CHAPTER – V

FINDINGS, DISCUSSIONS AND RECOMMENDATION

“To interpret is to explain, to find meaning” – Fred N. Kerlinger

5.1 INTRODUCTION

Interpretation takes the results of analysis, makes inferences pertinent to the research relations studied and draws conclusions about these relations. The researcher who interprets the research results searches them for their meaning and implications. This is done in two ways. One, the relation within the research study and its data are interpreted. This is the narrower and here the interpretation and analysis are closely intertwined. Therefore the inference is sought immediately such as the existence of any relation and draws out its significance for the research problem as the data is ordered, broken down and manipulated. Two, the broader meaning of the research data is sought. This is done by comparing the results and inferences drawn within the data to the theory and other research results. The meaning is sought and implication between one’s research results and conclusion either of one’s own or of other researchers. The results are also compared with the demands and expectations of theory.

This chapter deals with a summary of the major findings, Discussion, Recommendations and Educational Implications, Suggestions for Further Research and Conclusion.

5.2 FINDINGS

1. There is no significant difference between the control and the experimental group B.Ed student-teachers in their pre-test mean scores.

2. There is significant difference between the pre-test and the post-test mean scores of control group.
3. There is significant difference between the pre-test and the post-test mean scores of experimental group.

4. There is significant difference between the control and the experimental group B.Ed student-teachers in their post-test mean scores.

5. There is significant difference between the control and the experimental group B.Ed student-teachers in their post-test mean scores with reference to the knowledge level objectives.

6. There is significant difference between the control and the experimental group B.Ed student-teachers in their post-test mean scores with reference to the understanding level objectives.

7. There is significant difference between the control and the experimental group B.Ed student-teachers in their post-test mean scores with reference to the application level objectives.

8. There is significant difference between below average student-teachers of the control and the experimental group in their post-test mean scores.

9. There is significant difference between below average student-teachers of the control and the experimental group in their post-test mean scores with reference to the knowledge level objectives.

10. There is no significant difference between below average student-teachers of the control and the experimental group in their post-test mean scores with reference to the understanding level objectives.

11. There is significant difference between below average student-teachers of the control and the experimental group in their post-test mean scores with reference to the application level objectives.
12. There is significant difference between average student-teachers of the control and the experimental group in their post-test mean scores.

13. There is significant difference between average student-teachers of the control and the experimental group in their post-test mean scores with reference to the knowledge level objectives.

14. There is significant difference between average student-teachers of the control and the experimental group in their post-test mean scores with reference to the understanding level objectives.

15. There is significant difference between average student-teachers of the control and the experimental group in their post-test mean scores with reference to the application level objectives.

16. There is significant difference between above average student-teachers of the control and the experimental group in their post-test mean scores.

17. There is significant difference between above average student-teachers of the control and the experimental group in their post-test mean scores with reference to the knowledge level objectives.

18. There is no significant difference between above average student-teachers of the control and the experimental group in their post-test mean scores with reference to the understanding level objectives.

19. There is no significant difference between above average student-teachers of the control and the experimental group in their post-test mean scores with reference to the application level objectives.

20. There is no significant difference between the pre-attitude and post-attitude scales of the control group student-teachers.
21. There is significant difference between the pre-attitude and post-attitude scales of the experimental group student-teachers.

22. There is very low correlation between the gain scores and the pre-attitude scale of the control group student-teachers towards E-content in the Teaching of Mathematics Education.

23. There is very high correlation between the gain scores and the pre-attitude scale of the experimental group student-teachers towards E-content in the Teaching of Mathematics Education.

24. There is very low correlation between the gain scores and the post-attitude scale of the control group student-teachers towards E-content in the Teaching of Mathematics Education.

25. There is very high correlation between the gain scores and the post-attitude scale of the experimental group student-teachers towards E-content in the Teaching of Mathematics Education.

26. There is significant effect size for the difference between the means of pre-test and post-test score mean in E-content in the Teaching of Mathematics Education.

27. The gain ratio obtained through E-content in the Teaching of Mathematics Education among the B.Ed. student-teachers is high.

5.3 DISCUSSION

Finding No. 1 shows that there is no significant difference in the pre-test scores attained by the control and experimental groups. This justifies that the subjects in both the groups have been equated under the rationale of their previous knowledge.
Finding No.4 points out the significant difference between the control and experimental groups in their post-test scores. This finding justifies the significant effectiveness of E-content in Teaching of Mathematics Education. This finding ascertains that e-content has the potentials to improve learning opportunities for the students, and it is a very powerful tool of education and is valuable to the learners.

