveness of Instructional Strategies Brain Based Learning Strategy, Circles of Learning Strategy over Activity Oriented Method of Teaching on Self Efficacy after controlling the Covariates (Pre Experimental Status in terms of Self Efficacy, Verbal Intelligence, Non Verbal Intelligence and Classroom Environment singly and in Combination) for Total Sample is presented in this part.

50) Effectiveness of BBLS and CLS over Control in case of Self Efficacy – Pre Experimental Status in terms of Self Efficacy Controlled

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Self-Efficacy of VII standard students is significant (p<.01) for the Total Sample. Self Efficacy scores differ significantly among BBLS, CLS, and AOMT groups even when the effect of Pre Experimental Status in Self Efficacy removed singly.

i) BBLS group shows significantly higher levels of Self Efficacy than Control group (p<.01)

ii) CLS group do not show significant difference than Control group (p = n.s).

iii) CLS group shows significantly higher levels of Self Efficacy than Control group (p<.01) Total Sample.

51) Effectiveness of BBLS and CLS over Control in case of Self Efficacy – Verbal Intelligence as covariate

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Self Efficacy of VII standard students is significant (p<.01) for the Total Sample. Self Efficacy scores differ significantly among BBLS, CLS,
and AOMT groups even when the effect of Verbal Intelligence is removed singly.

i) BBL's group shows significantly higher levels of Self Efficacy than Control group ($p < .01$).

ii) CLS group do not show significantly difference than Control group ($p = n.s.$).

iii) CLS group shows significantly higher levels of Self Efficacy than Control group ($p < .01$) Total Sample.

52) Effectiveness of BBL's and CLS over Control in case of Self Efficacy

Non Verbal Intelligence as covariate

The effect of Instructional Strategies (BBL's, CLS and Control - AOMT) on Self Efficacy of VII standard students is significant ($p < .01$) for the Total Sample. Self Efficacy scores differ significantly among BBL's, CLS, and AOMT groups even when the effect of Non Verbal Intelligence is removed singly.

i) BBL's group shows significantly higher levels of Self Efficacy than Control group ($p < .01$)

ii) CLS group do not show significantly difference than Control group ($p = n.s.$).

iii) CLS group shows significantly higher levels of Self Efficacy than Control group ($p < .01$) Total Sample.

53) Effectiveness of BBL's and CLS over Control in case of Self Efficacy

– Classroom Environment as covariate

The effect of Instructional Strategies (BBL's, CLS and Control - AOMT) on Self Efficacy of VII standard students is significant ($p < .01$) for
the Total Sample. Self Efficacy scores differ significantly among BBLS, CLS, and AOMT groups even when the effect of Classroom Environment is removed singly.

i. BBLS group shows significantly higher levels of Self Efficacy than Control group ($p<.01$)

ii. CLS group do not show significantly difference than Control group ($p = n.s$).

iii. CLS group shows significantly higher levels of Self Efficacy than Control group ($p<.01$) Total Sample.

54) Effectiveness of BBLS and CLS over Control in case of Self-Efficacy – Pre Experimental Status in Self Efficacy, Verbal Intelligence, Non-Verbal Intelligence and Classroom Environment as Covariates in Combination

The effect of Instructional Strategies (BBLS, CLS and Control - AOMT) on Self Efficacy of VII standard students is significant ($p<.01$) for the Total Sample. Self Efficacy scores differ significantly among BBLS, CLS, and AOMT groups even when the effect of four covariates is removed in combination.

i. BBLS group shows significantly higher levels of Self Efficacy than Control group ($p<.01$).

ii. CLS group do not show significantly difference than Control group ($p = n.s$).

iii. CLS group shows significantly higher levels of Self Efficacy than Control group ($p<.01$) Total Sample.
Results of the Two Way Analysis (ANOVA) of Variance for Achievement in Mathematics

In the present study, Two-Way Factorial ANOVA was utilized to examine whether any change in the levels of the Independent Variables (Instructional Strategies and Learning Styles) create variation in Achievement in Mathematics (Total score and Objectivewise) or not. Main and interaction effects of the Independent Variables are interpreted using the results of Two Way ANOVA.

