

EFFECTIVENESS OF CAI FOR TEACHING PLANT PHYSIOLOGY AT HIGHER SECONDARY LEVEL

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Investigated By

S. GOPINATHAN

Reg. No. 2006T04

Guided By

**Dr. N. PUGALENTHI M.Sc., M.Ed., M.Phil., PGDPM., Ph.D.,
Reader
Department of Biological Science**



**SRI RAMAKRISHNA MISSION VIDYALAYA
COLLEGE OF EDUCATION**

(AUTONOMOUS)

COIMBATORE – 641 020

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CERTIFICATE

This is the certify that the dissertation entitled “**EFFECTIVENESS OF CAI FOR TEACHING PLANT PHYSIOLOGY AT HIGHER SECONDARY LEVEL**”

submitted to Bharathiar University through Sri Ramakrishna Mission Vidyalaya College Of Education (Autonomous) for the award of the **Degree of Master of Education** is a record of original research work done by **S.GOPINATHAN, Reg. No. 2006T04** during the period of 2006 – 2007 on my supervision and guidance and the dissertation has not formed the basis for the award of any Degree / Diploma / Associateship / Fellowship or similar title to any candidate of any University or Institution.

Signature of the Principal
(Dr.N.MUTHAIAH)

Signature of the Guide
(Dr.N.PUGALENTHI)

Place : Coimbatore

Date :

DECLARATION

I declare that the dissertation entitled **“EFFECTIVENESS OF CAI FOR TEACHING PLANT PHYSIOLOGY AT HIGHER SECONDARY LEVEL”** Submitted to Bharathiar University through Sri Ramakrishna Mission Vidyalaya College of Education (Autonomous) in partial fulfillment of the requirement for the award of the Degree of Master of Education is a record of original research work done by **S.GOPINATHAN, Reg. No. 2006T04** during the period of **2006 – 2007** under the guidance and supervision of **Dr. N. PUGALENTHI, Ph.D., Reader Department of Biological Science, Sri Ramakrishna Mission Vidyalaya College of Education, Coimbatore – 20**. This work has not been submitted earlier, in full or part, for any Diploma or Degree in this or any other University.

Signature of the Investigator

Station : Coimbatore

Date :

S.GOPINATHAN

CHAPTER-I

EFFECTIVENESS OF CAI FOR TEACHING PLANT PHYSIOLOGY AT HIGHER SECONDARY LEVEL

1.100 INTRODUCTION

One of the most important forces in human lives today is the computer. Through this computer the technological achievement of the information revolution is a blessing not a curse of all the fruits of modern technology the computer perhaps has come to attain the most pervasive influence in society. The computer has gradually grown to be the central element in almost all commercial and Engineering activities.

The second was “The adaptation of the written word as a tool of education” Prior to that time, oral instruction prevailed and it was with reluctance that “writing was permitted to coexist with the spoken word in the class room”. The third revolution came with the invention of printing and the subsequent wide availability of books. The fourth revolution in the field of education is the development in electronics. Notably those involving the radio, television tap recorder and computer etc. Behavioral scientists have joined the fourth revolution and have pointed out the importance of defining learning objectives and suggesting ways in which natural learning process can be utilized in the presentation of subject matter by using the popped-up technology today’s world.

The technological advancements are also affecting the social structure of development of developed and under developed societies, ensuing to effect the teaching –learning process by providing valuable help in improving the task of teacher, as viable tool by using different types of technological gadgets to improve the quality of instruction. As such the involvement of technological know- low in teaching- learning process help in teaching and learning to which we refer to as the education technology.

1.10 SCIENCE EDUCATION:

The term “science “ is both a body of knowledge and process of acquiring it. (Fit Patrick 1960)

Science education is within the realm of possibility to link, the most powerful concept of science to graving minds. Of children through active ornamental pedagogy.

Science education promoter the inherent value system of science on very large scale. It is creation of human mind with its freely invested ideas and concepts.

1.20 AIM OF SCIENCE TEACHING:

The aim of science teaching under the following

- ❖ Acquisition of the knowledge and information.
- ❖ Development of Interest and appreciation.
- ❖ Development of favorable habits.
- ❖ Development of scientific attitude.

- ❖ Development of skills and abilities.
- ❖ Training in scientific method.
- ❖ Scientific students as a basis for future career.
- ❖ Provision for utilization of Leisure.

1.21 Importance of Science Education:

Science education plays an important role in one's everyday life helps human welfare and process. Besides teaching of science, it also imparts training in attitude and scientific temper, which are very valuable, and at the same time are transferable to other situation in life.

Kothari commission reported shift to the acquisition of knowledge together with the ability to think logically to draw conclusion and to make decision.

Ishwer Bhai patel Commission focused on the acquisition of skills for purposeful observation and development of aesthetic perception and creativity through participation in artistic activities and National Council for Educational Research and Training (1963) observed that the Science is not just an accumulation of facts, which must be stored in the memory. It is an active growing body of knowledge.

So science education should be placed in school curriculum at all level and its teaching should be impressive in order to inculcate its values.

1.30 PURPOSE OF BIOLOGY EDUCATION

Biology has now become more analytical. Owing to high concentration of research in molecular biology, our knowledge in this field is expanding at an enormous rate. Remarkable advances have been genetically manipulated to yield new goods and services. Methods of diagnosis of disease and disorders have been refined and speeded up. There is fresh excitement about the origin and evolution of life, working of genes, proteins, membranes and plant physiology and in the understanding of regulation of differentiation, reproduction, behaving and adaptation.

The last few decades have witnessed serious global changes plant have been responsible for modifying their environment as no other species has done before. The population has escalated. Resources have dwindled Green drunks of our earth have been peeled off. Numerous organisms have become extinct. Droughts, floods, famines and other disasters have affected many parts of the world. The ozone layer has been disrupted at the Polar Regions and there is deep anxiety about the increased carbon divide content and other pollutants in the atmosphere and accumulation of toxic chemicals in soil and water bodies. The anticipated changes in the world climate and rainfall patterns are causing deep concern. The prospects of a nuclear holocaust are frightening.

In the coming years biology education would be expected to find new strategies to meet the world needs of food and feed, Safe drinking water, shelter and health. Biology has a vital role to play in their efforts and to eradicate hunger, poverty and disease, mitigate pollution, sustain natural living resources. Prevent eco degradation and improve the quality of life and ensure biological conservation.

1.40 EDUCATIONAL TECHNOLOGY

The term “Technology” as Offish (1964) observes, implies the application of science to art. When we apply the science of learning and communication to teaching we are technologists, i.e., the technology of instruction.

