CHAPTER-V

FINDINGS, IMPLICATIONS AND SUGGESTIONS
CHAPTER-5

FINDINGS, EDUCATIONAL IMPLICATIONS AND SUGGESTIONS FOR FURTHER STUDY

"The time has come," Walrus said, "talk of many things," yes, look back into what has been done is necessary at this stage to understand the relevancy of this venture. However, valid, reliable and adequate the data may be, it does not serve any worthwhile purpose unless it is carefully edited systematically, classified and intelligently interpreted and rationally concluded. After trespassing many odds, the investigator has reached a destination where she can prove the worth of her study in the form of conclusion. Based on the analysis and interpretation of results, findings were lined up. Keeping in view the major findings, implications of the study have been peeked into. Some suggestions have also been laid down for further research in the field related to this study. So, this chapter is devoted to represent the major findings, conclusion, implications of the study and suggestions for further research in the field of education.

5.1 FINDINGS OF THE STUDY

Role of ICT in the field of education is emerging as a growing concept in all parts of the world. For developing countries, it has the potential for increasing access to and improving the relevance and quality of education. It thus represents a potentially equalizing strategy for developing countries. ICT is a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies-scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons. Keong, Horani & Daniel (2005) found that the use of ICT can make the teaching process more effective as well as enhance the students’ capabilities in understanding basic concepts. So, ICT play a vital role in the field of education due to its multisensory approach. It offers opportunities for learners in every aspect and especially it can play a major role in improving student’s academic achievement. It provides a good ground for complex subject matter like science and mathematics as we have studied in chapter two. The effectiveness of IT-
Enabled Instructional Package in Science (Biology) over Traditional method of teaching has been established through the present study. Based on the analysis and interpretation of data, a set of findings and conclusions have been drawn on the basis of their discussion, a wide range of implications and suggestions also need to be focussed on for further research in the field related to this study. Some of the significant possibilities and provisions in the terms of findings of this piece of research may be as follows:

1. OPINION ABOUT EFFECTIVENESS OF IT-ENABLED INSTRUCTIONAL PACKAGE IN SCIENCE (BIOLOGY)

Section wise analysis of opinionnaire has been done by the investigator to know the experts opinion about acceptance of IT-Enabled Instructional Package (ITEIP). The findings obtained from analysis of opinionnaire are being explained here.

- It is elicited by 90% subject experts that the examples given in the package were relevant & interesting and topics chosen were well explained. It was further asserted by 80% experts that the level of language distribution, arrangements of topics and sub-topics and color combination is really appreciable. 70% subject experts have agreed with the number of slides and extent of animation and audio-visuals used in the package. Furthermore it was shown that the 84% experts given their agreement, only 6% of experts disagreed and the rest 10% remain undecided about the statement given in the scale in Part-A i.e. Presentation of Content’.

- The analysis also revealed that it is highly useful for students. 90% subject experts opined that ITEIP is quite successful in capturing the attention of students, enhance their concentration level, self-pace learning, elaboration of complex concepts, recollect all the points easily and can use as and when required. Also 80% subject experts have acknowledged the accessibility of previous content, real-life element, motivates students learning, removal of fear from learners for science and virtual demonstration of activities with the help of package. 70% of subject experts recognized the development of scientific outlook of the students and remove their difficulties with the help
of package. It has been found that 82.66% experts given their agreement, only 6.67% of experts disagreed and the rest 10.67% remain undecided about the statement given in the scale in Part-B i.e. ‘Utility for Students’.

- It has been further asserted that 90% of subject experts have positively acknowledged the provision of innovative techniques of teaching to the teachers, monitoring learning progress of students frequently and take feedback effectively through MCQs at the end of each lesson given in the package. 80% experts have agreed that ITEIP is quit helpful in developing potential of teachers to discover learning together, in maintaining decorum, providing revision of important points and effectively facilitate the students learning. It can further be concluded that 86% experts in agreement, only 4% of experts disagreed and the rest 10% remain undecided about the statement given in the section-C i.e. ‘Utility for Teachers’.

- On analysis of total opinion of experts regarding overall selection of content indicated that 84% of the experts agreed for the effectiveness of IT-Enabled Instructional Package (ITEIP) in Science. Only 6% of experts disagreed and the rest 10% remain undecided about the statement given in the scale.

Thus findings obtained from analysis of opinionnaire revealed that most of the experts accepted the effectiveness of IT-Enabled Instructional Package (ITEIP). It is also determined that through using ITEIP, students would be able to apply the knowledge of science concepts to real life situation and helpful in developing their scientific outlook. It is also helpful in increasing their achievement level at own pace in motivating and fascinating way in today competitive education system. In last experts suggested that ITEIP should be made an inseparable part of normal classroom teaching-learning process then only we can make maximum benefit from this approach.