Scheffe' Test of Post-hoc Comparison was used as a follow-up analysis, wherever the Independent Variables have significant main effect on Achievement in Mathematics. Results of the Analysis of Variance for Achievement for the Total sample, Boys and Girls are presented briefly in this section of the findings.

55) Two Way ANOVA for the Achievement in Mathematics (Total and Objective wise) by Instructional Strategies (BBLS, CLS and AOMT) by Learning Styles for Total Sample

i) The main effect of Instructional Strategies on Achievement in Mathematics (Total and Objective wise) of Standard VII students for the Total sample is significant (p<.01).

ii) The main effect of Learning Styles on Achievement in Mathematics (Total score) of Standard VII students for the Total sample is not significant (p= n.s).

iii) The interaction effect of Instructional Strategies and Learning Styles on Achievement in Mathematics (Total and Objective-wise scores) for Total sample are not found significant (p=n.s.).
56) Two Way ANOVA for the Achievement in Mathematics (Total Score) by Instructional Strategies (BBLS, CLS and AOMT) by Learning Styles for Boys

i) The main effect of Instructional Strategies on Achievement in Mathematics (Total Score and Objectives except Understanding and Creating) of VII standard students is significant (p<.01) for the Boys.

ii) The main effect of Learning Styles on Achievement in Mathematics (Total score and Objectives) of Standard VII students for the Boys is not significant (p= n.s).

iii) The interaction effect of Instructional Strategies and Learning Styles on Achievement in Mathematics (Total and Objective-wise scores) for Boys are not found significant (p=n.s).

57) Two Way ANOVA for the Achievement in Mathematics (Total Score and Objectives) by Instructional Strategies (BBLS, CLS and AOMT) by Learning Styles for Girls

i) The main effect of Instructional Strategies on Achievement in Mathematics (Total Score and Objective Evaluating) of VII standard students is significant (p<.01) except Evaluating (p= n.s) for Girls.

ii) The main effect of Learning Styles on Achievement in Mathematics (Objectives- Understanding and Evaluating) of VII standard students is significant (p<.01) for the Girls. Total score and Objectives except Understanding and Evaluating are not found significant (p= n.s) for Girls.

iii) The interaction effect of Instructional Strategies and Learning Styles on Achievement in Mathematics (Total and Objective-wise scores) for Girls are not found significant (p=n.s).
Results of the Two Way Analysis of Variance (ANOVA) for Self Efficacy

In the present study, Two-Way Factorial ANOVA was utilized to examine whether any change in the levels of the Independent Variables (Instructional Strategies and Learning Styles) create variation in Self Efficacy or not. Main and interaction effects of the Independent Variables are interpreted using the results of ANOVA.

Scheffe' Test of Post-hoc Comparison was used as a follow-up analysis, wherever the Independent Variables have significant main and interaction effect on Achievement in Mathematics. Results of the Analysis of Variance for Achievement for the Total sample, Boys and Girls are presented briefly in this section of the findings.

58) Two Way ANOVA for the Self Efficacy by Instructional Strategies (BBLS, CLS and Control) by Learning Styles for Total Sample

i) The main effect of Instructional Strategies on Self Efficacy of Standard VII students for the Total sample is significant (p<.01).

ii) The main effect of Learning Styles on Self Efficacy for the Total sample is not significant (p= n.s.).

iii) The interaction effect of Instructional Strategies and Learning Styles on Self Efficacy for Total sample are not found significant (p=n.s.).

59) Two Way ANOVA for the Self Efficacy by Instructional Strategies (BBLS, CLS and AOMT) by Learning Styles for Boys

i) The main effect of Instructional Strategies on Self Efficacy of VII standard students is significant (p<.01) for the Boys.
ii) The main effect of Learning Styles on Self Efficacy for the Boys is not significant (p= n.s).

iii) The interaction effect of Instructional Strategies and Learning Styles on Self Efficacy for Boys are not found significant (p=n.s.).