Educational technology is the application of scientific knowledge about learning and the conditions of learning to improve the effectiveness and efficiency of teaching and learning- G.O.Lathe

Educational Technology is a system which facilitates learning and makes learning easy, effective, durable and comprehensive. - Tilak Raj

The present century is rightly called the technological century. The influence of advancement in the fields of science and technology on the valued aspect of the- has results in its modernizations, which in turn has given rise to the new discipline – Educational Technology.

The explosion of knowledge, pupil's resources have lead to a search of bringing order to this threatened situation with the application of a scientific approach to teaching and learning. It becomes possible to provide circumstances, which will enable the work of the teacher to become considerably more effective.

The future, schools, colleges and universities are bound to change rapidly due to the impact of the advanced technologies even in the field of education and there is the need to great education and the teacher educator's to meet the future requirements of the emerging society.

1.41 Technology in Education

This is based on the application of engineering principle for developing electro-mechanical equipment like motion pictures, tape-recorders, teaching machines, computers, television etc. This approach of educational technology is a bye product of the 20th century. Davis (1971) thinks that the hardware approach is based on the application of physical science to the education and training system which mechanics the process of teaching gradually so that the teachers would be able to deal with more students resulting in less costs and economy in finances. It is said that good teachers have always used visual aids to assist their teaching ancient great masters used illustrations and models to increase the interests of their students. Today educational technology is stressing modern audio-visual and computer equipment.

1.41 Technology of Education

Refers to the study of principles, theories, formulate to solve problems in the teaching, learning or training process. Technology of Education provides the mainframe work of Educational technology.

Where as 'Technology in Education' provides the support to implement the broader instructional design. It primarily implies systematic approach to instructional design incorporating alternative methodologies, media and aids with reference to the objective-vis-à-vis learning content. This accommodates the systems approach, programmed learning etc.

According to the encyclopedia of Education (1971.vol-9 P-22) Educational Technology is the purposeful combination or separately of objects, technique, devices, events and relationships to increase the effective ness of the educational process.

1.42 Application of Educational Technology

Educational Technology has gradually influenced and developed the teaching learning process. Since the world is moving towards Technological growth information and special place in education. The trend is to introduce technological principles in the classroom. Educational technology consist of all modern media, methods and materials, which can be used to maximizing the learning experience of student at various level.

1.44 Computers

Computer is a power driven machine equipped with keyboards, electronic circuit's storage compartment and recording devices. It is a glorified calculator with the capacity to store a large amount of information and it can reproduce any of them when called for.

A significant benefit offered by the computer is the ease and speed with which it can manage the learning process.

1.45 Computer Assisted Learning

Computer in education is a recent development in India. A formal beginning is only with class project with the limited objectives of developing literacy. Computer aided learning is not yet an activity. There are a few early bird researchers who have begun research on CAL / CAI. But it is essentially in its infancy. One can hardly locate five or six studies on CAL / CAI and couple of efforts in developing CAL software.

The studies in this area compared the effectiveness of CAL / CAI over the conventional approach. In all cases the researchers found greater learning gains through CAI than conventional methods. In one or two cases, it has also been found that CAI is more effective on development of knowledge. For understanding and higher cognitive levels it was not very effective.

1.46 THE ROLE OF TEACHER AND CAI

- ❖ Machines mean relief from the more mechanical aspects of the teacher work.
- ❖ Teacher need no longer be 'talking books' or paper correcting automation.
- ❖ They can hereafter work in areas like evaluation, curriculum revision, guidance and human relations.

- ❖ Although we cannot forecast the areas where in computer may be helpful in the possibilities of their effective use in the educational scene and enormous
- ❖ The system approach utilizes the principles of “cross media approach” to instructive, with a variety of related material reinforcing the instructional effect of each other.
- ❖ CAI is not excluding the teacher from the classroom.

1.47 ADVANTAGE OF COMPUTER ASSISTED INSTRUCTION

The CAI has following advantages

- Each student receiver instruction at his own pace.
- Each student responds continuously as he receiver instruction.
- Each student receiver rapid feed back from his response
- All unit of learning are broken down into sub-units and small elements of learning in small steps.
- Lesson from the theories of learning are taken into account at stage of instructional design.
- Student can learn in their own styles and ways through examples case studies (or) problems
- Students can test their own learning at any time of progress. At the end of unit learning may also be aimed at one’s convenience
- Any lesson material in any subject can be programmed in the form of words, pictures and experiments.

1.50 NEED FOR THE STUDY

Over the last decades. Computers and communication technologies have had a significant impact on the ways, which we learn, teach, communicate and gain access to information. The significance of the role-played by computer – based

technologies in education and training is likely. To increase quite considerably. Earlier, computers and communication technologies in education concentrated on individual instruction involving computer Assisted learning and computer Based Training.

But, the recent development in educational technology call for a more “Holist and integrated” models and approaches to educational process in a particular setting, latest techniques like electronic lectures, collaborative learning and teaching. Tele-teaching, student self-assess mend through automated interactive online testing, use of digital resource lib-varies, and access to the internet, and the world hide web (www) would be the educational tools and techniques in the near future.

Computers are planned to be made available in every school, colleges, and university, so the systematic researches in this field are, therefore, necessary to improve the teaching – learning process effectively. Hence, the investigator preferred this for investigation.

The main problem of assisted instruction is lack of quality educational software and inability of teachers to adopt use of computers in schools. The reasons include the software production, the length of time needed to develop and tart programs and for reward for such pioneer efforts. As a result, until quite recently, very little was available that appears to take advantage of power and complexity of the available machines.

The situation is rapidly changing now, the volume and variety of educational software available in quite comfortable and seems to be increasing steadily. How ever this increase brings its own difficulties for teachers and students. The most obvious of which is the problem of deciding which programme to bay and how to use them. Unlike books it is not possible to browse through software before

buying it. Due to the problem of copyright and piracy, the producers and publishers are reluctant to allow used trails. But even this is solved; there remains the most difficult problem of quality. Hence there is a need of quality. CAI software especially for science subjects.

The Government of TamilNadu has taken a policy decision to introduce computer education in all higher secondary schools. As a first phase computer education has been introduced and computer facility has been established in 170 schools in Tamilnadu and it is likely to be extended to more schools in the years to come. Hence it is the right time to develop and use CAI model on various subject at higher secondary level.

The earlier attempts on preparation of CAI software not made on multi media platform. Consequently, the quality studies have been undertaken on CAI Particularity for plant physiology for XI standard. Hence the researcher has chosen the present study, which will be useful to the teachers and students of XI standard Government school and matriculation school Taking in to consideration, an attempt has been made to teach plant physiology and to evaluate the effectiveness by means of criterion Reference. Test (CRT) developed by the researches.

1.61 OBJECTIVES OF THE STUDY

- 1.To develop a software package for teaching the plant physiology to the students of +1 level.
- 2.To find out whether there is any significant difference between the control group and the experimental groups in academic achievement while teaching through CAI
- 3.To find out whether there is any significant difference between the Govt school and the matriculation school.

