CHAPTER V

SUMMARY AND CONCLUSION
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CHAPTER – V
SUMMARY AND CONCLUSION

5.1. INTRODUCTION

Learning typically includes the notion of a process that brings about a relatively stable change in an individual or group. As one does with technology, one wishes to adopt a broad interpretation of this term. The researcher can include both individuals and groups including methods of learning in this discussion. The researcher likes to include changes in directly observable aspects of an individual through an achievement test. One acknowledges that learning can occur in purposeful situations in which there is an explicit goal for an individual or group to learn as well as in incidental situations in which there is no explicit learning goal or interest. This is the familiar intentional-incidental distinction, of course, with instruction being that which is intended to support and facilitate intentional learning. Clearly technology can play an active role in intentional as well as in incidental learning. Regardless of whether the learning is intended or incidental or whether it involves changes, if there is a claim that learning has occurred then it is reasonable to expect that the associated change(s) are relatively stable and persistent and that there is evidence that such change(s) in fact occurred.

Based on the views of Cope and Ward (2002), effectively integrating new technologies into learning environments is challenging under the best of circumstances. Learning technologies are considered to enhance learning through encouraging and simplifying the seeking and grasping of the meaning of the content being taught. The use of learning technologies in the classroom by students has been perceived as leading to learning outcomes which involved deeper understanding.
Education is a form of social practice, which in the majority of cases involves interaction between teachers and students, as well as among students. Teaching and learning issues, which are at the heart of educational practice, are usually ill-defined and complex phenomena. Understanding these issues requires understanding a whole range of issues such as history, attitudes, motives and biases of faculty and students alike (Naidu et al 2002).

According to Sfard (1998), learning reflects the dynamic and complex nature of learning. There is not a single or simple view of human learning that accounts for what individuals and groups are able to master and understand. Learning is complex and processes that lead to and support learning. Moreover, accepting the activity perspective with regard to learning leads one naturally to deemphasize the traditional distinction between learning and working and to emphasize goals and outcomes.

Seeing, doing, and thinking are the three stages in a learning process. With multimedia, the students do not just sit back and watch but instead interact with a computer to acquire information on demand in a nonlinear fashion. Information that is unimportant or previously learned does not block the path to information that is important which can be accessed immediately. Assimilation of information into the final and most sophisticated stage of learning occurs from the integration of the symbolic world of language and mathematics into the visual and interactive world. Interaction with information results in the development of thinking, (Eisenback 1993).

5.2. OBJECTIVES OF THE STUDY

The objectives of the study are:

i) To prepare and validate programmed learning materials, computer assisted instruction and multimedia package for learning Botany at higher secondary level.
ii) To find out if there is any significant difference between their pre and post test achievement scores of students who learnt Botany through

   a) Conventional teaching.
   b) Programmed Learning Method (PLM).
   c) Computer Assisted Instruction (CAI).
   d) Multimedia package (MMP).

iii) To find out if there is any significant difference between and among the groups of various strategies

   a) Conventional teaching.
   b) Programmed Learning Method (PLM).
   c) Computer Assisted Instruction (CAI).
   d) Multimedia package (MMP).

iv) To find out if there is any significant difference in conventional teaching methods between

   a) Government aided and private school students
   b) Boys and girl students
   c) Rural and urban area students

v) To find out if there is any significant difference between the students who studied Botany through PLM among

   a) Government aided and private schools
   b) Boys and girls
   c) Rural and urban area

vi) To find out if there is any significant difference between the students who studied Botany through CAI among

   a) Government aided and private schools
   b) Boys and girls
   c) Rural and urban area
vii) To find out if there is any significant difference between the students who studied Botany through MMP among

a) Government aided and private schools

b) Boys and girls

c) Rural and urban area

5.3. SAMPLE OF THE STUDY

Two hundred and forty students studying in XII Std under the pattern (10+2+3) of state board syllabus from four different schools of government aided and private in Salem educational district of Tamilnadu in India. The sample includes both boys and girls in rural and urban area.

5.4. INSTRUMENTATION

Some of the tools and methods are,

i) Achievement test consists of pre and post to assess the performance of all the control and experimental groups

ii) (PLM and CAI developed by the researcher)

iii) Multimedia CD also developed by the researcher and

iv) Multimedia Opinion Schedule is the tool used for teachers

5.5. EXPERIMENTATION

Self learning packages like programmed learning method, computer assisted instruction and multimedia for the experimental groups; traditional conventional teaching for the control group are the four methods used in the experimental study. A good rapport was established between the researcher and the students of control and experimental groups. Two hundred and forty students are divided into four groups. Each group consists of sixty students. Pre test was administered to all the groups with an achievement test. After three months, experimental groups are given with proper instructions.
Treatments are given only to the experimental groups in parallel forms. For the control group also the conventional teaching method was followed during the parallel sessions. Then post test has been administered for all the four groups. The pre and post test achievement scores are used for data analysis.

