CHAPTER VI  
SUMMARY AND CONCLUSIONS

6.1 STUDY IN RETROSPECT

The present study has been designed to find out the awareness and academic achievement of primary level student teachers regarding the use of modern instructional strategies. The summary of the study is presented in this chapter.

6.1.1. Objectives of the Study

1. To assess the infrastructural facilities and instructional resources available in primary teacher training institutes for using modern instructional strategies.

2. To understand the awareness of primary level student teachers about the use of modern instructional strategies.

3. To understand the opinion of primary level student teachers about the use of modern instructional strategies.

4. To analyse the views and opinion of primary teacher educators about their use of modern instructional strategies.

5. To understand the academic achievement of primary level student teachers who learnt through modern instructional strategies.

6. To compare the academic achievement of primary level student teachers who learnt through modern instructional strategies and those who learnt through the conventional lecture method.
7. To compare the delayed memory achievement of primary level student teachers who learnt through modern instructional strategies and those who learnt through the conventional lecture method.

6.1.2 Hypotheses of the Study

The hypotheses formulated for the present study are the following:

1. Primary teacher education institutions do not have adequate infrastructural facilities and instructional resources required for adopting modern instructional strategies.
2. Primary level student teachers do not have adequate awareness about modern instructional strategies.
3. Primary level student teachers are in favour of using modern instructional strategies.
4. The academic achievement of student teachers using modern instructional strategies is better than the academic achievement of student teachers using the conventional lecture method.
5. The delayed memory achievement of student teachers using modern instructional strategies is better than the delayed memory achievement of student teachers using the conventional lecture method.

6.1.3 Methodology in Brief

Survey and experimental methods were found to be appropriate for the present study.
Major tools and techniques used for the collection of data are the following:

1. Checklist
2. Awareness Test
3. Opinionnaire
4. Interview Schedule
5. Raven's Standard Progressive Matrices – A, B, C, D & E.
6. Achievement Test
7. Computer-assisted Instructional Software
8. Co-operative Learning Package
9. Delayed Memory Achievement Test.

The sample for the survey comprised of 530 student teachers belonging to government, DIET, aided and unaided primary teacher training institutes (TTIs) in Kottayam District. The student teachers studying in all the TTIs and the teacher educators teaching in these institutions were selected as sample for the study.

Infrastructural facilities and instructional resources available in primary teacher training institutions were collected using the prepared checklist. An awareness test on modern instructional strategies to measure the awareness of student teachers and an opinionnaire to find out their opinions in using modern instructional strategies were administered. Views and opinions of teacher educators on the use of modern strategies of instruction were collected by conducting personal interview with them.
For the experimental study, three TTIs were selected, one TTI each from aided, government and DIET sectors. The sample for the experiment comprised of a total of 105 student teachers with 35 from each of these TTIs. In each TTI, the sample comprised of two experimental groups and one control group. The independent variables and dependent variables of the study are the instructional strategy and the achievement of student teachers, respectively. The experimental study was conducted in the three TTIs separately. For understanding the intelligence, Raven's Progressive Matrices was administered to the experimental and control groups before starting the experiment. In the beginning of the experiment, a pre-test using the achievement test was administered to student teachers in experimental group and the control group. In each teacher training institute, student teachers of experimental group I and experimental group II were taught using the co-operative learning package and the computer-assisted instructional software respectively, prepared by the investigator. In the control group, student teachers were taught in the conventional lecture method. At the end of the experiment, the same achievement test was administered as the post-test. In order to measure the delayed memory achievement of student teachers, a post-delayed test was administered, three weeks after the conduct of the post-test.

Appropriate statistical techniques were used to analyse the data collected. The major statistical techniques used are 't' test, chi-square test and Analysis of Covariance.
6.2 MAJOR FINDINGS

The major findings that have emerged from the present study are the following:

6.2.1 Infrastructural Facilities and Instructional Resources related to Modern Instructional Strategies Available in TTls

The majority of the primary Teacher Training Institutes (TTls) under study are not equipped with satisfactory infrastructural facilities and instructional resources, while a few have facilities and resources in certain items.

The majority of the Teacher Training Institutes (TTls) under study do not have sufficient number of reference books (57.14%), journals (64.29%), workbooks for pupils (57.14%), programmed texts (57.14%) and instructional modules (64.29%) in the library. But in libraries of all TTls (100%), sufficient number of handbooks for teachers are available.

The majority of the TTls have only satisfactory facilities of space (67.14%), furniture (57.14%), light (57.14%) and ventilation (57.14%).

Half (50%) of the TTls under study have only average facilities and resources in science laboratory with regard to laboratory equipments, apparatus, chemicals, real objects, specimens, charts, still models, working models, improvised aids and overhead transparencies. But in terms of maps, globes, atlas, still models, working models and improvised aids in the social science laboratory, a good majority of TTls (71.4%) have good facilities.
A great majority (78.57%) of TTIs do not have any resource for conducting psychology experiments like Intelligence Tests, Personality Tests, Attitude Tests, Interest Inventories and Creativity Test.

All the TTIs (100%) under study do not have the facilities and resources associated with the language laboratory such as learning centers and booths, multi-standard VCR, multimedia personal computers, instructional audio/video cassettes, CD-ROM and language software.

The projected aids are not adequately available in majority of the TTIs under study which are as follows: epidiascope (78.57%), filmstrip projector (57.14%), film projector (71.42%), slide projector (42.86%), micro projector (100%), overhead projector (64.29%), and sound synchronised slide projector (100%). Of the available projected aids, only a small proportion is in working condition as follows: epidiascope (14.29%), filmstrip projector (21.43%), film projector (14.28%), slide projector (42.86%), overhead projector (28.57%).