2. COMPARISON OF MEAN ACHIEVEMENT SCORES OF EXPERIMENTAL AND CONTROL GROUP IN SCIENCE (Before Experimental Treatment)

- It has been found that the there was no difference in the achievement level of two groups namely experimental and control before conducting experiment.
It leads to the conclusion that there is no difference in the achievement scores of two groups (E & C) i.e. initially experimental group and control group were similar in their performance.

- No significant difference was found in Pre achievement scores of boys of experimental group & control group of tenth graders to be taught through IT-Enabled instructional strategy and conventional method before experimental treatment. It leads to the inference that boys of two groups (E & C) were similar in their performance on achievement test before giving the experimental treatment.

- No significant difference was found in the achievement scores of experimental group girls and control group girls to be taught through IT-Enabled instructional strategy and conventional method before experimental treatment. It leads to the conclusion that there is no difference in the achievement scores of girls of two groups (E & C) i.e. initially experimental and control group girls were similar in their performance.

3. EFFECT OF INSTRUCTIONAL TREATMENT AND GENDER ON ACHIEVEMENT IN SCIENCE (After Experimental Treatment)

- There was found a significant effect of treatment on mean achievement scores in Science of tenth class students leading to the inference that experimental treatment yielded difference in achievement scores in Science (Biology). After comparing the mean achievement scores of experimental and control group with the help of t-test, a significant difference was found in both the groups. It discloses the fact that students of experimental group have higher achievement in science than the students of control group. It can therefore be inferred that students who are taught science through IT-Enabled instructional strategy show significant improvement in their achievement than the students who received instructions through conventional method of teaching.

- Gender was found to have a significant effect on achievement scores in science of tenth class students but there was no significant difference in achievement between boys and girls. However, in context of mean scores it was found that the boys achieved better than their female counterparts.
There was a significant interaction effect of treatment and Gender on achievement in science of tenth class students leading to the inference that two variables interact with each other. Further investigation with the help of t-test revealed that

a) A significant difference was found in the performance of boys and girls when exposed to teaching through IT-Enabled Instructional Package (ITEIP). In context of mean scores it was found that mean scores of boys of experimental group was higher than the mean scores of control group girls which revealed that boys achieved more than girls.

b) Whereas no significant difference was found when we compare post-test mean achievement scores in science of boys and girls of control group, leading to conclusion that boys and girls learning through conventional method of teaching were equal in their performance. However when we compare the mean scores of boys and girls of control group, it was found that boys had higher achievement than their female counterparts.

c) The post-test achievement scores in science of boys of experimental group and control group of tenth graders differ significantly in favor of experimental group boys. This implies that boys who were taught science through IT-Enabled instructional strategy illustrated significant improvement in their achievement than the boys who received instructions through conventional method of teaching. A close inspection of mean scores indicated that boys of experimental group performed better than boys of control group.

d) The post test achievement scores of girls of experimental group was found significantly higher than the post test achievement scores of control group. This leads to inference that the girls who were taught through IT-Enabled instructional package showed significant improvement in their achievement in science than the girls who received instructions through conventional method. However, in the context of mean scores, girls of experimental group had higher achievement in science with the girls of control group.
4. **EFFECT OF INSTRUCTIONAL TREATMENT AND GENDER ON ACHIEVEMENT IN SCIENCE** (in terms of Mean Gain Achievement Scores)

- Instructional treatment had a significant effect on mean gain achievement scores in Science of tenth class students leading to the conclusion that experimental treatment yielded difference in mean gains on achievement scores in Science (Biology). The mean gain achievement scores in Science (Biology) of experimental group and control group of tenth graders differ significantly in favor of experimental group. It suggests that students who are taught Science through IT-Enabled instructional package strategy show significant improvement in their achievement than the students who received instructions through traditional method of teaching.

- Gender was found to have a significant effect on mean gain achievement scores in science of students. But after comparing the mean gain achievement scores of boys and girls with the help of t-test, no significant difference was found between boy and girls. This leads to conclusion that Boys and Girls learning through IT-Enabled Instructional Package (ITEIP) are equal in their performance. However, an examination of means indicated that Boys group performed better than Girls group after being exposed to experimental treatment.