Moreover it has been observed from the following studies:

a. “Effects of Computer Assisted Instruction (CAI) on the secondary school students’ performance in Biology” by Yusuf, Mudasiru and Afolabi, Adedeji (2010) indicate that the performance of the students who were exposed to CAI either individually or cooperatively were better than their counterparts who were exposed to the conventional classroom instructions.

b. “Effectiveness of teaching chemistry through Computer Assisted Instruction over the Traditional Teaching Method” by Vasanthi and Hema (2003) indicate that the teaching chemistry through CAI was found to be more effective than teaching through the traditional method.

c. “Effectiveness of Computer Multimedia Package [SLM] on Achievement of Eleventh Standard Students in Social Sciences” by Girija. N. Srinivasalu, and Vijayalakshmi S. (2010) indicate that the superior performance of the experimental group over the traditional group suggested that SLM was found to be effective.

d. “Effectiveness of Interactive Multimedia-Based Learning with the Conventional Teaching Method with the Science Group Students” by Arulsamy, S. (2005) observed that the experimental group’s performance was far superior to that of their counterparts. This study clearly revealed the positive impact of multimedia.
e. “Development of Multimedia Instructional System on Educational Technology for B.Ed., student-teachers” by Vishnu Panddurang Shikhare (2007) indicate that the Multimedia Instructional System was found more effective than the Conventional Instructional System.

g. “Development and Effectiveness of Computer Based Learning Programme in Teaching Mathematics for the students of standard IX Gujarati medium secondary school” by Falguni S. Vansia (2012) indicate that the Mathematics teaching through CBL programme was comparatively better than the traditional method in terms of the achievement of the students.

h. “Effect on E-Content Learning Package in Mathematics Education for The Prospective Teachers” by Robert Joan, D. R. (2013) indicate that the experimental group is more effective than the control group. Thus E-content learning package in Mathematics Education for the prospective teachers is more effective.


Finding No. 2 & 3 reveals that E-content has significant effect on teaching of Mathematics Education. This effectiveness is significantly greater than that
played by conventional method. This may be due to the following features of e-content:

- E-content presents the content in multiple formats.
- The contents are explained in a simple text with unambiguous suitable graphics, animations and with relevant supportive headings.

These ideas can be strengthened by the results from the study “Effectiveness of Computer Assisted Teaching Lesson on the topic UNO in History at the Higher Secondary Level” by Helen Joy, Shaiju (2005) indicate that the mean post-test scores of the Computer Assisted Teaching (CAT) group were found to be significantly higher than that of the Lecture Method group.

Finding No.5, 6, and 7 show the significant effectiveness of E-content in enabling the student-teachers to achieve more in all the three dimensions of the objectives - knowledge, understanding, and application, thus validating the fact that e-content has significant role in adding effectiveness in enhancing knowledge, understanding, and application of the student-teachers.

For instance, an experimental study conducted by Takaci, Durdica (2011) on “Multimedia Approach in Teaching Mathematics- Example of Lesson about The Definite Integral Application for Determining an Area” indicate that the students from the multimedia group showed better theoretical, practical and visual knowledge. Besides that survey carried out at the end of this research clearly showed that students from the multimedia group were highly interested in this way of learning.

In another study, Nirmala Sundara Raj, (2006) made an attempt to develop visual basic-based computer assisted instruction and computer animated packages in zoology and their effectiveness on achievement of the plus one students. The finding of the study revealed that the multimedia group was better than the control
group in their gain scores and attainment of the knowledge, understanding and skill objectives in zoology.

Finding No.8, 9, 10 and 11 reveal that there is significant difference between below average student-teachers of the control group and experimental group in their attainment of knowledge and application level objectives through e-content, but there is no significant difference in their attainment of understanding level. This may be due to the fact that e-content helps in retaining, recalling and recognising facts related to the methods of teaching mathematics, thus enhancing the student-teachers’ attainment in the knowledge level. Since e-content widens opportunity for learning through practical methods, learning at one’s own pace and encouraging self-learning and self-evaluation, which are the factors for enhancing attainment in the application level of objectives. Regarding understanding level, which requires skills of rationalisation, correlation, comparison and generalisation may be, learning through e-content has not helped significantly in the achievement of the below average student-teachers who cannot be ascertained to possess these skills.

Moreover it has been observed from the study “Effects of Applying Computer Assisted Instruction (CAI) on College Freshmen’s English Vocabulary Development” by Hui-Yi Liang and Chih-Chien Yang (2013) indicate that the students who used computer-assisted learning in vocabulary building, their test results were generally better. Low-proficiency students benefited more from CAI than the high-proficiency students.