5.6. DATA ANALYSIS

To study the effects of PLM, CAI, and multimedia package with reference to gender, type of school and location of the school, the data are collected and analyses using SPSS package. Mean and standard deviation, ‘t’-test and F-test (ANOVA) and post-hoc range tests have been worked out.

5.7. MAJOR FINDINGS OF THE STUDY

The achievement scores of the post test are higher than the pre test among all the groups such as conventional teaching, PLM, CAI and MMP shows that the effectiveness of teaching methods in higher secondary school students. This may be due to change in their method of study than the monotonous style of teaching, parental care, study habits, retention rate and self regulatory skills.

The achievement scores of students using the MMP are the highest among all the means of the treatment and control groups with regard to Botany learning. Multimedia package gives much interactivity made the learner engaged and interest over the subject, better understanding of the concept, videos gives a clear idea about the scientific concepts, animations and pictures increases the memory, repeated drill increases the retention rate, improves academic achievement and gives freedom to self learning. Students using the package are highly participatory in learning than the monotonous style of normal teaching and learning process. Hence the package is user friendly, the learner can quit at any time, increases the self regulatory skills in reading and it increases the learning time of the learner. The
multimedia package reduces the learning time taken by the learner to mastery over the concept.


Government aided and private school students not differed in their post test mean scores of the control group. This is because the same conventional teaching method was followed in the educational system of India as well as Tamilnadu in the case of private or government schools.

Girls performed better than boys' students in the control group while learning Botany in the post test. Every year the state government of Tamilnadu is conducting common examinations for higher secondary school students based on the common higher secondary school syllabus. The past history of the results proved that girls are out performed than boys in their achievement test. In this study also the findings coincides the above fact. In Indian style of living boys are more exposed to outside activities than girls and reading time are some of the reasons.

There is no significant difference between the students of urban and rural area in utilizing the conventional teaching methods in learning Botany during the post test. Teachers appointed by the government of Tamilnadu are qualified with sufficient subject knowledge. So teaching methods, drill and practice, motivation are common in both urban and rural area.
Private school students are equally performed to Government aided school students in learning Botany during their post test in using the PLM as the teaching method. Students in Government aided and private are equally motivated due to the new learning material.

Among girls and boys in the post test, there is no difference found in using the teaching methods of the PLM groups. This may be due to the new strategy introduced; boys are also concentrating towards the self learning material. The result of the study was supported by the findings of the study conducted by Jyoti Tare (2001).

There is no significant difference found between the students of urban and rural area in using PLM as the teaching methods in learning Botany during the post test. They were not differed much in their study habits, concentration over the subject matter, and perception towards the self learning material.

The relative effectiveness of the linear programmed material over traditional method in teaching various subjects was substantiated by the findings of the studies conducted by Alter (1962), Goldbeck et al (1962), Moore and Smith (1962), Eigen (1963), Kulkarni and mullick (1968), Desai (1985) and Jijish Elias (2009). Many research findings supports the favourable attitudes towards the preparation, evaluation of Programmed Learning Material and the achievement level by many researchers like Hickey and Anwyll (1961), Hickey and laidlaw (1962), Beane (1962), Sarkar (1969) was Shah (1972).

CAI seems to be more useful to students in private schools than students in Government aided schools in learning Botany during their post test. Students in the private schools are more familiar with computers than the students of government aided schools.

Among girls and boys in the post test, there is no difference found in using the learning methods of the CAI group. It shows that both
boys and girls have the same attitude and interest towards the self learning package. The result of the study was supported by Barad 2010.

In learning Botany, rural students performed better than urban students in CAI group in the post test. Urban students have more exposure of computers whereas rural students are not so. In country like India especially in the state of Tamilnadu, rural area has been lagging behind the basic facilities and sources. But in private schools have more number of computers even though the school lies in rural area. So automatically the students will get the exposure of computers in schools. When the package was introduced to them, the students are highly motivated.


MMP seems to be more useful to students in private schools than students in Government aided schools in learning Botany during their post test. Students in the private schools are more familiar with computers than the students of government aided schools. Their family background, financial support of the parents, basic operation skills in computers, schools with adequate computers, Handled computers in their lower levels of learning and having knowledge with CD-ROM's contains stories and rhymes were the main reasons of the better performance of the private school students than government aided school students. Now a day, state government is started introducing computers in the schools of government aided categories. Some CD packages of lower level subjects are introduced and it is distributed for
the betterment of students through all the district level chief authorities of education department of Tamilnadu.

Among girls and boys in the post test, there is no difference found in using the teaching methods of the MMP group. Interactivity of the package influences both of them significantly. So in the case of achievement test, both of them are not differed.