All the TTIs (100%) under study are equipped with simulators, chalkboards, flannel boards, display board and public addressing system in working condition. The availability and the state of functioning of the learning aids are as follows: white board (availability (50%), working condition (50%), radio (availability (100%), working condition (71.42%), still camera (availability (28.58%), working condition (28.5%), audio cassettes on educational programmes (availability (42.86%), working condition (42.86%).
Electronic media devices such as close circuit television, fax devices, Digital Video Disc, interactive video and the devices for teleconferencing are not available in all the TTIs (100%) under study. In vast majority of the TTIs, Video Cassette Recorder and video cassettes on educational programmes (85.72%), LCD projector (85.72%) and Video Compact Disc (85.72%) are not available. But a great majority (92.85%) of the TTIs under study are equipped with computers, floppy disc and CD-ROM. But in all the TTIs (100%), Compact Disc Interactive (CD-I) and Compact Disc-Video (CD-V) are not available.

Accessibility to internet and E-mail is not available in majority (57.14%) of the TTIs under study. In all the institutions under study, E-learning, internet-based video conferencing, bulletin board service and electronic publishing are not available.

6.2.2 Awareness of Primary Level Student Teachers about the Use of Modern Instructional Strategies

The majority of the student teachers under study have only average awareness about the various aspects of modern instructional strategies.

Multisensory Equipments and Projection Aids

With regard to the 'use of audio-visual aids used for classroom teaching', the majority (81.32%) of the student teachers at primary level have good awareness. But it is to be noted that 10.79 percent have only average awareness and 1.89 percent have poor awareness in this aspect. Also,
significant difference exists among student teachers with respect to their awareness regarding this aspect ($\chi^2 = 566.88; p < 0.01$).

About 'the projected aids conducive for classroom learning', the majority (66.23%) of the student teachers under study have only average awareness, a good number (26.42%) of them have poor awareness and only a negligible proportion (7.36%) of them have good awareness. There exists significant difference among student teachers with respect to their awareness in the aspect ($\chi^2 = 286.92; p < 0.01$).

Regarding 'the use of slide projector', a good proportion (42.64%) of student teachers have only poor awareness and a limited number (29.43%) have average awareness and only a few (27.92%) of them have good awareness. There is significant difference among student teachers with respect to their awareness in this respect ($\chi^2 = 20.85; p < 0.01$).

A vast majority (80.75%) of the student teachers under study have only average awareness and 4.15 percent of them have poor awareness regarding 'models as learning aids'. Only a limited number (15.09%) of them have good awareness in this regard. There is significant difference among student teachers with respect to their awareness in this respect ($\chi^2 = 545.86; p < 0.01$).

About the educational values of television, 69.81 percent of the student teachers have good awareness, 27.17 percent have average awareness and 3.02 percent of them have poor awareness. There is
significant difference among student teachers about their awareness in this regard \( (\chi^2 = 363.77; p < 0.01) \).

A vast majority (86.6%) of student teachers have only poor awareness and 3.02 percent of them have only average awareness regarding the ‘use of LCD projector’. Only a small number (10.38%) of the subjects under study have good awareness in this regard. There is significant difference among student teachers in their awareness about this matter \( (\chi^2 = 681.11; p < 0.01) \).

A great majority (86.60%) of the student teachers under study have only poor awareness and a negligible proportion (3.96%) of them have average awareness regarding the use of language laboratory and only a limited number (13.77%) have good awareness in this regard. There is significant difference among student teachers with respect to their awareness in this respect \( (\chi^2 = 578.68; p < 0.01) \).

Regarding good awareness about the use of multi-sensory equipments and devices, there is significant difference at 0.05 level between the student teachers belonging to Government and Aided Teacher Training Institutes \( (t = 2.47) \), between plus two-qualified student teachers and those with graduation and above \( (t = 2.56) \).

Regarding poor awareness about the use of multi-sensory equipments and projection devices, there is significant difference between student teachers belonging to Government and Aided TTI's \( (t = 3.75) \) and
Aided and Unaided TTIs \( (t = 3.06) \) at 0.01 level and between plus two-qualified student teachers and those with graduation and above \( (t = 1.94) \) at 0.05 level.

With respect to computer-assisted instruction, the majority (61.32\%) of the primary level student teachers under study have only average awareness and 6.23 percent of them have poor awareness. Only 32.45 percent of the student teachers have good awareness in this regard. There is significant difference among student teachers with respect to their awareness about computer-assisted instruction \( (\chi^2 = 241.50; p < 0.01) \).

**Self-learning Strategies**

The majority (53.02\%) of student teachers have only average awareness and also a considerable number of them (26.04\%) have poor awareness about 'self-learning techniques'. Only 20.94 percent of the subjects under study have good awareness in this regard. There is significant difference among student teachers with respect to their awareness about self-learning strategies \( (\chi^2 = 94.99; p < 0.01) \).

A major proportion (40.19\%) of the student teachers under study have only average awareness and 12.83 percent of them have poor awareness regarding the advantages of programmed instruction. At the same time, 46.98 percent of the subjects under study have good awareness about the same aspect. There exists significant difference among student teachers in their awareness regarding the advantages of programmed instruction \( (\chi^2 = 103.93; p < 0.01) \).
With respect to 'instructional module', a good majority (64.34%) of student teachers have only poor awareness and a considerable number (30.75%) of them have only average awareness. Only 4.91 percent of the subjects under study have good awareness regarding the same. There is significant difference among student teachers in their awareness about instructional module ($\chi^2 = 282.41; p < 0.01$).

About 'self-learning techniques and backward students', the majority (65.66%) of student teachers have only average awareness and 15.09 percent of the subjects under study have poor awareness. Only a limited number (19.25%) of the student teachers under study have good awareness regarding the same. There exists significant difference among student teachers with respect to their awareness on self-learning techniques and backward students ($\chi^2 = 250.61; p < 0.01$).

With respect to good awareness on 'self-learning strategies', there is significant difference between plus two-qualified student teachers and those with graduation and above ($t = 3.67$) at 0.01 level and between student teachers belonging to Government and Aided TTls ($t = 2.47$) and Aided and Unaided TTls ($t = 2.26$) at 0.05 level.