4. To find out the effectiveness of CAI method on the achievement of +1 students in Govt school boys and girls
5. To study the effectiveness of CAI method on the achievement of +1 students in matriculation school boys and girls.
6. To understand the effectiveness of CAI for Teaching in Govt schools.
7. To understand the effectiveness of CAI for Teaching in matriculation schools.

1.61 OBJECTIVES OF TEACHING PLANT PHYSIOLOGY AT HIGHER SECONDARY LEVEL.

At higher secondary level, the plant physiology subjects are introduced for the reason stated below.

- (i) To bring qualitative improvement in every walk of students life.
- (ii) To inculcate a spirit of inquiry, creativity, objectivity, the courage to question, aesthetic sensibility and an abiding environmental consciousness
- (iii) To provide a broad-based biological knowledge, stimulate a deep interest in the natural world.

1.70 HYPOTHESES OF THE STUDY

To accomplish the objectives of the study, the following null hypotheses were formed.

- There is no significant difference between the achievement of scores of the control group and the experimental group students studying in Government schools.
- There is no significant difference between the achievement scores of the control group and the experimental group of the students studying in matriculation school.

- There is no significant difference between the achievement scores of students of control group in Government School and the control group of students in Matriculation School.
- There is no significant difference between the achievement scores of Experimental group of studying in Government school and the experimental group of students studying in matriculation school.
- There is no significant difference between the achievement of boys and girls in experimental group studying in Government school.
- There is no significant between the achievement of boys and girls in experimental group studying in Matriculation school.
- There is no significant difference between the achievement of boys of experimental group in Government school and experimental group of boys studying in Matriculation school.
- There is no significant difference between the achievement of girls of experimental group studying in government school and experimental group of boys studying in Matriculation school.
- There is no significant difference between the achievement of boys and girls of control groups studying in government school.
- There is no significant difference between the achievement of control groups of boys and girls studying in Matriculation schools.
- There is no significant difference between the achievement of control groups of studying in Government schools and Matriculation schools in control group.
- There is no significant difference between the achievement of control groups studying in Government schools and Matriculation schools .

1.80 LIMITATION OF THE STUDY

- ✓ The study is restricted to the teaching of photosynthesis at Higher Secondary school level only.

- ✓ Only Govt and matriculation school students formed the control and experimental groups.
- ✓ Owing to the constraint of time and resources, the use of CAI in photosynthesis covers only one chapter.
- ✓ Since this is an experimental study, the study is confined to only Govt school and matriculation school.
- ✓ The study sample is used to +1 students only.

1.90 ORGANISATION OF THE THESIS

Thesis is presented in five chapters, the problem has been introduced and the need for the study is discussed in the first chapter.

The second chapter consists of review of related literature whereas the third chapter explains the methodology adopted in the study. The fourth and fifth chapters are devoted for data and summary and findings respectively.

CHAPTER-II

REVIEW OF RELATED LITERATURE

2.10 Introduction

Mouly.J.G. (1970) states that “An essential aspect of any research project is the review of related literature. The review of related literature is an exacting task, calling for a deep insight and clear perspective of the overall field. It is a crucial step which invariably minimizes the risk of dead-ends, rejected topics, rejected studies, oriented towards approaches already discarded by previous investigators and it helps to avoid erroneous findings based on faulty research designs. It promotes a greater understanding of the problem and its crucial aspects and ensures the avoidance of unnecessary duplication; it provides comparative data on the basis of which to evaluate and interpret the significance of one’s findings, and in addition, contributes to the scholarship of the investigator.

This is chapter is based on two dimensions.

Review of related studies in abroad review of related studies in India

2.20 Review of related studies conducted abroad

Ann (1998) conducted a study on “Students selection of communication media Computer mediated communication, Face to Face communication, Distance educational medium”. The study concluded that computer mediated communication within the campus based courses appeared to benefit primarily those students who also engaged in traditional interaction.

ACTE task forces on technology (1987) the challenge of electronic technologies for colleges. The forces highlighted in its report the highlight of findings are that inclusion of electronic technology is a must for college of education however the teacher and student must with electronic technology usage.

American state of Utah tried to introduce a comprehensive computer-managed learning system covering virtually the entire curriculum. Many of the teachers felt that their traditional role had been usurped by the computer and also resented the fact that their efficiency as teachers was effectively measured by the on-going program of diagnostic tests.

An analysis of Information Technology relationship in the Korean education administrative organization (computers). The results of the study showed that the typical mid-level official is a man with a bachelor's or master's degree who is over 35 years of age and most likely to use a stand along personal computer for word processing software and personal management and financial accounting application program.

An identification barrier to the integration of information technology as perceived by secondary education. Teacher students (Computers, Electronic Mail, World Wide Web, Internet Net Scape, Eric, Audio equipment, C.D. ROM, Distance learning video tape, laser discs by Kay (1996). The study concluded that although many barriers were encountered, the majority of students said they enjoyed using information technology recommendation included.

Anderson (1983) carried out a study entitled "Computer literacy changes for teacher education". In his findings the teacher society requires a changes in its way of teaching i.e. it insisted the need for computer literacy for teachers.

As Jacqutia Magarry (1983) writes "If the computer's role is artificially restricted to that of an electronic blackboard (or) super calculators, the experiment will probably demonstrate that it has no more effect of the learning as measured by pre-and-post tests than you would expect of a block board (or) calculator between achievement and selected leaning style elements of computer assisted".

Bidd, (1977) studied the perceptible effects of the increase in students use of information technology applications on the continuity building efforts of students affairs / student life practitioner (internet, world wide web, e-mail, Residence halls, Computer introverts). The results indicated that there was a perceived effect, however, it was not as great as might have been expected.

Choiserie (1991) attitude towards computers as an essential variable for an implementation of computers as an essential variable for an implementation of computer assisted instruction in Korean secondary school. The dissertation abstract lead to following conditions. Implementation of CAI in secondary school Korea is a compulsory one but the attitude of teacher towards us of computers in Korean Secondary School requires more computer software and teachers have lack of time to learn above software.

- (a) Establishing classroom studies equipped for hands on experience based learning activities.

Grant (1991) implementing Computer Technology in educational settings. The findings revealed that implementation of Computers Technology in educational area are most invited change in area of teaching. However the way to use Computer Technology is teaching must depend upon the teacher who use computer of CAI.

Haring (1974) and Pachan (1976) have pointed out that “Computers can influence the way students learn through providing on alternative to analytic methods.