- Treatment and Gender had a significant interaction effect on mean gain achievement scores in science of tenth class students leading to the inference that two variables interact with each other. After comparing the mean gain achievement scores for the experimental and control group with the help of t-test following conclusion were drawn

  a) There was found to be a significant difference in the performance of boys and girls when exposed to teaching through IT-Enabled Instructional Package (ITEIP). An examination of means leads to conclusion that gain achievement scores of boys is more than girls. It can be said that boys were more benefited by instructional strategy (ITEIP).

  b) Whereas no significant difference was found when we compare mean gain achievement scores of boys and girls of control group, this leads to
conclusion that boys and girls learning through conventional method of teaching were equal in this context.

c) However when we compare the mean scores of boys and girls of control group, it was found that boys had higher achievement than their female counterparts. After the comparison of boys of experimental and control group in terms of mean gain achievement scores, it was found that boys of both the groups differ significantly in mean gain science achievement in favor of experimental group boys. It can be revealed that IT-Enabled instructional strategy is more effective than conventional teaching strategy in raising the achievement of boys in science.

d) A significant difference was found in mean gain science achievement scores between the girls of experimental group and control group. When girls of experimental and control group were compared on mean gain achievement score it was found that mean gain achievement score of experimental group girls is higher than that of control group girls. This entails that the girls exposed to IT-Enabled instructional package strategy benefitted more in their achievement in comparison to the girls exposed to conventional method of teaching.

5.2 CONCLUSION

ICT plays a key role in the modern systems of education. Students find it easier to refer to the internet than searching for information in fact reference books. Modern technologies are improving the students and teachers knowledge and give the innovative techniques. Education is a lifelong process and it should meet the needs of variety of learners. Multimedia will provoke radical changes in the teaching system because it is a woven combination of text graphic art sound animation and video elements. It represents the second wave in educational technology. Development in computers, communication and consumer electronics is compared to the first wave that is technology development in audio, video, and TV media which occurred many decades ago. Today, CD-ROM, Drives, Video Disk Player, Video Data Projectors, Animation Packages, Speech, Music are known as second wave in educational technology. It puts learning into the controls of the learner. It benefits both the students as well as the teachers. The purpose of the
The present study was therefore to ascertain the effectiveness of using IT-enabled instructional strategy as compared to Conventional classroom strategy. The findings clearly suggest that the inclusion of IT-enabled instructional package in science for class X students is very effective. It was also found that both the gender i.e. male and female has shown significant improvement in their achievement level after giving experimental treatment with ITEIP. Precisely, it can be said that IT-enabled instructional package (ITEIP) provides greater opportunities for the students to learn. It is better than the traditional method of learning. It brings an enhancement in achievement and provides new multisensory learning experiences.

5.3 EDUCATIONAL IMPLICATIONS

Teaching at school as well as higher level mostly concentrates on giving information which is not the sole objective of teaching. Along with giving information, the other objectives are: developing understanding & application of the concepts; developing expression power; developing reasoning & thinking power; development of judgment & decision making ability; improving comprehension, speed and vocabulary and developing tolerance and ambiguity, risk taking capacity, scientific temper, etc. With the present infrastructure, class size, availability of teachers, quality of teachers, training of teachers, etc., it is difficult to achieve all the objectives. Further, most of the teachers use Conventional Method which does not have potentiality of achieving majority of above mentioned objectives. The objectives are multi-dimensional in nature, so for their achievement multiple methods should be used in an integrated fashion. It is a well known fact that not a single teacher is capable of giving up to date and complete information in his own subject. The ICT can fill this gap because it can provide access to different sources of information. It will provide correct information as comprehensive as possible in different formats with different examples. IT-Enabled instructional package also provides online interaction facility. Students and teachers can exchange their ideas and views, and get clarification on any topic from different experts, practitioners, etc. It helps learners to broaden the information base.
The package provides variety in the presentation of content which helps learners in concentration, better understanding, and long retention of information which is not possible otherwise. The learners can get opportunity to work on any live project with learners and experts from other countries. The super highway and cyber space also help in qualitative improvement of Teaching-Learning Process. ITEIP provides flexibility to learners, which is denied by the conventional process and method. Flexibility is a must for mastery learning and quality learning. On Internet, many websites are available freely which may be utilized by teachers and students for understanding different concepts, improving vocabulary, developing reasoning and thinking, etc. The present study has a wide range of implementation in the field of education. Some of the implications are given below:

- **For Schools**: School organization should be considered technology as a useful tool so that teachers can successfully integrate technology into their teaching. Teachers with the goal of using technology in classroom instruction could not achieve technology integration in schools if technology will be treated as an unnecessary tool. Students can learn better through electronic media and communication technologies because they work as a live teacher and guide the learners more effectively. IT-Enabled instructional package if find a permanent place in school time table can be proved as a boon in today's overcrowded classrooms. With the help of it, pupils can manipulate information on computers so that they can develop better understanding of the relationship between different types of information. Students should be encouraged to use computers and Internet facility to learn more and more and enhancing knowledge. Apart from this information technology course should be given due place in the curriculum.