Regarding poor awareness on 'self-learning strategies', there is significant difference between the student teachers belonging to Aided and Unaided TTls ($t = 2.58$) at 0.01 level and those subjects belonging to Government and Aided TTls ($t = 2.28$) at 0.05 level.
E-learning and Web-based Technology

About 'the characteristics of E-learning', the majority (57.17%) of the student teachers under study have poor awareness and also a considerable number (37.92%) have only average awareness. Only a negligible proportion (4.91%) of them have good awareness regarding the same. There exists significant difference among student teachers with respect to their awareness ($\chi^2 = 222.18; p < 0.01$) about the characteristics of E-learning.

A good proportion (44.34%) of student teachers have only average awareness and 11.32 percent of the subjects under study have poor awareness about 'the accessibility of internet as an electronic medium'. At the same time, 44.34 percent of the subjects have good awareness regarding the same. The chi-square value obtained shows significant difference among student teachers with respect to their awareness about this aspect ($\chi^2 = 115.57; p < 0.01$).

Regarding the 'advantages of teleconferencing', the majority (50.75%) of student teachers have only average awareness and also 40.57 percent of the subjects under study have poor awareness. Only a negligible proportion (8.68%) of them have good awareness regarding the same aspect. There exists significant difference among student teachers with respect to their awareness about the 'advantages of teleconferencing' ($\chi^2 = 115.57; p < 0.01$).
With respect to good awareness about E-learning and web-based technology, there is significant difference between the student teachers belonging to Aided and Unaided Teacher Training Institutes ($t = 3.13$) and between plus two-qualified student teachers and those with graduation and above ($t = 3.21$) at 0.01 level.

Regarding poor awareness about E-learning and web-based technology, there is significant difference between the student teachers belonging to Aided and Unaided TTIs ($t = 3.45$) and between plus two qualified student teachers and those with graduation and above ($t = 2.92$).

**Group Learning Strategies**

About 'the advantages of debates', the majority (53.96%) of the student teachers under study have good awareness. But a good proportion (37.92%) of the subjects have only average awareness and 8.11 percent of them have poor awareness in this regard. There is significant difference among student teachers with respect to their awareness about 'the advantages of debates' ($\chi^2 = 172.15; p < 0.01$).

A good majority (69.81%) of student teachers have only average awareness and also a considerable number (20%) of them have poor awareness regarding the 'essential features of co-operative learning'. Only a small number (10.19%) of the subjects under study have good awareness about the same. There is significant difference among student teachers in their awareness on 'the essential features of co-operative learning' ($\chi^2 = 325.01; p < 0.01$).
Regarding group learning strategies, the majority (56.64%) of the student teachers under study have good awareness. It is to be noted that a considerable number (36.98%) have only average awareness and 6.8 percent of the subjects under study have poor awareness about the same aspect. There is significant difference among student teachers in their awareness about 'group learning strategies' ($\chi^2 = 194.49; p < 0.01$).

A good proportion (43.40%) of the student teachers have poor awareness and a considerable number (29.62%) of them have only average awareness about 'the essential characteristics of brainstorming'. Only 26.98 percent of the subjects have good awareness regarding the same. There is significant difference among student teachers in their awareness about 'the essential characteristics of brainstorming' ($\chi^2 = 24.71; p < 0.01$).

With respect to 'simulation', a major proportion (44.72%) of the student teachers under study have only average awareness and also a considerable number (21.32%) of the subjects under study have poor awareness. It is also seen that 33.96 percent of them have good awareness regarding the same. In this regard, there is significant difference among student teachers in their awareness ($\chi^2 = 43.60; p < 0.01$).

About 'seminar strategy', a good number (45.85%) of the student teachers under study have only average awareness and 7.36 percent of them have poor awareness. At the same time, 46.79 percent of the subjects under study have good awareness regarding the same aspect.
There is significant difference among student teachers with respect to their awareness on 'seminar strategy' ($\chi^2 = 160.98; p < 0.01$).

Regarding good awareness about group learning strategies, there exists no significant difference between male and female student teachers and those subjects belonging to Government and Aided TTIs and Aided and Unaided TTIs and Government and Unaided TTIs and between plus two-qualified student teachers and those with graduation and above and between student teachers of rural and urban localities.

**Theoretical Bases of Modern Instructional Strategies**

With respect to awareness on 'the psychological bases of multisensory learning strategies', the majority (50.75%) of the student teachers under study have only average awareness and a good number (42.64%) of them have only poor awareness. Only a negligible proportion (6.60%) of the subjects under study are having good awareness about the same. There is significant difference among student teachers with respect to their awareness on the psychological bases of multisensory learning strategies ($\chi^2 = 175.68; p < 0.01$).

A great majority (82.62%) of student teachers have only average awareness and 12.64 percent of them have poor awareness about the differences between hardware approach and software approach. Only a small proportion of them have good awareness about this. The chi-square value (576.66) obtained shows significant difference at 0.01 level among
student teachers in their awareness about the differences between hardware approach and software approach.

About the process skills based on multiple intelligence theory, a major proportion (48.11%) of the student teachers under study have only poor awareness and a considerable number (31.70%) of them have only average awareness. Only a limited number (20.19%) of them have good awareness regarding the same. The chi-square value obtained shows significant difference at 0.01 level among student teachers in their awareness about multiple intelligence theory ($\chi^2 = 62.63; p < 0.01$).

A good majority (69.25%) of the student teachers under study have only poor awareness and also a considerable number (26.42%) of them have only average awareness regarding 'learning strategies based on constructivism'. Only a negligible proportion of the subjects under study have good awareness about this aspect. There exists significant difference among student teachers with respect to their awareness about the learning strategies based on constructivism ($\chi^2 = 346.33; p < 0.01$).

Regarding the awareness on the theoretical bases of modern instructional strategies, there is significant difference between plus two-qualified student teachers and those with graduation and above ($t = 3.20$) at 0.01 level and between those belonging to Government and Aided Teacher Training Institutes ($t = 1.98$) at 0.05 level.

With respect to poor awareness about the theoretical bases of modern instructional strategies, there is significant difference between plus
two-qualified student teachers and those with graduation (t = 2.66) at 0.01
level and between the student teachers belonging to Government and Aided
TTIs (t = 2.53) at 0.05 level with respect to their poor awareness on the
theoretical bases of modern instructional strategies.