Hoof (1986) study on the birth and nurturing of a new discipline pointed out, that the introduction of computer in school level is a though provoking one. Use of computer as instructional material helps the students to know more about abstract ideas. However the usage of computer in a class room situation seems to be difficult one. The lack of appropriate funds and use of software are also found to be barriers.

Knotos (1985) is of the opinion that “usage of micros for simulation of some processes in classroom teaching enhances the learning process of children”.

Lasser (1991) educational developed supplementary video material in solving formal economic problems. He concluded that video could be a suitable medium for improving academic performance of the learners.

Majid (1980) studied the “Factors affecting the use of media instruction at Jordanian community colleges”. He observed that instructional technology can play a potential role in teaching-learning process, but the potential has not gained wide appeal.

Major (1969) studied “The effectiveness of computer assisted multi-media instruction followed by recitation sessions”. The study revealed combinations of discussion with media presentation were possible and further research in the area might lead to more optional arrangements of media-instructor scheduling.

Making an analysis of the computer-literacy, Curely Robert (1986), observes that selected demographic characteristics and computer exposures scores were found to related significantly to both attitude and computer literacy scores.

Mc Dermott (1985) found that there was no significant difference in either cognitive or affective aspects of computer literacy between students who used co-operative strategies and those who worked alone. Students in both groups had similar perception of peer relationships within the classroom.

Meckenzie, while advocating for CAL packages says,” one of the basic assumptions of the programmed packages is that the students need have no computer programming knowledge to again enrichment from the CAL packages”.

Mentioning about the attitudinal factors for the introduction of computers: Gray (1983) cites two examples, one of them being quoted below:

Norns (1976) has developed software packages in which the extensive use of the computer in an under-graduate experimental laboratory situation has been made showing the capability of computers to simulate the laboratory situation has been made showing the capability of computers to simulate the laboratory conditions.

Owen (1985) is of the opinion that “even though education has a reputation for moving slowly when initiating changes, computer literacy is an area where education has progressed rapidly”.

Pascual (1993) made a study on two fold. He applied linguistics approach and empirical study designed to measure the degree of motivation in students learning English using CAI material had non-CAL material showed themselves more motivation that their counterpart.

Richard.C.Anderson has opined “ when more elaborate and less error-prone procedure, that presumably could be implemented with computer assisted instruction are used to make branching decisions, then there may be an advantage to branching techniques”.

Robert (1988) explore an evaluation of CAI program, WORK WORKS being used adjunctively in English as a second language curriculum aimed at communicative competence. He designed to promote grammar acquisition and structured competency by presenting contextual passage for students. He measure the English proficiency between pre-test and post-test to test grammar and reading score. He found that the student didn't achieve significant higher gains in grammar and reading scores that did control

group's subject- WORK WORKS students did achieve more mastery level scores on the level 3G. TELP post-test that the control groups.

Roger Hunt (1985) mentions in his book that, "A student could sit at a teletypewriter terminal and call in the program and participate in the lesson. This form of teaching methods can be particularly used for remedial purpose. Many students thus freeing the teacher to spend time on more personal tuition can use a program.

Taylor (1969) evaluated the "Teaching Effectiveness and Efficiency for three presentation models, Conventional Presentation- programmed for group, programmed text book and multimedia was the most effective of the other models.

The classroom teachers rated the computer assisted programs as being well run worthwhile and successful in the students enjoyed working in the computers.

The findings of Hawley (1985) are that computer assisted instructions was more cost effective that traditional instruction significantly improved the mathematical concept and computer literacy of grade five students.

The findings of Lawrence (1985) regarding computer assisted instruction are :

- ❖ The principal and teachers viewed the computer-assisted program as being beneficial.
- ❖ There are evidence (Lane and Lane, 1984) to show that computers assisted programs overcome the problems associated with pupil's lack of interest in the present day science courses which are mostly theoretical, factually overloaded and emphasis recall at the expense of understanding.

While supporting the simulation in a computer, Hartley points out that in simulation programs as initiatives required of the learner the insights received from the program depend very much upon the preparation and background knowledge of the student.

2.30 REVIEW OF SELECTED STUDIES CONDUCTED IN INDIA

Although development of programmed learning material has not found its usage in actual classroom, its efficiency has been compared with the conventional method of teaching in various studies.

The studies of Shah (1964), Desai (1966), Sharma (1966), Shah (1969), Gulgarni (1969), Nagar (1971), Sharma (1972), Joshi (1972), Metha (1973), Panda (1974), Reddy (1975), Patel (1975), Govinda (1976), Chandrakala (1976), Sabarwal (1978), Parlikar (1979), Pandey (1950), Inamdar (1981) and Sudhahar (1981) reported that teaching through

programmed learning material was superior to the conventional method of teaching in terms of academic achievement of the students.

Birla Institute of Technology and Science (BITS) , Pilani is handling a number of computer projects . The center developed a Devanagiri computer named SIDDHARTHA and demonstrated successfully on April 14, 1982.

Chakravarthi (1978) studied the individual effectiveness of strategies S1 (lecturing and Question – Answering) Strategy S2 (Lecturing and Question – Answering by using behavior objectives) and Strategy S3 (Discussion by using instructional material) on the development of achievement comprehension, application ability and total achievement in the study of Geography by pupils of standards IX, .He found that third method was more effective than the other two.

Chandra (1986) studied the under achievement in Chemistry. Her comparative study of using CAI and CCTV for instruction of science for IX standard pupils was to know the effectiveness of these two. She investigated the effectiveness of using the two hardware, namely Computer and CCTV on the achievement of pupils in science. The CAI was found to be more effective over the other two methods, namely CCTV and conventional.

Chatterjee (1991) observed that large step programmed learning materials consume less time than the small step programmed learning materials and there is no significant difference in immediate achievement of the students.

Goyal (1988) observed that the structure of CLASS project in selected schools of India brought a significant change in India school of education. He concluded that computers are powerful teaching aids in the hands of the teacher and will make the classroom teaching highly motivating and meaningful. Further he made dull students, due to CAI become normal students.

Karpagakumarval.(1990) in his research study on “effectiveness of computer assisted instruction, video assisted instruction and conventional instruction group in English language learning has found out that the achievement of CAI is better than the achievement on the conventional instruction group. There is no significant difference in the achievement of CAI group and video assisted instruction in terms of going scores and both CAI and VAI are equally effective.

Khan (1993) compared the programmed instruction with structured communication and teacher directed communications in teaching history. the study revealed that programmed learning material was less effective than the teacher directed structured lesson for total achievement in learning concepts and rules. Programmed learning material was found to be better suited for learning concepts rather than rules.

Kumar (1981) conducted a comparative study on the “relative effectiveness of three models of instruction”. In this study the teachers opined that educational technologies were helpful in their teaching and the teacher wanted in service programs in this direction.