- **For Planners**: Potential of IT-Enabled instructional package should be utilized to enhance quality of education at all the levels of education viz Primary, Secondary and Higher. Government should also establish IT-Enabled instructional package portal in various organisations such as Institutes of Education and Research, Curriculum Wing, Test Book Boards, Curriculum Research and development Centres, and Education University. Private
organizations can step forward to educational software development if copyright act prevails and a system to check the software piracy is established. Government should also offer incentives for teachers who contribute to such type of instructional package. Steps should be taken to meet the needs of the literature about IT-Enabled instructional package in the libraries of our institutions. There are a number of IT-Enabled instructional package learning journals, which can be purchased or subscribed for the libraries.

- **For Administrators:** The administration should allow enough flexibility for teachers to make decisions regarding the use of technology in the classroom instruction. Neither administrators nor colleagues forced them to use a particular tool in a certain way in classroom instruction. Also, the presence of professional collaboration seems to be crucial to the technology integration. All teachers expressed that designing technology-rich lesson plans takes time. Collaboration with other teachers through online or face-to-face discussions help teachers decrease the amount of time that they need to spend in designing technology enrich lesson plans. Thus, administrators might allow teachers time to design lesson plans that incorporate technology. It also seems important that teachers need to attend professional development opportunities to learn innovative lesson plans and to update their knowledge of technology. Thus, administrators should also provide teachers high-quality professional development.

- **For Teacher Educators:** Finally, teacher education programs would motivate teachers on adopting technology use in their classroom when teaching. They will required to take content specific technology course where they will learn about the use of particular technology tools in science classrooms and pedagogical issues related to technology integration into teaching and learning, it would be beneficial for them to make their teaching more impressive and effective. Learning these courses will decrease their fear of use of technology. For this purpose teachers should be provided opportunities to explore and practice with various technology tools in technology courses. More practice and self exploration might help them increase their comfort level with the technology tools. Another aspect is that teachers should be allowed to check out educational
technology tools that they practice within their technology courses to explore them more on their own time.

- **For Teachers:** This study implies that having access to the technology outside the school seems impact teachers' technology integration efforts. Teachers used technology in their personal lives. It is easier for them to use some of those tools in their classroom since they do not need to spend extra time to learn about those tools for classroom instruction. With the help of ITEIP, the teacher is freed of the administration burden. They thus, would be able to devote more time to the task of helping students for which they are trained. Moreover, the students will also enjoy their course of study. Again ICT used learning sessions like solving puzzles and riddles, holding group discussions on some general topics in class may act as a source of edutainment (education plus entertainment) which makes the teacher more resourceful.

- **For Students:** The use of IT-Enabled instructional package (ITEIP) leads to positive attitude of teachers as well as students towards ICT. Thus, when taught through ITEIP the students feel more involved in studies, which help significantly in raising their achievement. Traditional method of teaching if supplemented with IT-Enabled instructional package can prove to be more effective in enhancing their achievement. It would be helpful in enhancing the aspects of teaching through presentation of information in different ways and forms. IT-Enabled instructional package mode of teaching needs to be introduced for teaching science as it significantly enhance academic achievement among pupils. Important skills such as critical thinking, creative problem solving, psycho motor skills and synthesis of knowledge can easily be attained through use of ITEIP. So, the careful incorporation of computer for teaching science course will help the students to grasp the basic concepts of science.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

No research is perfect and complete in all aspects. Every research has got its own limitations. Due to paucity of time and resources at the disposal of the investigator, all the aspects of the problem cannot be expected to deal with. Therefore, the present
The present study has been carried out only on limited topics of Science syllabus; more studies may be conducted involving larger content of the curriculum and different subjects.

There is need to compare multimedia method of instruction learning with other method of instruction at different grade level.

The present study has been conducted on class X. To confirm the findings of present study, it is desirable to investigate the effect of IT-Enabled instructional package on achievement of learners of different grade level and subject area.

Further research can be conducted to explore the effectiveness of IT-Enabled instructional package on disadvantaged groups such as backward, low achievers, mentally retarded and gifted.

Effectiveness of IT-Enabled instructional package may be studied in relation to other variables, such as group size, creativity, intelligence, economic background, age, cognitive style, personality and classroom environment etc.

The study indicates that IT-Enabled instructional package is an effective intervention for improving student’s academic achievement. Further, research is needed to predict and explain how such type of strategy can become more effective instructional tool.

Research is needed to compare the combination of various mediums/elements (text, audio, video, animation and graphics) of ITEIP i.e. up to what extent a medium is superior to others.

The researches could be conducted on the perceptual changes in the students, on being taught through ITEIP using different scales.

The study may be replicated on rural, tribal and slum population, where chances of drop outs and failures are high.
The list which has been given above is, however, not exhaustive but illustrative. There are vast areas in this field which have not been explored so far and any attempt in this direction may both be rewarding and instructive. If the present study is able to provide thinking in this direction, the efforts of the investigator would be amply rewarded.

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