**Instructional Strategies Suitable for Primary Classes**

About the characteristics of the learning materials used in
primary classes, the majority (61.70%) of the primary level student teachers
under study have only average awareness and also 6.98 percent of subjects
under study have only poor awareness. Another 31.32 percent of subjects
have good awareness in this regard. There exists significant difference
among student teachers with respect to their awareness about 'the
characteristics of the learning materials used in primary classes' ($\chi^2 = 238.98$;
p < 0.01).

A good majority (62.45%) of student teachers under study have
only average awareness and also 5.85 percent of the subjects under study
have only poor awareness regarding 'teacher's role in the project'. Another
31.70 percent of the subjects under study have good awareness about this
aspect. There exists significant difference among student teachers with
respect to their awareness about 'teacher's role in the project' ($\chi^2 = 255.35$;
p < 0.01).

Regarding the characteristics of activity-based instructional
strategies, the majority (66.60%) of the student teachers under study have
only average awareness and also 6.98 percent of them have poor awareness.
Only 26.42 percent of the subjects under study have good awareness. There exists significant difference among student teachers in their awareness about this aspect ($\chi^2 = 294.03; p < 0.01$).

The majority (53.77%) of the student teachers under study have only average awareness and also 21.13 percent of the subjects under study have only poor awareness about 'learner-participation in instructional strategies'. About the same aspect, 25.09 percent of the subjects under study have good awareness. There is significant difference in awareness among the student teachers under study regarding learner participation in instructional strategies ($\chi^2 = 294.03; p < 0.01$).

With respect to good awareness on the characteristics of strategies suitable for primary classes, there is significant difference between plus two-qualified student teachers and those with graduation and above ($t = 3.23$) at 0.01 level and between those belonging to Government and Aided Teacher Training Institutes ($t = 2.16$) at 0.05 level.

Regarding poor awareness on the characteristics of strategies suitable for primary classes, there is significant difference between Government and Aided TTIs ($t = 2.60$) at 0.01 level and between plus two-qualified student teachers and those with graduation and above ($t = 2.17$) at 0.05 level.
6.2.3 Opinion of Primary Level Student Teachers about the Use of Modern Instructional Strategies

**Characteristics and Advantages of Modern Instructional Strategies**

The majority of student teachers under study have a favourable opinion about the characteristics and advantages of modern instructional strategies. Majority of them (57.74%) have a strong opinion that modern instructional strategies provide more clarity to learning material ($\chi^2 = 773.98; p < 0.01$). A good number (41.70%) of student teachers disapprove that in modern instructional strategies, individualised instruction based on the learner’s pace and interest is not possible ($\chi^2 = 291.72; p < 0.01$). A good majority of the student teachers (65.47%) have a strong favourable opinion that modern instructional strategies enhance learner’s curiosity and the spirit of enquiry ($\chi^2 = 819.40; p < 0.01$). It is also seen that 30.75 percent of the student teachers disapprove the opinion that gifted students are more benefited by the use of modern instructional strategies ($\chi^2 = 70.58; p < 0.01$) and 40.57 percent of student teachers disapprove the negative statement that ‘modern instructional strategies create despair and tension among learners’ ($\chi^2 = 213.36; p < 0.01$).

A good number of student teachers (31.50%) strongly disagree with the statement that the communication between the teacher and the learner is not effective while using modern instructional strategies ($\chi^2 = 287.87; p < 0.01$) and 30.19 percent student teachers have a favourable opinion that
learning through modern instructional strategies takes more time than the conventional methods. The majority of the student teachers have a favourable opinion that with proper planning, modern instructional strategies can be effectively put into practice ($\chi^2 = 91.23; p < 0.01$). A good number (47.92%) of student teachers have a strong favourable opinion that the prime objective of modern instructional strategies is to develop process skills among learners ($\chi^2 = 377.45; p < 0.01$). A good majority of student teachers (68.11%) strongly favour the opinion that classes based on modern instructional strategies should be included in the primary teacher education curriculum ($\chi^2 = 866.94; p < 0.01$).

**Self-learning Strategies**

*The majority of the student teachers have a favourable opinion about the relevance and use of self-learning strategies. This is evidenced in the following findings:*

A considerable proportion of student teachers (33.20%) do not agree with the statement that in instruction based on constructivism, learners do not acquire knowledge by self-activity ($\chi^2 = 187.57; p < 0.01$) while 24.5 percent of them strongly disapprove the statement. A good number of student teachers (20.19%) agree that in computer-assisted instruction, in the absence of the teacher, the learner tends to become less active and productive ($\chi^2 = 123.79; p < 0.01$). A considerable number (47.92) of student teachers have strong favourable opinion that classes based on computer-assisted
instruction should be made an essential component of formal education \((\chi^2 = 558.91; p < 0.01)\).

A notable proportion of student teachers (29.55%) disagree with the statement that it is not possible to provide immediate feedback in computer-assisted instruction and programmed instruction \((\chi^2 = 135.92; p < 0.01)\). Moreover, 40.38 percent of student teachers disagree with the statement that in programmed instruction, since the learning material is divided into small frames, there is no effective instruction \((\chi^2 = 213.85; p < 0.01)\) and 31.70 percent student teachers have strong opinion that discovery learning promotes independent thinking among learners \((\chi^2 = 438.06; p < 0.01)\). A good proportion (39.81%) of student teachers strongly agree that instructional module is a suitable strategy for self-learning \((\chi^2 = 305.64; p < 0.01)\).

**Role of Teachers in Modern Instructional Strategies**

A good majority of student teachers have a favourable opinion about the role of the teacher in modern instructional strategies and the training to be given to them. This is evidenced in the following findings:

The majority of student teachers (60.19%) have a strong favourable opinion that technological know-how is essential for both the teacher and the learner for using modern instructional strategies \((\chi^2 = 672.11; p < 0.01)\). The opinion of student teachers about the role of teacher as a facilitator in modern instructional strategies is significant \((\chi^2 = 1156.09; p <\)
A vast majority of them (77.55%) strongly disagree with the statement that the teacher does not act as a facilitator in modern instructional strategies.