Nachimuthu (1989) studied on “Impact of CAI on Math’s achievement at secondary level”. He found that there is significant different between the groups. Learning through traditional method and CAI. The higher means scores of the experimental group imply that this difference is in favor of the experimental group imply that this difference is in favor of the experimental group. Therefore it was concluded that the CAI was superior to the traditional method.

National Institute of Information Technology (NIIT) has been set-up in India, which has tie-up with the leading educational bodies in Europe and USA for use of their courseware, teaching aids and visiting faculty.

Nixon (1993) conducted a study entitled, “Development and periodic classification for IX std pupils.” He reported that there was a significant difference between CAI and traditional teaching.

Planiappan (1988) studied student the effectiveness of CAI on mathematics learning. He found the group that was exposed to CAI performed significantly better.

Pandian (1995) in his study on “Development of a software program for underachievers in physics at +2 level found that the software developed by him significantly improves the achievement of under achievers in physics. Moreover he confirmed that CAI package is more effective than conventional method of teaching in improving achievement of underachievers in physics at +2 level.

Purshothaman and Stella (1991) proved in their study that CAI group performed significantly better in math's learning and that the time taken by the traditional group to complete the instruction on the selected topic.

Radhakarishnan (1993) developed slide / tape and over head transparencies for slow learners in commerce. He concluded that they were more effective in terms of academic achievement.

Raghavan (1988) studies educating through computers. He concluded that computer contributes to the educational enterprise as a pre-test tool in research cognition. The computers are very powerful aids in the hands of a teacher are will make the classroom meaningful.

Sanal and Suri (1995) compared "the effectiveness of lecture method programmed learning method and lecture with programmed learning materials in terms of achievement in organic chemistry of students of IX std. They observed that when intelligence was taken as covariate, lecture with programmed learning materials was found to be most effective method the others were found to be least effective.

Sekar (1998) did study on "A study on the effect of Computer Assisted Instruction in teaching mathematics at secondary level". His study proved that the CAI has got great influence that the traditional method.

Shan (1978) adopted an industrial strategy comprising programmed learning materials library reading, material, discussion and practical work designed for B.Ed. level students. He observed the strategy was effective in terms of achievement of students. However the effective in terms of

achievement of students. However the effectiveness of library work was not satisfactory.

Shanmuasundaram and Stella (1990) studied the effectiveness of CAI group performed significantly better than the control group that was taught by the traditional method.

Stella (1989) studied the effectiveness of CAI program on learning set theory of VIII standard level. Her study concluded that the CAI was a more effective method than the conventional method. She moved that irrespective of the variable a sex that experimental taught by the traditional method.

Study on availability and utilization of education technology in higher secondary schools by Solcachi (1991). The major findings of research were the utilization rate was higher in urban school as compared to rural school. Government and private school also differed in their utilization rate. The aided schools did a better job.

The earliest of the attempts to introduce computer literacy goes back to early seventies of IIT, Kanpur, where an experiment was undertaken with the school children.

The works in mathematics education using computer to introduce several concepts and techniques such as introducing various types of pentagon have been started in West Bengal.

2.40 Conclusion

From the above review of related literature, investigator has come to know about the related researchers carried out in India and abroad. The review has thrown light on the specific area investigated in terms of the types, and variety of related literature research studies carried out, samples used, methods followed and their limitations and the topics yet to be studied. In line with these facts, the investigator has tried to study the methods, procedures, tools and analysis for the successful carrying out of the present investigation.

2.50 Rationale for the study

Studies abstracted in the various studies of research reveal that no study has focused its specific attention on teaching the topic plant physiology higher secondary students through CAI. In this sense the present study is unique against the series of studies covered in the review. This study is a modest attempt to fill the research gap identified from the review of related literature.

CHAPTER-III

3.10 OVERVIEW

The research methodology includes the problem selected for this study, objectives and hypotheses of the study, population and sampling instrumentation, and statistical techniques applied for this study. The above said aspects of research design have been described more distinctly in this chapter.

3.20 METHODS OF RESEARCH

Steps of procedures in education research are common to all research studies their methods differ. The research methods are the historical research, normative study, the experimental method and case study.

Experimental research provides a systematic and logical method for answering the question, "what will happen if this is done when certain variables are carefully controlled or manipulated?" In fact, deliberate manipulation is a part of the experimental method. In an experiment, the research measures the effects of an experiment, which he conducts intentionally.

Experimental studies generally need small samples. Experiments are mostly an essential feature of physical and natural sciences. Experimentation provided a method of hypothesis testing. They then test the hypothesis and confirm or disconfirm it in the light of the controlled variable relationship that

have observed. The confirmation or rejection is always stated in terms of probability rather than certainty, Experimentation, thus is the most sophisticated, exacting and powerful method for discovering and developing an organized body of knowledge. The ultimate purpose of experimentation is to generalize the variable relationships.

Research design in case of experimental studies, apart reducing bias and ensuring reliability, must permit drawing inferences about causality. Experiments are meant to determine relationships between the data and the unknown. So, the investigator has decided to take up the experimental method in order to collect data from a small sample chosen from the population to study the effectiveness of CAI in teaching plant physiology.

3.30 RESEARCH PROBLEM

One of the most difficult phases of the research project is the choice of a suitable problem. Beginners are likely to select a problem that is much too broad in scope. This may be due to their lack of understanding of the nature of research and systematic problem solving activity. It may also be due to their enthusiastic but naive desire to solve problems important quickly and immediately.

Those who are more experienced know that research is often tedious, Painfully slow, and rarely spectacular. They realize that the search for truth and the solution of important problems take a great deal of time and energy and the intensive application of logical thinking. Research makes its contribution to human welfare by countries small additions to knowledge. The

researcher has some of the characteristics of the ant, which brings its single grain of sand to the anthill.

Before formulating the research problem the investigator has consulted research books, professors working in colleges of education and guide professor. The investigator has met the above team of persons many times and problems in different polling the knowledge and ideas of experts and sharing the results of their efforts.

Academic research projects have been subjected to much criticism both by the academic community and by the general public. The academic research project is usually a requirement in partial fulfillment of the requirement of an advanced degree or M. Phil. the Initial motivation may be the desire to engage in research in research but the practical need of meeting a requirement.

By keeping the above said facts in mind, the researcher has formulated the following research problem for his study. Effectiveness of CAI in teaching plant physiology at Higher Secondary Level”.

3.40 POPULATION AND SAMPLE

The experimental study was conducted for matriculation students of +1 were selected from keerthiman matric Higher Secondary School, Kanuvai and Government Higher Secondary School, Thadagam for the study.

The sample size was 64 The sample drawn was divided into two equivalent groups equate for mean and standard deviation on the basis of their performance in Bio-botany at X std public examination.