59) Two Way ANOVA for the Self Efficacy by Instructional Strategies (BBLS, CLS and AOMT) by Learning Styles for Girls

i) The main effect of Instructional Strategies on Self Efficacy of VII standard students is not significant (p= n.s) for the Girls.

ii) The main effect of Learning Styles on Self Efficacy not significant (p= n.s).

iii) The interaction effect of Instructional Strategies and Learning Styles on Self Efficacy for Girls are not found significant (p=n.s).

Tenability of Hypotheses

The tenability of the hypotheses stated for the present experimental study are examined, considering the major findings of the study.

1. Hypothesis one states that “There will be no significant difference in the mean Achievement in Mathematics (Total and Objective wise scores) of the Experimental and Control groups for the Total sample, Boys and Girls”.

   For the Total Score, One-Way ANOVA for the data revealed that the effect of Instructional Strategies on Mean Achievement in Mathematics is significant. From the Schefe Test of Post –hoc Comparison, three out of three ANOVA yielded significant difference in Achievement in Mathematics among BBLS, CLS, and AOMT for the Total Sample, Boys and Girls is found.
For the Objective wise Scores (except Remembering and Creating for Girls) the effect of Instructional Strategies on Mean Achievement in Mathematics is significant. (Mean scores of the Achievement in Mathematics (for the relevant variables) differ significantly among BBLS, CLS, and AOMT. From the Scheffe Test of Post –hoc Comparison, six out of six comparisons on Objective wise scores yielded significant difference, for Total Sample and Boys. Four Out of Six ANOVA yielded (except Remembering and Creating) significant difference for Girls. Thus the first hypothesis is rejected.

2. Hypothesis two states that “There will be no significant difference in the mean Gain score of Achievement in Mathematics of the Experimental and Control groups for the Total sample, Boys and Girls”.

Analysis of the data revealed that the effect of Instructional Strategies on Mean Gain scores of Achievement is significant. Mean scores of the Achievement in Mathematics differ significantly among BBLS, CLS, and AOMT for Total Sample, Boys and Girls. From the Scheffe Test of Post –hoc Comparison, the Gain scores yielded significant difference, for Total Sample, Boys, and Girls. Hence the second hypothesis is rejected.

3. Hypothesis three states that “There will be no significant difference in the mean Self Efficacy of the Experimental and Control groups for the Total sample, Boys and Girls”.

Analysis of the data revealed that the effect of Instructional Strategies on Mean Self- Efficacy scores is significant ($p<.01$) for Total Sample and Boys. It also reveals Mean Self- Efficacy scores is significant ($p<.05$) for Girls. From the Scheffe Test of Post –hoc Comparison, the Mean Self Efficacy scores yielded significant difference, for Total Sample, Boys, and Girls. Hence the third hypothesis is rejected.
4. Hypothesis four states that “There will be no significant difference in the mean Gain Score of Self-Efficacy of the Experimental and Control Groups for the Total sample, Boys and Girls”.

Analysis of the data revealed that the effect of Instructional Strategies on Mean Gain scores of Self-Efficacy scores is significant ($p<.01$) for Total Sample, Boys. It also reveals mean Gain Self-Efficacy scores is significant ($p<.05$) for Girls. From the Scheffe Test of Post–hoc Comparison, the Mean Self Efficacy scores yielded significant difference, for Total Sample, Boys and Girls. Hence the fourth hypothesis is rejected.

5. Hypothesis five states that “Students taught through Brain Based Learning Strategy (BBLS) will not differ significantly from Students taught through Activity Oriented Method of Teaching (AOMT) in terms of Achievement in Mathematics of standard VII Students”.

To test this hypothesis, Two Way Factorial ANCOVA followed by Scheffe’ Test of Post-hoc Comparison were employed. Analysis of the data revealed that the effect of Instructional Strategies on Achievement in Mathematics (Total and Objective wise) between BBLS and AOMT is significant. Significant difference in Achievement (Total and Objective wise scores) between the BBLS and Control groups was found in 35 out of 35 ANCOVA done, in favour of the BBLS. From the Scheffe Test of Post-hoc Comparison, it also reveals that BBLS group is effective for higher levels of Achievement in Mathematics (Total and Objective wise) than the Control group Hence the fifth hypothesis is rejected.