The majority of student teachers (51.70%) do strongly approve the opinion that in inquiry training, how to learn rather than what to learn should be given importance by the teacher \( (\chi^2 = 533.02; p < 0.01) \). About 46.04 percent student teachers strongly agree with the statement that school teachers are not properly trained in using modern instructional strategies \( (\chi^2 = 346.49; p < 0.01) \) and 50.75 percent student teachers strongly disagree with the statement that through lecture method alone acquisition of knowledge is possible \( (\chi^2 = 506.70; p < 0.01) \). A good number of student teachers (40.57%) strongly express their unfavourable opinion about the statement, ‘team teaching is not suitable for exploiting the abilities of individual teachers’.

**Group Learning Strategies**

The opinion of student teachers for the various items included under ‘group learning strategies’ is as follows:

The majority of student teachers (69.80%) have a strong favourable opinion that activity-based group learning promotes team spirit and co-operation among learners \( (\chi^2 = 955.43; p < 0.01) \). For the statement that brainstorming does not promote free expression and collective thinking in a group, 44.15 percent student teachers express their strong disagreement \( (\chi^2 = 304.64; p < 0.01) \). A good number (40.57%) of student teachers disagree with the statement that in team teaching, it is not possible to exploit
the innate potentialities and capacities of individual teachers ($\chi^2 = 432.40; p < 0.01$) and 36.79 percent student teachers disagree with the statement that in panel discussion, there is no open discussion between the panellists and the group ($\chi^2 = 169.91; p < 0.01$).

The majority of the student teachers (50.38%) have a strong favourable opinion that in 'colloquy' as a group learning strategy is feasible at primary education level ($\chi^2 = 505.72; p < 0.01$) and 47.74 percent student teachers strongly disapprove the statement that curriculum transaction is not possible through group activities at the primary level ($\chi^2 = 773.98; p < 0.01$). The majority of the student teachers (51.50%) very strongly express the opinion that project method promotes interaction, co-operation and team-spirit among learners ($\chi^2 = 623.77; p < 0.01$).

A good number of student teachers (40%) very strongly express the opinion that collaborative learning promotes wholehearted participation and interaction among teachers and students ($\chi^2 = 571.57; p < 0.01$) and 49.62 percent student teachers have a very strong opinion that in co-operative learning, students interact well, share their ideas and achieve academic proficiency ($\chi^2 = 681.72; p < 0.01$). A good number (38.17%) of student teachers have a strong favourable opinion that peer tutorials are effective for cognitive development through discussion and clarification ($\chi^2 = 248.25; p < 0.01$). A good majority of student teachers (55.66%) have strong
disagreement with the statement 'simulation is a strategy not suitable for primary school curriculum' \( (\chi^2 = 483.92; \ p < 0.01) \).

A good number of (48.11%) student teachers have strong disagreement with the statement, 'role-play as a strategy is effective for analysing pupils’ responses in various situations' \( (\chi^2 = 453.49; \ p < 0.01) \).

**Information and Communication Technology**

*The findings based on student teachers’ opinion about the role of information and communication technology in classroom teaching are given below:*

A good number (49.62%) of student teachers very strongly support the opinion, ‘information technology enables the teacher to do his work effectively’ and a negligible portion of them (0.75) have strong disagreement in this regard \( (\chi^2 = 648.58; \ p < 0.01) \). For the item representing the negative statement that the use of different media in multimedia package does not enhance the learning process, the chi-square value obtained is significant \( (\chi^2 = 394.45; \ p < 0.01) \). It is seen that 50.75 percent student teachers have a strong unfavourable opinion at this statement.

A major proportion of student teachers (45.85%) strongly disagree with the statement that television should not be used as an instructional medium in primary classes \( (\chi^2 = 342.87; \ p < 0.01) \). A good majority (63.58%) of student teachers have a strong favourable opinion that
the use of suitable tapes/cassettes/CDs makes instruction interesting and informative \( (\chi^2 = 776.36; \ p < 0.01) \).

6.2.4 Views and Opinions of Teacher Educators about the Use of Modern Instructional Strategies in TTIs

The views and opinions of teacher educators reveal that the infrastructural facilities for adopting modern instructional strategies are limited except in some TTIs. This is true with regard to the infrastructural facilities of Science Laboratory, Psychology Laboratory, Educational Technology Display Room and Computer Laboratory.

Most (70%) of the teacher educators reported that slide projectors, overhead projectors and computers were available in their TTIs. The majority (75%) of the teacher educators under study expressed their desire to have computer in their institutes for instructional purposes.

Teacher educators working in DIET-TTI reported that the facilities for the utilisation of Edusat networks, computer software and web-based technology were available in their institution.

A good majority (75%) of teacher educators opined that technological devices and equipments were not maintained in proper working condition and they emphasised the need for regular repair and maintenance of these equipments.

The majority of the teacher educators (85%) under study expressed their positive opinion about the use of LCD projectors, though LCD projectors are available only in a negligible number of the TTIs under study.
A vast majority (75%) of the teacher educators reported that student teachers were given practice in adopting group instructional strategies like brainstorming, seminar, debate, panel discussion and co-operative learning. But self-learning strategies like instructional module and computer-assisted instruction are not used for instructional purposes.

A good majority (70%) of the teacher educators are of the view that in their teacher training institutes, libraries are stacked with books and journals, but current periodicals and journals related to education are not available.

The majority (55%) of teacher educators are satisfied with the facilities available in science laboratories and social science laboratories. The remaining 45 percent of teacher educators pointed out the inadequate laboratory facilities which need to be improved and updated in accordance with the curriculum revisions made at the T.T.C. level and the school level.

A good majority (75%) of the teacher educators under study reported that student teachers were given training in making improvised aids and a good number (50%) of them appreciated the quality of improvised aids made by student teachers.