DISTRIBUTION OF THE SAMPLE

Name of the school	Experimental group	control group
Government	17	17
Matriculation	15	15

Name of the school	Experimental group		Control group	
	Male	Female	Male	Female
Government	8	9	8	9
Matriculation	8	7	8	7

3.41 Selection of Unit

The investigator studied carefully the Bio-botany syllabus prescribed by the Government of TamilNadu for standard X1. Some reasons for selecting the topic were. (i) It is one of unit the pupils find it difficult to study (ii) It is one of the units growing importance in modern science world.

3.42 TREATMENT OF EXPERIMENT GROUP

All the members of the CAI Group were assembled in a convenient hall where the CAI package and computer were set ready. Then the investigator explained that they would be seeing a computer lesson after which they would be asked to answer a questioner in writing. A short introduction to the lesson was also given by he investigator. Black board was used whenever

necessary. Revision was done with the help of thought provoking questions. The time taken for the class was 60 minutes. Care was taken so that all could view the programme clearly. At the end of the treatment both the groups were are again tested.

3.43 TREATMENT OF CONTROL GROUP

The control group received the instruction through the conventional method. The same topic was taught to the control group. Black board was also used in their method like the experimental method. The time taken to teach the lesson was kept strictly as 60 minutes. Five days after the exposure the post test was administered under invigoration.

3.50 CHARACTERISTICS OF GOOD SAMPLE

A Good sample of a population is the one, which, within restrictions imposed by its size, will reproduce the characteristics of the population with the greatest possible accuracy. That is to say, a good sample should be free from

1. Error due to bias and
2. Random sampling error

To select a good sample for any purpose, therefore, one should avoid such faulty method as the following.

1. Deliberate selection of the unit of the sample
2. Selection of a procedure where there is a connection between the method of selection and the characteristic under consideration.

3. Substituting one unit (include in the sample but found not available) by some other more convenient one.
4. Incomplete coverage of the units selected for study, i.e. ignoring the failures in the sample in responding to the study.

TYPE OF SAMPLING USED

A variety of sampling techniques is available for the use of research purpose, They are systematic sampling stratified random sampling, purposive sampling etc. at times it is advisable to subdivide the population into smaller homogeneous group to get more accurate representation. Since the investigator has decided to collect data from various sub groups, cluster sampling technique is used of this investigation.

3.51 INSTRUMENTATION

In educational research a variety of tools has been developed to aid to the collection of data. these tools are of different kinds and employ distinctive ways of describing and quantifying the data. Each tool is particularly appropriate for certain sources of data yielding information of the kind and in the form that would be most effectively used.

A variety of research tools has been used in any educational research.

They are,

1. Interview method.
2. Observation technique
3. Rating scale
4. Schedule
5. Questionnaire

QUESTIONNAIRE METHOD

This method is quite, particularly in case of big enquiries. It is being adopted by private individuals, research workers, private, and public organizations.

In general the work questionnaire refers the device for getting answer the questions by using a form which the respondent fill sin himself.

3.52 CONSTRUCTION OF THE INSTRUMENT

In educational research, a variety of Instruments or tools like questionnaire, observation, interview, schedule, checklist, rating scale etc., are used. The questionnaire method is found to be most suitable instrument for this study. So the researcher used questionnaire method to collect data from the students regarding their achievements.

Since the investigation is aimed to study the effectiveness of CAI in teaching plant physiology higher secondary level, the investigator decided to construct an achievement tool to get the scores of +1 students in their school subject.

The investigator constructed a tool to find out the achievement of +1 students in Bio-Botany especially in the area Plant Physiology

- ❖ The tool consists of
- ❖ Multiple choice questions.

A model questionnaire to study the achievement of +1 students in Bio-Botany is prepared and circulated to the P.G. teachers handling Bio- Botany in the higher secondary schools and the professors working in the college of education. They are requested to go through the questionnaire to give valuable opinion and suggestions to modify the tool in a better manner. Most of the P.G. Teachers and professors gave their opinion regarding the content and format of the tool. Necessary modifications are carried out to incorporate the opinions and the suggestions given by the P.G. Teachers and professors.

3.53 COMPUTER ASSISTED INSTRUCTION

The investigator prepared a CAI in the topic “plant physiology. the video lesson was screened to a panel of judges. Their rating about the suitability of the lesson to +1 students and content validity of the lesson was ascertained. Since the medium of instruction is Tamil and English most of the schools, audio instruction has been prepared in Tamil and English version.

3.54 VALIDITY OF CAI

A group of 20 Students of students were exposed to the CAI lesson plant physiology.

The students were by the investigator about the clarity of visual and audio information's. The CAI was revised in the light of their comments.

3.60 PILOT STUDY

The pilot study is conducted to know how good the tool is to assess the achievement in chemistry of students studying in various higher secondary schools. After the preparation of pilot test items according to the plan it is necessary to give a trail in actual use. Only then it is possible to locate the suitable items and construct the test in its final form.

The following are some of the aims of a pilot study:

1. To locate weak and defective items.
2. To provide data needed to determine how many items should constitute the finished test.
3. To decide on proper format.

The investigator selected three schools for the pilot study. A sample of hundred students has been chosen among those schools. The distribution of the sample for the pilot study is presented in the below table.

LIST OF THE SCHOOLS SELECTED FOR THE PILOT STUDY

S.NO	NAME OF THE SCHOOL	LOCATION	TYPE	NO. OF STUDENTS		TOTAL
				BOYS	GIRLS	
1.	Government Hr. Sec. School, Thadgam	Rural	Govt.	16	18	34
2.	Matriculation Hr. Sec. School. Kanuvai.	Rural	Matriculation	16	14	30
		Total		32	32	64

3.61 ADMINISTRATION OF THE PILOT STUDY

The above mentioned three schools are selected for the purpose of conducting pilot study. The investigator has met the heads of the schools and got permission to administer the pilot study. On the appointed day, the investigator has visited the above schools one by one and administer the pilot study in person. Precautions are taken to ensure to ensure normal conditions while conducting the study. No time limit was specified to the students All the students are requested to answer all the items in the questionnaire without omitting any item. The answer all the items in the questionnaires are collected in each school then and there by the investigator. The investigator scored all the questionnaires and arrived total score for each student.

3.70 ITEM ANALYSIS

The construction of solid and reliable tests requires quantitative information regarding the difficulty and discriminative power of each item. Such information is provided by item analysis method.

Item analysis is helps to shorten a test increases its validity and reliability by indicating the item that can be discovered or included. In order to know whether the test item has the difficulty value or not; the item should be analysed. This can be found out by arranging the scores of students from higher to lowest.

3.71 DIFFICULTY INDEX

After arranging the answer script in the descending order of marks, the top 27% of the corrected answer scripts are taken out. This forms the high group. The bottom 27% of the answer scripts are taken out. This forms the groups. The middle group is discarded.