6. Hypothesis six states that “Students taught through Circles of Learning Strategy (CLS) will not differ significantly from Students taught through Activity Oriented Method of Teaching (AOMT) in terms of Achievement in Mathematics of standard VII Students”.

To test this hypothesis, Two Way Factorial ANCOVA followed by
Scheffe’ Test of Post-hoc Comparison were employed. Analysis of the data revealed that the effect of Instructional Strategies on Achievement in Mathematics (Total and Objective wise) between CLS and AOMT is significant. Out of 45 ANCOVA 19 ANCOVA was in favour of the BBLS group. Hence the sixth hypothesis is partially rejected.

7. Hypothesis seven states that “Students taught through Brain Based Learning Strategy (BBLS) will not differ significantly from Students taught through Circles of Learning Strategy (CLS) in terms of Achievement in Mathematics of standard VII Students”.

Analysis of the data revealed that the effect of Instructional Strategies on Achievement in Mathematics is significant between BBLS and CLS groups. Out of 35 ANCOVA only 13 ANCOVA was in favour of BBLS. Hence the seventh hypothesis is rejected.

8. Hypothesis eight states that “Students taught through Brain Based Learning Strategy (BBLS) will not differ significantly from Students taught through Activity Oriented Method of Teaching (AOMT) in terms of Self Efficacy of standard VII Students”.

Analysis of the data revealed that the effect of Instructional Strategies on Self Efficacy is significant between BBLS and AOMT. 5 Out of 5 ANCOVA favored BBLS for Self Efficacy. Hence the eighth hypothesis is rejected.

9. Hypothesis nine states that “Students taught through Circles of Learning Strategy (CLS) will not differ significantly from Students taught through Activity Oriented Method of Teaching (AOMT) in terms of Self Efficacy of standard VII Students”.

Analysis of the data revealed that the effect of Instructional Strategies on Self Efficacy is not significant between CLS and AOMT. Hence the ninth hypothesis is accepted.
10. Hypothesis ten states that “Students taught through Brain Based Learning Strategy (BBLs) will not differ significantly from Students taught through Circles of Learning Strategy (CLS) in terms of Self Efficacy of standard VII Students”.

Analysis of the data revealed that the effect of Instructional Strategies on Self Efficacy is significant between BBLs and CLS groups. 5 out of 5 ANCOVA was found in favour of BBLs than CLS. Hence the tenth hypothesis is rejected.

11. Hypothesis eleven states that “There will be no significant main effect of the Independent Variables (Instructional Strategies and Learning Styles) on Achievement in Mathematics (Total and Objective wise scores) of standard VII Students for the Total sample, Boys and Girls”.

Analysis of the data revealed that, in seven out of 7 ANCOVA undertaken for the Total sample, the main effect of Instructional Strategies and on Achievement in Mathematics (Total and Objective wise scores) is significant ($p<.01$). Five out of seven ANCOVA done for Boys showed significant main effect ($p<.01$) on Achievement in Mathematics (Total and Objective wise Scores ), except for the objectives Understanding and Creating. For Girls, two out of seven ANOVA showed significant main effect ($p<.01$) on Achievement in Mathematics (Total score and for the Evaluating.)

In short, 14 out of 21 ANOVA employed, showed significant main effect of Instructional Strategies on Achievement in Mathematics (Total Score for relevant Objectives).

For the main effect of Learning Styles on Achievement in Mathematics (Total score and Objective wise scores), only two out of 21 ANOVA yielded significant main effect (for the Objective understanding and Evaluating) for Total sample. Hence the eleventh hypothesis is partially rejected.
12. Hypothesis twelve states that “There will be no significant interaction effect of the Independent Variables (Instructional Strategies and Learning Styles) on Achievement in Mathematics (Total and Objective wise scores) of standard VII Students for the Total sample, Boys and Girls”.