Half of teacher educators (50%) are of the view that they find adequate time for adopting modern instructional strategies. Rest of the teacher educators under study pointed out the need for allotting adequate time in the time table for implementing modern instructional strategies.
The majority (55%) of the teacher educators under study are of the view that a good number of the student teachers who complete the T.T.C course have only average awareness about modern instructional strategies and are of the view that student teachers require more training and practice in adopting modern instructional strategies in the present situation.

A vast majority (85%) of the subjects of study are of the view that during practice teaching, student teachers teach lessons by incorporating instructional strategies like brainstorming, seminar, project and group activities. But self-learning strategies like instructional module and computer-assisted instruction are not at all used by them.

A considerable number (50%) of teacher educators are of the view that they receive encouragement and co-operation from the head of their institution.

The majority of the teacher educators (70%) are not satisfied with the training including the computer training they have received in using modern instructional strategies and want to receive comprehensive in-service training programme in using computer for instructional purposes.

Teacher educators pointed out the following limitations of modern instructional strategies from the practical perspective:

- lack of infrastructural facilities
- lack of proper instructional resources
- lack of proper in-service training
- lack of time
lack of adequate preparation and practice by teacher educators and student teachers

- lack of finance
- large number of student intake
- lack of proper support and co-operation from the concerned authorities

Teacher educators proposed the following suggestions for making improvement in the use of modern instructional strategies:

- Ensure adequate infrastructural facilities
- Make available reference materials and related resources in each TTI
- Update the facilities and resources for modern instructional strategies now and then
- Provide comprehensive training to teacher educators and students teachers
- Provide On the Spot Support (OSS) during the implementation stage
- Ensure the service of a technician in every teacher training institute.

6.2.5 Academic Achievement of Student Teachers

1. The achievement of student teachers who learnt through the Co-operative Learning Package is found better than the student teachers who learnt through the Conventional Lecture Method of teaching. There is significant difference in the mean post-test scores of student teachers in Experimental Group I (COL) and the Control Group (CLM) (t = 8.03; p < 0.01).
2. The achievement of student teachers who learnt through the Computer-Assisted Instructional Software is found better than the student teachers who learnt through the Conventional Lecture Method of teaching. There is significant difference between the mean post-test scores of student teachers in Experimental Group II (CAI) and the Control Group (CLM) \(t = 5.18; p < 0.01\).

3. The achievement of student teachers who learnt through the Co-operative Learning Package is found better than the student teachers who learnt through the Computer Assisted Instructional Software. There is significant difference between the mean post-test scores of student teachers in Experimental Group I (COL) and Experimental Group II (CAI) \(t = 3.42; p < 0.01\).

4. Among the instructional materials of the three strategies under study, viz., Co-operative Learning Package, Computer-Assisted Instructional Software and the Conventional Lecture Method, the Co-operative Learning Package is the most effective one in the achievement of the total sample of primary level student teachers.

- The Analysis of Covariance applied to the pre-test and post-test scores of student teachers in Experimental and Control groups shows that the three groups differ significantly in their post-test scores in achievement test \(F_{yx} = 39.46; p < 0.01\).

- When the adjusted means for post-test scores of the Experimental and Control groups were tested for significance, it was found significant at
The adjusted mean of the Co-operative Learning group (43.91) is significantly higher than the adjusted mean of the Computer-Assisted Instructional group (37.25) and the Conventional Lecture method (32.78) group at 0.01 level.

5. In each subsample, viz., Government, Aided and DIET, TTIs, the achievement of student teachers who learnt through the Co-operative Learning Package and who learnt through the Computer-Assisted Instructional Software is better than the student teachers who learnt through the Conventional Lecture method (t values – Govt. – 5.26 and 2.63; p < 0.01; Aided – 4.52; p < 0.01; 2.08; p < 0.05; DIET – 5.63 and 3.16; p < 0.01 respectively).

6. In each subsample, namely Government, Aided and DIET, TTIs, the achievement of student teachers who through the Co-operative Learning Package is found better than the student teachers who through the Computer-assisted Instructional Software (t values – Govt. 2.14; Aided – 1.96; DIET – 2.18) which are significant at 0.05 level.

- The Analysis of Covariance applied to the pre-test and post-test scores of the Experimental and Control groups in Government, Aided and DIET, TTIs shows that the three groups differ significantly in the post-test scores of the achievement test (Fyx = 9.54; p < 0.01).

- When the adjusted means for post-test scores of the Experimental and Control groups in Government, Aided and DIET TTIs were tested for significance, it was found significant at 0.01 level (t = 5.50; 5.18 and
5.60 respectively). The adjusted means of the Co-operative Learning groups of the subsamples (44.19, 44.15 and 46.98 respectively) are significantly higher than the adjusted means of the Computer-assisted Instructional group (36.00; 37.10 and 39.18 respectively) and the adjusted means of the Conventional Lecture method (41.99, 36.00 and 30.95 respectively) at 0.01 level.

7. The Co-operative Learning Package is found more effective than the Conventional Lecture method in the delayed memory achievement of the total sample and subsamples of primary level student teachers (Total sample- $t = 10.35; p < 0.01$; Subsamples- ‘t’ – Government – 4.00; Aided – 3.79; DIET – 4.99; p < 0.01).

8. The Computer-assisted Instructional Software is more effective than the Conventional Lecture method in the delayed memory achievement of the total sample and subsamples of primary level student teachers (Total sample- $t = 4.24; p < 0.01$; Subsamples- ‘t’ – Government – 6.75; Aided – 5.80; DIET – 7.33; p < 0.01).

9. The Co-operative Learning Package is more effective than the Computer-assisted Instructional Software in the delayed memory achievement of the total sample and subsamples of primary level student teachers (Total sample- $t = 2.20; p < 0.05$; Subsamples- ‘t’ – Government – 2.11; Aided – 1.96; DIET – 2.19; p < 0.05).
6.3 TENABILITY OF THE HYPOTHESES

The tenability of the hypotheses are stated below:

**Hypothesis 1**

*Primary teacher education institutions do not have adequate infrastructural facilities and instructional resources required for adopting modern instructional strategies.*

The finding No. 6.2.1 shows that the majority of primary teacher training institutes are not equipped with adequate infrastructural facilities and instructional resources. A few TTIs have facilities and resources in certain items. Hence, the above hypothesis is not fully substantiated.