The difficulty index was computed by continue the correct response to the item in the high group adding the number of correct response in the low group and dividing by the total number of students (Number if students from low and high group). The following formula is used to determine the difficulty index of a item.

$$P = \frac{R_u + R_L}{N} \times 100$$

Where

P = Item difficulty index.

R_u = Number of correct responses from the upper group.

R_L = Number of correct responses from the lower group.

N = Total number of students who tried them.

3.72 DISCRIMINATION POWER

Item discriminating power is the which can clearly differentiate between students in the upper level and those in the lower level. A test possesses between high achieving and low achieving students. A commonly used discrimination power is simply the difference is proportion of correct response between the group of those scoring in the top 27% on the total test and the group scoring in the bottom 27% on the same test. The following formula is used to determine the discrimination power of a test item.

$$\text{Discrimination power} = \frac{R_u - R_L}{\frac{1}{2} N}$$

Where

R_u = Number of correct responses from the group.

R_L = Number of correct responses from the lower group.

N = Total number of students who tried them.

TOOL FOR FINAL STUDY

The tool for final study consists of 25 multiple-choice questions. A student can get a maximum score of 25 and minimum score of 0.

3.73 SAMPLE FOR THE FINAL STUDY

Among the variable sampling techniques, the researcher decided to use stratified sampling procedure. Government school and matriculation Higher Secondary School in Thadagam, Kanuvai.

CONTROL GROUP:

The control group students were asked to sit comfortably in a classroom. The light and ventilation arrangements in that classroom were made perfect. The investigator taught them in conventional method. The lesson plan prepared earlier by the investigator was used to teach. Black was used wherever it was felt necessary. The questions and doubts raised by the subjects were cleared by the investigator. Soon after the teaching, the revision was done with the help of thought provoking questions.

ADMINISTRATION OF THE POST TEST

After completing the conventional method of teaching, the post - test was conducted. They were not allowed to consult with others the post-test question paper which were used for experimental group were used for control group also. The students were asked to write their answer in the separate answer sheets which were distributed earlier. The scoring was done against the criteria.

ADMINISTRATION OF RETENTION TEST

The same posttest questionnaire was given after one-month period to obtain their retention score.

The two treatments were scored objectively and the scores were transferred to the data sheets. This was combined along with the information gathered through the personal data sheet. All the scores were sorted to yield various tables for statistical analysis.

3.80 RELIABILITY

A test is said to be reliable to the extent the scores obtained through it are consistent over time and over different samples of the test items. They are not the errors of measurements crept in by the nature of the test. Reliability refers to the results obtained with an evaluation instrument and not to the instrument itself. An estimate of reliability always relates to a particular type of consistency of scores over different samples of questions. Low reliability can restrict the degree of validity. Reliability is primarily statistical in nature in the sense that the scores obtained on two successive occasions are correlation with each other. This co-efficient of correlation is known as self-correlation and its value is called the “reliability co-efficient”.

a) Test – Retest Reliability

Checking the test reliability by giving the test retest method, the same test is administered twice to the same group of pupils with a given time interval between the two administration of the test. The resulting test scores are correlated and this correlation co-efficient provides a measure of stability, that is, it indicates how stable the test results are over a given period of time. So it is otherwise known as a “measure of stability”. The estimate of reliability in this case will vary according to the length of time interval allowed between the two administrations.

b) Equivalent forms of reliability

Checking test reliability through two equivalent forms of the same test.

Estimating reliability by means of the equivalent form method involves the use of two different but equivalent forms of the test (also called parallel or alternate forms). The two forms of the test are equivalent tests have equal inter correlations among items. That is, two equivalent forms must be homogenous in all respects, but not a duplication of test items. The two forms of test are administered to the same group of pupils in close succession and the resulting test scores are correlated. This correlation co-efficient provides of equivalence.

c) Split – Half method

Checking test reliability by splitting a test into two halves.

Since a test consists of many questions, all the questions in a test together try to measure learning related to a particular aspect. When the test is divided into two halves they would represent two equivalent forms, and each of them would still measure the same aspect. It is a general expectation that the total scores of students on each half should be consistent. Here, the reliability of the test is estimated in terms of the consistency of the scores over the two halves of the test. The used procedure to split the test into halves that are most equivalent is to score the even-numbered items separately. This provides two scores for each pupil, the correlation between which provides a measure of internal consistency. This gives the reliability estimate of half the

length of the test. To estimate the reliability of the scores on the full length test, the following formula is used.

$$\text{Reliability on full test} = \frac{2 \times \text{Reliability on first } \frac{1}{2} \text{ test}}{1 + \text{Reliability on second } \frac{1}{2} \text{ test}}$$

d) Kuder and Richardson Estimation

Kuder and Richardson developed 2 formulae KR-20 and KR-21, which could avoid the question of how to split a test into halves. These formulae provide the means of all possible split-half estimates of reliability of a test. The most popular formula is KR – 21 which is given below

$$\text{KR – 21} \\ R = \frac{N}{N-1} \left[1 - \frac{E_{pq}}{S_x^2} \right]$$

Where N = Number of items in the test

$$P = \frac{\text{Number of persons answering item correctly}}{\text{Number of persons taking the test}}$$

$$Q = \frac{\text{Number of persons answering item wrongly}}{\text{Number of persons taking the test}}$$

E = Summation sign indicating the pq is summated over all Items

Sx² = Variance of the total test

R = Reliability of a test

Test – retest method would consume more time. The split – half method is not quite suitable, because there is no natural classification of even and odd items and therefore, it was not used. The method of rationale equivalence represents an attempt to get an estimate of the reliability of a test. A simple approximation is often useful to teachers and others who want to determine quickly the reliability of the short objective classroom examination. It reads

$$r_{11} = \frac{n\sigma^2 - \mu(n - \mu)}{\sigma^2(n - 1)}$$

r_{11} = Reliability of the whole test

n = Number of items in the test

σ^2 = S.D. of the test scores

μ = mean of the test scores

The reliability has been derived by the method of rationale equivalence method was determined. The obtained co-efficient was 0.94.

3.90 VALIDITY OF TOOL

Henry E Garret (1955) defines validity as the fidelity with which if measures what if purposes to measure. He mentions three methods of establishing validity.

The following are the methods to determine the validity of the test.

(a) Face Validity

Face validity implies that a test measures super filially. What the test maker desires to measure, and not what it actually measures. This type of validity was very little significance.

(b) Content Validity

Content Validity represents the objectives of the content. Validity of content should be rated carefully by a number of specialists. Statistical Andy sis should be performed to determine content Validity.

(c) Concurrent validity

Concurrent Validity involves correlating a new test on the individual with other established tests. Scores on a group-mental teat may be correlated with those on an individual mental test.