There is no difference found during the post test in urban and rural students in learning Botany among the MMP group. Students while using the package has much interactivity and feels free with out any controlled situation makes them interesting both in urban and rural area.


Mohanty (2008) points out rightly that in order to ensure efficiency as well as effectiveness in learning, teachers have to use their imagination, ingenuity and intuitive. In the electronic era, one has a variety of resources starting from traditional media to the present potential computer, internet etc that are storehouses of multimedia and materials. With the advent of computers and technological advances like the internet, school education, higher education, teacher training and distance education, the usage is in some form or the other is prevalent. There is a definite change in the entire teaching learning process.

According to Buckley (1999), and Douglas Siviter (1999), are stressing the importance of developing and implementing computer-based learning packages to support education. The learning process develops an internal capability, a reservoir of linked information, which
the learner uses to perform various functions, synthesize into new information or to solve problems. Technology may be used more effectively to bypass learning. Technologies are used to "train the brain" to achieve a given performance then learning.

5.8. EDUCATIONAL IMPLICATIONS

The advent of multimedia and multimedia technologies has changed the way educators teach and students learn. With multimedia, the communication of the information can be done in a more effective manner and it can be an effective instructional medium for delivering information. A multi-sensory experience can be created for the audience, which in turn elicits positive attitudes towards the application. On the part of the creator, designing a multimedia application that is interactive and multi-sensory can be both a challenge and a thrill. Multimedia application design offers new insights into the learning process of the designer and forces him or her to represent information and knowledge in a new and innovative way (Neo and Neo 2000).

Self-instructional package holds great potential for individual as well as group learning if properly and systematically developed in accordance with the needs of the learners. By such package one can learn at his own pace with immediate personalized feedback and knowledge of progress.

In learning, students expect guidance and change from their daily routine schedule. If learning occurs through self-learning packages like multimedia, they get motivated and learn the habit of self-learning without any external force. It gives confidence to the learner. If multimedia package or approach is given along with traditional instruction, the performance of the students in their achievement level will increase.

Students in groups participate and feel comfortable because they can discuss among their peers, they develop competitive spirit,
encourages learning with understanding than rote learning and memory. Students used up with their self regulatory skills like reading habits made them encouraging and increases creative thinking.

At present one has a lot of media materials and methods available and the teachers are to teach a variety of subjects/contents. In order to optimize the quantum of learning experiences we need to select suitable media, methods, materials according to the funds, time, media etc, that are available. So graphic media are mostly traditional and are regarded as the most powerful of all senses through which we see, perceive and visualize everything. One picture is equal to hundreds of words. Lindstorm (1994), in his study he reveals that the use of Multimedia in industries has been extensive, as it has shown that people remember 20% of what they see, 40% of what they see and hear, but about 75% of what they see and hear and do simultaneously.

An interaction process between the learner and the contents, the learner and the teacher, the learner and other learners, the learner and the community and the learner and home are the various aspects of the learner. So teacher has to play the role of a creator, evaluator and facilitator for teaching and learning process (Gupta 1995).

Since the students of multimedia group performed better than the other experimental groups and control group, it is recommended that for students while teaching, the concept will be supplement with multimedia components. Teachers can prepare their own packages or any other form of slide shows with the help of computers, to make the subject concept clear to the students in all levels. Hence teachers must have a positive attitude towards the usage and knowledge of computers. Then only teachers can fill the thrust of technological knowledge of the students to the current situation. They may be enriched with sufficient knowledge about the computer software also.
Students are ready to accept the changes in their learning styles, but their teachers are feeling feared that computers are complicated to handle, if they are used in education for teaching and learning purpose and computer must substantiate the traditional teachers. Neither the pre-service teacher training courses are focusing to include computers in integration with education, nor are the in service trainings focusing upon using computers in education.

Learning through multimedia is an active and engaged process. Although technology in the classroom does have many benefits, there are clear drawbacks as well. Lack of proper training, limited access to sufficient quantities of a technology, and the extra time required for many implementations of technology are the few reasons that technology is often not used extensively in the classroom.

Another difficulty is introduced when access to a sufficient quantity of a resource is limited. This is often seen when the quantity of computers or digital cameras for classroom use is not enough to meet the needs of an entire classroom. It also occurs in less noticed forms such as limited access for technology exploration because of the high cost of technology and the fear of damages. In other cases, the inconvenience of resource placement is a hindrance, such as having to transport a classroom to a computer lab instead of having in-classroom computer access by means of technology such as laptops.