**Hypothesis 2**

*Primary level student teachers do not have adequate awareness on modern instructional strategies.*

The finding No. 6.2.2 indicates that the majority of student teachers have only average awareness about the various aspects of modern instructional strategies. Thus, the hypothesis formulated above is substantiated.

**Hypothesis 3**

*Primary level student teachers are in favour of using modern instructional strategies.*

The finding No. 6.2.3 indicates that the majority of student teachers have favourable opinion about the characteristics and advantages of modern instructional strategies. They have strong favourable opinion that
modern instructional strategies enhance learners' curiosity and the spirit of inquiry. Hence, the above hypothesis is substantiated.

**Hypothesis 4**

The academic achievement of student teachers who learnt through modern instructional strategies is better than the achievement of student teachers who learnt through the conventional lecture method of teaching.

Finding numbers 6.2.5.1, 6.2.5.2, 6.2.5.3, 6.2.5.4, 6.2.5.5 and 6.2.5.6 indicate that the achievement of student teachers who learnt using modern instructional strategies is better than that of student teachers who learnt using the conventional lecture method of teaching. Thus, the hypothesis formulated above is substantiated.

**Hypothesis 5**

The delayed memory achievement of student teachers who learnt through modern instructional strategies will be much better than the delayed memory achievement of student teachers who learnt through the conventional lecture method of teaching.

Finding numbers 6.2.5.7, 6.2.5.8 and 6.2.5.9 indicate that the delayed memory achievement of student teachers who learnt through the Co-operative Learning Package and the Computer-assisted Instructional Software are better than that of student teachers who learnt through the Conventional Lecture Method. Thus, the hypothesis formulated above is substantiated.
6.4 CONCLUSIONS OF THE STUDY

The major conclusions that emerged from the study are given below:

Findings of the study indicate that the majority of the primary teacher training institutes under study are equipped with minimum facilities and resources for implementing modern instructional strategies. The majority of the TTIs under study have only satisfactory facilities and resources associated with library, science laboratory, social science laboratory, educational technology display room and psychology laboratory. Accessibility to Information and Communication Technology based on computer software, E-learning and web-based technology is not adequate for instructional purposes in primary teacher training institutes.

The majority of the student teachers under study have favourable opinion about the use of modern instructional strategies. Their opinion about the characteristics and advantages of modern instructional strategies, self-learning strategies, the role of teachers in modern instructional strategies, group learning strategies and information and communication technology reveal their positive opinion and approval for modern instructional strategies.

The teacher educators under study are not fully satisfied with the adoption of instructional strategies in primary Teacher Training Institutes. They are of the view that student teachers require more training and practice for adopting modern instructional strategies in the present situation.
educators reported that student teachers were given practice in adopting some of the instructional strategies, but self-learning strategies like instructional module and computer-assisted instruction were not used for instructional purposes in TTI.

It is clear that the student teachers of TTI do not have adequate practice in using modern instructional strategies. The absence of proper facilities and resources in TTI is the major cause for this state. Since there is dearth of fund, these institutions are not able to purchase the required equipments which are mostly expensive.

The majority of the student teachers under study have only average awareness about the various aspects of modern instructional strategies. The data and results of analysis point out the general poor awareness of student teachers about the significance and use of multi-sensory equipments and projection devices, E-learning and web-based technology and the theoretical bases of modern instructional strategies. The chi-square value obtained for all the items in the Awareness Test is significant at 0.01 level which shows that there exists significance of difference in the awareness of the student teachers under study.

There is significant difference between the student teachers belonging to Government and Aided TTI, between plus two-qualified student teachers and those with graduation and above at 0.05 level regarding their good awareness about the use of multi-sensory equipments and projection devices. Student teachers belonging to Aided TTI and those with
qualification graduation and above have more awareness than their corresponding counterparts. There is significant difference between student teachers belonging to Aided and Unaided TTls and between plus two-qualified student teachers and those with graduation and above at 0.01 level regarding their good awareness on E-learning and web-based technology. Student teachers belonging to Aided TTls and those with the qualification – graduation and above have more awareness than their corresponding counterparts.

Instruction using the Co-operative Learning Package and the Computer-assisted Instructional Software are more effective than the Conventional Lecture Method in the achievement of the total sample of primary level student teachers. Among the three strategies under study, Co-operative Learning Package is the most effective one in the achievement of the total sample of primary level student teachers.

Instruction using the prepared Co-operative Learning Package and the prepared Computer-assisted Instructional Software are more effective than the Conventional Lecture Method in the achievement of the subsamples of student teachers in Government, Aided and DIET TTls. Among the three strategies under study, instruction using the Co-operative Learning Package is the most effective one.

Among the three instructional strategies, the Co-operative Learning Package and the Computer-assisted Instructional Software are more effective than the Conventional Lecture Method in the delayed memory
achievement of the total sample and subsamples of primary level student teachers.

When compared between the Co-operative Learning Package and the Computer-assisted Instructional Software for the total sample and subsamples, primary level student teachers who learnt using the Co-operative Learning Package showed better delayed memory achievement.

6.5 IMPLICATIONS OF THE STUDY

The results of the present study can significantly influence the field of primary teacher education on both theoretical and practical contexts and have potential value in restructuring the teacher education curriculum. The present study has a number of wide implications which will provide the basis for the improvement of Trained Teacher Certificate (TTC) course in Kerala.

The findings of the study reveal that the majority of primary teacher training institutes are not equipped with adequate facilities and instructional resources for adopting modern instructional strategies. The study points out the general poor awareness of student teachers about the significance and use of multi-sensory equipments and projection devices, E-learning and web-based technology and the theoretical bases of modern instructional strategies. The majority of the teacher educators under study reported that computers and other electronic media were not accessible for instructional purposes in TTIs.
From the findings of the study, it is obvious that student teachers learn better by the use of modern instructional strategies. The two strategies namely Co-operative Learning and Computer-Assisted Instruction were tested for their effectiveness in enhancing the achievement of student teachers. The study reveals that these two strategies are more effective than the Conventional Lecture Method. Hence, there is a dire need to change the methods and strategies adopted in teacher training institutions. Teacher-centred and whole-class instructional strategies should no longer be the dominant teaching method.