Finding No. 12, 13, 14 and 15 justifies the significant effectiveness of e-content in the teaching of mathematics education for the average student-teachers. This fact points to the effectiveness of e-content in enabling the average student-teachers in attaining more in all the three dimensions of the objectives – knowledge, understanding and application.
Finding No. 16, 17, 18 and 19 reveal that though on the whole the experimental group above average student-teachers have attained significantly greater score in their post-test, their attainment is not significantly greater particularly in the understanding and application level.

The above average student-teachers who are noted for their ability to retain what they learn, and in utilising what they have learnt have gained significantly in attaining higher scores in knowledge level.

The above average student-teachers in general do not lack understanding and skill of application of the content imparted to them. Hence whatever may be the method whether traditional lecture method or e-content, they are able to understand and apply to the same extent, what they have been taught. That is why, there is no significant difference between the control and experimental group above average student-teachers.

The interesting derivation from the finding No. 20 and 21 is though the pre-attitude scores of the control group and the experimental group student-teachers towards e-content do not differ significantly, the post-attitude scores of the control group and the experimental group differ significantly. This establishes a significant effectiveness of e-content in enhancing the attitude to a favourable level of the student-teachers towards e-content. The familiarity with the e-content, the practical usage of e-content and the awareness of its benefits have developed more favourable attitude of the student-teachers towards e-content.

William, B. Edward (2007) compared the effectiveness of interactive multimedia CD-based learning with the conventional teaching method with the science group students. The study clearly revealed that the interactive multimedia CD-based learning prepared by the teacher could show immense impact in the learning of physics. Further, the experimental group has expressed a more
favourable attitude towards the interactive multimedia CD-based learning courseware.

**Rommel L. Verecio (2014) conducted a study on Students’ Evaluation of an Interactive Multimedia Courseware.** Findings of the study showed that the developed courseware facilitates and enhances the learning process in the classroom; arouses and maintains positive attitude of students toward learning the subject because of novelty of the materials used; and contributes consistent improvement in the ability to define and measure students’ attainment of educational goals. These results could encourage teachers and researchers in developing their own coursewares.

From the finding No. 22 and 24, it is inferred that the correlation between the gain score and the pre-attitude score of the control group (0.18) and that between the gain score and the post-attitude score of the control group (0.18) are both very low. The conventional method does not show much impact on the attitude of the control group student-teachers.

From the finding No. 23 and 25, it is inferred that the correlation between the gain score and the pre-attitude score of the experimental group (0.60) and that between the gain score and the post-attitude score of the experimental group (0.63) are both very high. This may be due to the fact that learning through e-content definitely helps in enhancing the attitude towards e-content of the experimental group of student-teachers to a more favourable level.

**Enok Joel.T. and Thangarajathi.S. (2011) made an attempt to find the influence of multimedia in enhancing attitude towards computer science at the higher secondary level.** The findings of the study were (i) the attitudes means scores of the control and the experimental groups do not differ significantly at the pre-test. Further, these two groups have similar in terms of their attitude, and (ii) the attitudes mean scores of the control and the experimental groups differ significantly at the post test. It is
concluded that higher mean scores of the experimental group student had a better attitude than the control group.

From the finding No. 26, it is inferred that the effect size value is 1.16 which indicates that the effect cost in the study for the experimental group to that of the control group is having larger difference in their post-test scores. Hence, it is concluded that the exposure of E-content in teaching of mathematics education helps the experimental group to perform tremendously in their achievement.

From the finding No. 27, it is inferred that the Gain ratio obtained through E-content in Teaching of Mathematics Education among B.Ed. Student-teachers for the Experimental Group (69.12%) is greater than that of the Control Group (53.09%), which reveals that the exposure of E-content in teaching of Mathematics Education helps the experimental group to perform tremendously in their achievement.

5.4 RECOMMENDATIONS OF THE STUDY

The recommendations of the present study are as follows:

1. Lecture method in the class should be minimized and new technologies, such as; use of e-content and interactive multimedia courseware can be introduced.
2. Both theoretical and practical knowledge should be enhanced through e-content.
3. The student-teachers may also be involved in the preparation of e-content.
4. In-service course training in the preparation of e-content should be given to the teacher-educators and teachers at all level.
5. An orientation should be given to the student-teachers for preparing script and storyboard to develop e-content.
6. The NCERT, SCERT, NCTE should introduce e-content in the form of curriculum development, to meet the challenges in education.

7. Practical demonstration should be carried with the help of e-content.

8. Subject periods may be increased for the effective use of the e-content in the classrooms.

9. Ensure an environment conducive for the students to be engaged in learning through e-content by minimizing possible distractions.

10. There is a possibility of cognitive overload and the teacher must be cautious about it.

11. Awareness about e-resources where the texts, images, animation and video pertinent to the topics selected for the development of e-content should be given to the teacher-educators.