No significant interaction effect of the Independent Variables (Instructional Strategies and Learning Styles) on Achievement in Mathematics (Total and Objective wise scores) of standard VII Students for the Total sample, Boys and Girls were found. Hence the twelfth hypothesis is not rejected.

13. Hypothesis thirteen states that “There will be no significant main effect of the Independent Variables (Instructional Strategies and Learning Styles) on Self -Efficacy of standard VII Students for the Total sample, Boys and Girls”.

Analysis of the data revealed that the main effect of the Instructional Strategies on Self - Efficacy is significant for Total Sample and Boys. It also reveals that no significant difference ($p= n.s$) is noted for girls.

Analysis of the data also revealed that there is no main effect of Learning Styles on Self efficacy for Total, Boys and Girls. So the thirteenth hypothesis is substantially rejected.

14. Hypothesis fourteen states that “There will be no significant interaction effect of the Independent Variables (Instructional Strategies and Learning Styles) on Self -Efficacy of standard VII Students for the Total sample, Boys and Girls”.

No significant interaction effect of the Independent Variables (Instructional Strategies and Learning Styles) on Self Efficacy of standard
VII Students for the Total sample, Boys and Girls were found. Hence the twelfth hypothesis is accepted.

**Educational Implications Derived**

The main intention behind the present study was to study the effectiveness and to study the main and interaction effects of certain Instructional Strategies (Brain Based Learning Strategy, Circles of Learning Strategy and Activity oriented Method of Teaching) on Achievement in Mathematics and Self Efficacy of Standard VII students. Some implications are derived based on the findings of the study to support the teaching system at primary level of education.

**Brain Based Learning Strategy**

From the present study, it is revealed that the experimental group I taught using Brain Based Learning Strategy is more effective when compared to the other two strategies experimented (Circles of Learning Strategy and Activity Oriented Method of Teaching). This may be because of the characteristics of the particular strategy. Upper Primary students have a brain which learns easy and fast. As a teacher it is so important to know how the brain learns. A teacher using a same strategy to a particular class for a whole year may create boredom, less motivated, formal and less interested especially in the mathematics classes.

One of the main findings of this study is that Brain Based Learning Strategy is more advantageous over Circles of Learning Strategy and Activity Oriented Method of Teaching in enhancing student’s academic achievement and Self efficacy. The implication of the finding is that, Brain Based Learning Strategy can be implemented as an instructional strategy at the upper primary level in Kerala.
The Study also revealed that Brain Based Learning Strategy has significance advantage over the Circles of Learning Strategy and Activity Oriented Method irrespective of gender in teaching Mathematics of Standard VII students. So, it can be said that Brain Based Learning Strategy can be used for instruction both in mixed gender classes and in single gender classes.

Brain Based Learning Strategy is seen more effective over the Circles of Learning Strategy and Activity Oriented Method in enhancing self efficacy. So Brain Based Learning Strategy can be used to enhance self efficacy in Upper Primary level.

Brain Based Learning Strategy does not insist on a particular approach or arrangement to follow in a normal classroom teaching. This strategy does not follow a specific aspect but a plethora of aspects. This makes each child to progress at their own pace thus creating a stress free and positive attitude towards learning both for high and low achievers.

Physiological aspects like physical activity, movements and threat free ambience should be provided to the students. Sitting for more than a hour reduce the oxygen flow to brain which create drowsiness and sleep. Sensory preferences can also be given significance in learning. There is influence of Taste, Sight, Touch, and Sound in learning process. Students also get enough freedom in learning like movement, threat free ambience, rewards and motivation in their learning process.

Brain Based Learning Strategy also advocated motivation and rewards. Review and revision is so important to follow in this strategy. It does not entertain in taking typical tests to measure the behavioural change. Assessment practices should change in accordingly.