Many strategies like web-based learning, co-operative learning, etc. have been developed for instructional purposes in many countries. These could be tested for their efficiency in Indian conditions and incorporated in our teacher training institutions.

Technology can make learning more interactive, enhance the enjoyment of learning, individualise and customise the curriculum to match learner’s developmental needs as well as personal interests.

The internet and on-line technologies are relatively newcomers to schools and teacher training institutions. They should be made accessible to facilitate effective and speedy learning. E-learning permits teachers to develop materials using the world wide resources of the web.

Co-operative problem-solving and team work seem to be indispensable to meet the challenges of teaching and learning.
The transformation from the conventional lecture method to modern instructional strategies should be gradual or else the student teachers and teacher educators would find it difficult to adjust with the transformed strategy.

Teacher educators and student teachers need to be trained in computers for the effective implementation of technology-aided learning which can serve as a tool for researches, communication and productivity. The attitude and aptitude of teachers in adopting new technologies is a must for its effective use. Forced learning will result in implementation without interest. Awareness sessions and practice sessions on modern instructional strategies are to be organised for teacher educators and student teachers.

6.6 SUGGESTIONS OF THE STUDY

The following suggestions are made on the basis of the findings and conclusion of the study:

1. Facilities for the proper use of Language Laboratory, Science Laboratory, Social Science Laboratory, Library, Psychology Laboratory, Educational Technology Display Room including computer software and web based technology should be enhanced and updated in each TTI.

2. Financial support for equipping and updating the primary teacher training institutes with facilities and resources is to be provided.

3. Effective steps should be taken for enriching the Trained Teachers Certificate course with proper emphasis on modern instructional
strategies like co-operative learning, computer-assisted instruction, E-learning and web-based technology. Innovative instructional strategies should be included as an integral component of the theory and practical aspects of the TTC curriculum.

4. Accessibility to Information and Communication Technology should be made available in TTIs.

5. Proper awareness on the significance and use of modern instructional strategies is to be cultivated among primary level student teachers. Agencies like NCERT, SCERT, CIET (Central Institute of Educational Technology) and DIET should organise awareness programmes, training sessions and in-service courses in this regard. Provisions should be made for giving training to student teachers in using electronic media such as computer software, on-line learning and disseminating literature through websites and other internet resources (web-based technology) for instructional purposes.

6. Teacher educators and student teachers should be motivated according to the signs of modern electronic era and become technologically empowered with much competence and confidence. They should appreciate and adopt emerging communication technology and innovative practices which can suit to the Indian context. Teacher educators must learn to operate sophisticated hardware and software while sustaining mastery of the central issues and pedagogy of their courses.
7. Teacher educators and student teachers should be made aware of the various aspects involved in computer-assisted instructional material and co-operative learning package such as its writing, editing, administration and evaluation.

8. Group learning strategies like co-operative learning and brainstorming should be given adequate weightage in the TTC curriculum. Student teachers should be given proper practice and support in adopting group learning strategies.

9. Collaborative teaching and learning involving student-generated questioning and sustained dialogue among student teachers and between student teachers and teacher educators should be encouraged.

10. For practice teaching, the main thrust has to be on a variety of techniques such as co-operative learning, panel discussion, project, seminar, demonstration, etc. as an integral part of classroom-teaching-learning procedures.

11. During the implementation stage of modern instructional strategies, On the Spot Support (OSS) to teacher educators and student teachers should be provided.

12. Heads of the institutions and other authorities concerned have to take initiative in the purchase and maintenance of the technological equipments and electronic media required for adopting modern
instructional strategies. The service of technical staff should be made available in TTIs.

13. Government agencies like UGC, NCTE, NAAC and NCERT should take initiative in adopting modern instructional strategies in teacher education institutions and classrooms. They should provide financial support as and when required. The government at state and central level must allocate more funds for the TTIs in building up facilities and resources for infrastructure and instructional uses.

14. Research and experiments in education and in teaching a particular subject should be promoted through the provisions of research facilities in teacher education institutions. All staff concerned with teacher education should be made aware of the findings of research in the field with which they are concerned.

6.7 SUGGESTIONS FOR FURTHER RESEARCH

The investigator is of the view that the present study opens up many avenues for more studies that would in future contribute to the nation’s endeavour in the field of education. Some suggestions for further research are given below:

1. Similar studies on a wider sample on all available modern instructional strategies would be advisable for valid generalisations. Studies to find out the effectiveness of innovative instructional strategies listed in the theoretical overview of this study like brainstorming, collaborative learning and simulation could be conducted at all levels of teacher education and training.
2. A comparative study of the effectiveness of Computer-assisted Instruction and Co-operative Learning in different subjects like physical and biological sciences, mathematics, social sciences, etc. may be adopted.

3. Studies to find out the effectiveness of Students Teams Achievement Divisions (STAD) strategy of co-operative learning at the secondary teacher education level would be conducted.

4. Studies to find out the effectiveness of modern instructional strategies on underachievers, slow learners, gifted learners, learning disabled, sensitive learners, attention-deficit learners and learners with language difficulty may be conducted.

5. A comprehensive study may be conducted to prepare computer-assisted software for remedial teaching programme.

6. Self-learning packages required for different instructional strategies may be prepared and subjected to assessment.

7. A study to find out the effectiveness of innovative instructional strategies adopted by novice teachers at primary schools may be conducted.

8. Studies to find out the effectiveness of instructional strategies like role-playing and collaborative learning in the delayed memory achievement of student teachers at pre-primary level may be conducted.

9. Attitude of educational practitioners, administrators, curriculum designers and classroom teachers towards the use of modern instructional strategies in teacher education institutions may be studied.
BIBLIOGRAPHY