Technology implementation can also be time-consuming. There may be an initial setup or training time cost inherent in the use of certain technologies. Even with these tasks accomplished, technology failure may occur during the activity and as a result teachers must have an alternative lesson ready. Another major issue arises because of the evolving nature of technology. New resources have to be designed and distributed whenever the technological platform has been changed. Finding quality materials to support classroom objectives after such
changes are often difficult even after they exist in sufficient quantity and teachers must design these resources on their own. So Government has to take necessary steps in implementing the innovative technology in the department of education to enhance better learning with understanding.

State government of Tamilnadu is concentrating the upliftment of government aided schools by providing computers. Apart from general CD’s, subject CD’s also if provided by the government it would be much beneficial to the students as well as teachers. The teachers provide training in using computer effectively to teach science and other subjects at higher secondary level. The teachers will be given in-service training to develop multimedia packages in the form of CD’s according to their own need.

National Council for Teacher Education (NCTE), has taken a decision to make Information and Communication Technology literacy a compulsory part of pre service course at secondary level. The main objective of this course shall be to enable each pre service student of B.Ed., M.Ed., B.P.Ed and M.P.Ed courses competent in using multimedia for preparing lesson plans, document creation, accessing online and off line resources on teacher education. Innovational instructional media are being widely adopted and have become an integral part of teaching in educational system. Our education system are acquiring large amounts of technological equipments, but it is also true that there is inadequate understanding on the part of teachers as they do not have adequate and suitable training to use these equipments. Therefore, there is need to train teachers for digital world in order to get qualitative product from our schools (Nasrin 2006).

In State Government of Tamilnadu has launched an e-smart classroom at a government higher secondary school on July 2010 onwards. In an e-smart classroom the teacher has an interactive electronic board, supported by a computer to teach subjects with the
help of 3D (Dimensional) images and animations. The animations would help students learn subjects; especially science, social science and mathematics with additional information on the subjects derived from the internet (The Hindu, 30.07.2010).

Some concepts cannot be explained in a traditional way. If in such cases the learning packages support the teachers in addition with the textual information, then the teaching learning process must be effective. So curriculum developers can keep this in mind while developing a curriculum along with their textual matter can suggest the government to provide educational CD’s.

Appropriate software’s in regional languages should be developed. Multimedia packages on science will enhance motivation; develop innovative materials, increases curiosity, scientific attitude towards the subject science. Creating positive attitude towards technology, using it in science subjects among teachers and learners should be developed.

The technological aids cannot replace the teacher; instead make the teacher more effective in her teaching. Self learning packages can reduce the workload of the teachers among intelligent students, so more individual attention given to slow learners is possible.

Students in Government aided schools rural area do not opt for English as a medium of instruction. Maximum software’s are developed in English language which the students in Government aided schools of rural area cannot use the package due to language problems. So Software’s should be developed in regional languages.

In a world dominated by technology, access to knowledge is more important than access to natural resources and capital. It is no longer possible to leave science and technology to scientists and technologists alone. Every individual must possess minimum science and technology literacy to prosper in this new environment. Irrespective
of what you do, you must acquire contemporary skills and adopt a scientific approach (Ramamurthy 2006).

The country needs people with capacity to think independently, logically, critically and also to create knowledge. In order to develop such capacities students need better understanding about their science subject using multimedia package.

According to Kalam, the former president of India, "The competitiveness is powered by knowledge power. Knowledge power is powered by innovation. Innovation is powered by science and technology and technology is powered by resource investment". (The Hindu, (9.12.2005).

According to Paine (1992), the learner can choose one or more routes of conventional delivery and other modes of delivery like multimedia, whenever it suits him throughout his learning career. The key issue must be the building of effective learning in individuals. Learners must drive the new situation, as the learner has to structure his learning at his or her own pace.

Giving direct experiences to the students are the best way to develop effective science education. The use of different audio-visual aids should be promoted to develop mastery of essential concepts and also to widen the already formed concepts in science for secondary school students (George 2006).

5.9. SUGGESTIONS FOR FURTHER RESEARCH

The study has been limited to learning science subjects like Botany, but the study can be conducted in other subjects of higher secondary school level also.

The result of present study indicates that teacher made instructional package based on their student needs can be used effectively for teaching and providing information to the learners.
This study gives repeated drill and practice in the packages, but packages should be prepared in the part of repeated evaluation alone in all the subjects.

Online testing is the current scenario in most of the areas of education. So much software's should be prepared in their subjects students to gain more knowledge to face the talent exams.

Studies can concentrate on lower level subjects with the implementation of technology. So the students in lower level can understand the concept much better along with their teacher's instruction.

More software's should be prepared to improve their practical classes for all the science subjects related to all the levels.

Students facing a tough time in India while facing the interviews due to lack of fluency. To improve skill in languages, more software's should be prepared for all the language labs related to school and college levels.

Packages should be prepared to stress and teach the biological and zoological terms to understand the students related to all the levels.

The study has also implications for principals and teachers for better planning the teaching learning process.