Brain Research is still in its path to reveal more mystery on brain. More aspects of learning were revealed due to such research which was
accomplished through the last two decades. Proper intervention of this knowledge to the present educational system can do wonders in teaching – learning process especially curriculum, arts, sports, food and health examination and so on.

Circles of Learning Strategy

Among the three groups experimented Experimental group II taught using Circles of Learning Strategy was found effective than Activity Oriented Method of teaching. Circles of Learning Strategy of Co operative learning gives students a varied learning experience than sitting in class as passive listeners.

Co operative learning Strategy was a path breaking innovation in the teaching process apart from the prevailing behaviourist method. This method can be surely imparted in the Upper Primary classes to teach mathematics.

Circles of Learning works in small groups in which each member has to play a significant role in the successful completion of each task. Teachers also should effectively plan each tasks and assign definite roles to each student in every group. Teacher plays a role more of facilitator than of an instructor.

Circles of Learning Strategy have its own differences from Activity Based Method of Teaching. Students taught using Circles of Learning Strategy was better in achievement and self efficacy that the control group. When students cannot understand the general explanation in the class they were able to discuss it their groups. Investigator found that the students acquired more interaction and communication among students.

This strategy also provides effective interaction among students. It is found that interaction was developed between students, among the groups and
the teacher. That is inter-group, intra-group and teacher-pupil interaction is found high. Teacher plays a different role than in autocratic setting. Teacher interacts with students in different forms like group dividing, giving instruction, give follow ups, doubt clarifications and through evaluation process.

This strategy also caters for nurturing effects like emotional, social and psychological, and intellectual levels. Since the students themselves engage in the learning sessions they learn self discipline and acquire knowledge to solve conflicts and problems which is very important in this post modern era. Most of the jobs including management sectors, banks and marketing areas demands interpersonal skills, communication skills and problem solving skills.

This is a world of nuclear families in which interaction is negligible even between the parents and children. Circles of Learning provide a wide opportunity for sharing, communicating, discussing, debating and knowledge exchanging. So it is advisory to use this strategy in present classroom situation.

Generally students consider Mathematics as abstract in nature. This can be reduced and can motivate learners through co-operative learning. Since each student plays a significant role, he/she perform, communicate and share with other members of the group.

Apart from academic achievement, it embraces the value system which lacks in the present scenario and nuclear families. This strategy also helps the students to improve on other qualities like mutual respect, problem solving, tolerance, helping mentality, leadership quality, and sharing. Although the present curriculum is based on activity, teachers can recreate the ideas so as to make them more co-operative in nature.
Both the mentioned strategies are acceptable in its own idea and approach but Brain Based Learning Strategy accommodates a wider spectrum in the process of learning. It gives concern to almost all aspects of learning like academics, food, physical activity, freedom, motivation, and many more.

As Co operative learning Strategy, Brain Based Learning Strategy should also be incorporated in the curriculum of teacher trainees. The new aspects in the brain research should not be ignored or neglected by the teaching community.

**Suggestions for Further Research**

Researcher expects that the present study would open up new paths to experiment through the unexplored areas of the variables experimented.

1. A study on different strategies used in the Brain Based Learning can be explored and combined to make a hand book for educators.

2. Learning Packages on Brain Based Learning Strategy can be developed and its effectiveness can be studied.

3. The present study can be replicated in different subjects and standards with varied experimental designs.

4. Classes on the importance and relevance of Brain Based Learning Strategy can be conducted to the in service teachers and their suggestions can be taken for newer experiments.

5. A survey study can be conducted to find out the attitude of teachers towards Brain Based Learning Strategy.

6. Brain Based Learning Strategy can be imparted to the students of remote interior rural areas where the teachers get less chance to experiment on.
7. The study can be extended to students with learning disabilities.

8. The present study can be replicated to find out the effectiveness of other affective variables.

9. After imparting lessons using Brain Based Learning Strategy, a study can be conducted on students to know about the positive effects and their attitude towards the new strategy.

10. Circles of learning strategy can be imparted in higher classes also so as to improve their communication and interpersonal skills. This can be studied using an experimental procedure.