12. The teacher-educators and the student-teachers should be aware of the University Grant Commission’s Consortium for Educational Communication.

13. Adequate infrastructure may be established in the educational institutions at all levels for the development and usage of e-content.

14. The e-content can be prepared to other topics like micro-teaching, aims and objectives of teaching mathematics, various techniques of teaching mathematics and lesson plan, etc.

15. Since e-content is found effective among the student-teachers it may be effective to the students of school and college level.

16. More involvement and greater variety in dissemination of the content are possible when e-content is used for instruction.

5.5 EDUCATIONAL IMPLICATIONS OF THE STUDY

The following are some of the suggested implications of the present study on the basis the major findings.
a. Student-teachers get benefited by the individualized instructions, self pacing and interactive nature of the e-content.

b. As e-contents are found to be effective, e-content can be used to help students to concretize the abstract ideas in mathematics.

c. As teaching through e-content effects more meaning in learning, the student-teachers could make use of the learnt methods of teaching mathematics in their classroom teaching in a more effective manner and it would help them to be good mathematics teacher.

d. The e-content in other topics could be prepared on other subjects as well.

e. Use of e-content proves that the instruction is more effective than that of the traditional method of instruction.

f. Learner’s active participation in the instructional process results in better teaching effectiveness among the student-teachers.

g. Teacher educators should use this kind of e-content for the slow learners or low achievers as per the requirement.

h. E-content will be helpful to the teacher educators as well as the student-teachers for the effective teaching-learning process.

i. Teaching through such e-content increases the curiosity and capabilities of the student-teachers.

j. E-contents are also useful for distance learning, adult education and other types of awareness programs.

k. Increasing the strength of the classroom, burden of the syllabus, heavy competitiveness will be reduced if e-content is applied.

l. To prepare e-content, training should be arranged for the teacher educators.
5.6 SUGGESTIONS FOR THE FURTHER STUDY

Every research study provides one or two answers about education, but also opens the door for five to ten additional questions. Based on the Discussion/Summary of Findings and Limitations of the present study, following suggestions are offered for further research in the area of effectiveness of e-content.

1. E-content provides opportunity for the student-teachers to study the materials on their own pace and therefore they get motivated for self learning. So this method may be applied in all subjects.

2. A study may be conducted to ascertain the effectiveness of e-content towards pupils’ achievement at the school level.

3. As an experiment, a similar study may also be undertaken on the rural children and the impact of e-content on their achievement.

4. In the context of rapid technological change in electronic media taking place, support of the parents on the children’s learning can be investigated.

5. Academic instruction should be adequately funded and the infrastructure facilities required should be provided by the government to facilitate investigations in this area.

6. Teacher focused research can also be initiated to study how well it is beneficial to the teachers.

7. E-content packages can be developed as bi-lingual or multi-lingual and the relative effectiveness can be studied.

8. Studies may be undertaken to see how the learning time is saved in the e-content method in comparison with the conventional method.
9. Studies may be carried out to find the relative effectiveness of individualized learning and group learning.

10. Better to study the relative effectiveness of the e-content and other instructional techniques.

11. Since e-content is a novice technology, there is scope of wide research opportunities to validate its effectiveness.

12. Effectiveness of e-content presentation will be a boon in teaching Science, Mathematics and Social science for the high school level students.

13. Effectiveness of e-content presentation will be a boon in teaching English, Tamil and Science for the primary students.

14. This experimental study can be extended and explained how it is useful when the learners are exposed to abstract ideas and concepts.

15. With the mixed methodological research design both the qualitative and the quantitative behaviour modifications can be studied.

5.7 CONCLUSION

In the light of research findings, it has become crystal clear that E-content in the Teaching of Mathematics Education has provided higher achievement in reaching to the behaviors at the levels of knowledge, understanding, application and skill of the student-teachers. Teaching of Mathematics Education through E-content has also improved the attitude towards E-content in the Teaching of Mathematics Education.

Besides, this trend indicates positive attitude of the student-teachers towards e-content as well as to use the e-content materials in their teaching-learning process as it paves the way for better results among the students. Therefore, as this educational system creates a comprehensive and collaborative
learning climate, this research strongly advocates the use of e-content for the teaching of Mathematics Education among the B.Ed., student-teachers as well as for the teaching of other subjects in the class room both in colleges and schools is very useful and powerful. It is hoped that this research finding will ignite the imagination of yet another researcher or a few other researchers who are also mathematics buffs.

E-content changes Teaching, not Teachers. E-content has great power to influence their teaching, but it does not fundamentally change them as teachers. So the teachers have to use E-content not just for technology’s sake but to support the students’ learning most efficiently and most effectively.