Validation of the CAI Programme

Validity of a Tool refers to Tool's quality to measure what it intends to measure. This means a test is valid when it can measure. The attainment of objectives for which it is designed. Boring for others believe that " The degree

to which the test actually succeeds in measuring what sets out to measure in called its validity”.

The study material was converted into a CAI Programme on power point and word system. The computer Assisted instruction programme was given to the secondary Biology teachers, professional and experts in the field for opinion.

Validity of the CAI material was established using content validity. Content validity is based upon careful examination of course textbooks, syllabus, objectives and the judgments of subject matter specialists. There the content validity of the CAI was well established since the study material for CAI programme was drawn from the prescribed textbook.

The concurrent validity was established by findings of the coefficient of correlation with the test mark and the students previous subject marks. The coefficient of correlation was found to be 0.890 which implies a positive significant relationship.

Hence the tool has concurrent validity.

SCORING

Scoring key was carefully prepared for test and the test papers were corrected according to the key.

STATISTICAL TECHNIQUES USED

The collected data were subjected to the following statistical analysis.

- ❖ 1. Mean
- ❖ 2. Median
- ❖ 3. Mode
- ❖ 4. Quartile deviation
- ❖ 5. Standard deviation
- ❖ 6. T-test for the difference Between two groups

3.91 CONCLUSION

This chapter presented the method and procedure followed. The present study, sample selected instrumentation and collection of data.

3.92 DOCUMENTATION

1. Karhari. C.R., 'Research Methodology, Methods and techniques,' Vishwa prakashan, New Delhi, 1999,p.149,150.
2. John, W.Best, James V.Kahn, 'Research in Education,' Prentice Hall of India Pvt.Ltd., New Delhi,1986,p-3,32
3. Ibid, p-11,12
4. Young P.V., 'Scientific social surveyys and Research, An Introduction to the Background, Content, Methods, Principles and Analysis of Social studies,' Asia publishing House, Bombay, 1961,p-540.
5. Sukis.S.P., Mehrotra. P.V and Mehrotra R.N., ' Elements of Educational research,' Allied Publishers Pvt., Ltd., New Delhi,1981,p-223.
6. Kulkarni. B.D., 'Research Methodology,' Everest publishing House, Pune, 1996, p-89.
7. Good and Halt, 'Methods of Social Research,' M.C. Hill book. Company, 1952,p-133.

CHAPTER – IV

ANALYSIS AND INTERPRETATION OF DATA

4.1. INTRODUCTION

The main theme of the investigation is to study the effectiveness of CAI in teaching for standard XI students. In chapter it is proposed to analysis the data obtained from the investigation and the results on the basis of the analysis are reported. The results of the investigation are as follows;

Table - 1

Comparison of the students achievement scores of the Control and Experimental group in Government schools.

Group	N	Mean	Standard deviation	't' value
Control group – Government	30	62.5	8.480	7.264
Experimental group – Government	30	80.311	10.4137	

HYPOTHESIS

There is no significant difference between the achievement of scores of the control group and the experimental group students studying in Government schools.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the scores of the control and experimental group students studying in government schools.

The mean score of the control group students studying in the government schools is 62.5 and that of experimental group students studying in the government school is 80.311. The calculated 't' value is 7.264 which is greater than the tabulated value at 0.01 level. It shows that there is a significant difference between the experimental and the control group students difference between the experimental and the control group students studying in the government school in learning.

CONCLUSION

“There is no significant difference between the achievement of scores of the control group and the experimental group students studying in Government schools.” is rejected. Since the mean value of the experimental group students is higher than that of the control group students in the government schools, it may be concluded that the performance in the achievement of the experimental group students is better than that of the control group students in government schools.

GRAPH – 1

Showing in the Comparison of the students achievement scores of the Control and Experimental group in Government schools.

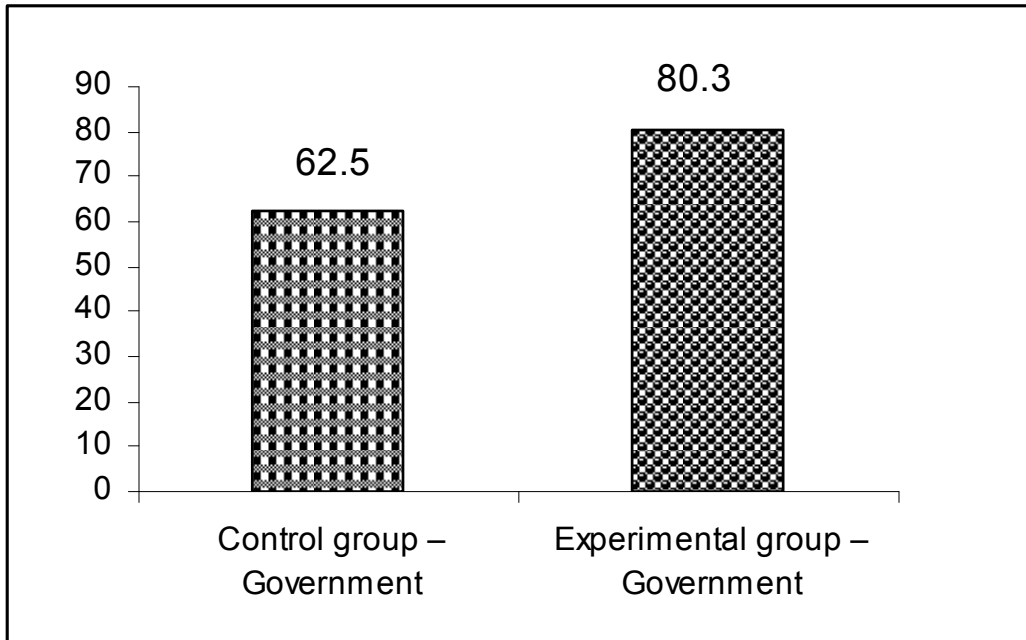


Table-2

Comparison of the students achievement of the control and Experimental group in matriculation school.

Group	Mean	Standard deviation	't' value
Control group - matriculation	66.4	9.1488	4.187
Experimental group- matriculation	76.04	8.678	

HYPOTHESIS

There is no significant difference between the achievement scores of the control group and the experimental group of the students studying in matriculation school.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the scores of the control and experimental group students studying in matriculation schools. The mean score of the control group students studying in the matriculation school is 66.4 and that of experimental group students studying in the matriculation school is 76.04. The calculated 't' value is 4.187, which is greater than the tabulated value at 0.01 level. It shows that there is a significant difference between the experimental and the control group students studying in the matriculation school in learning.

CONCLUSION

“There is no significant difference between the achievement scores of the control group and the experimental group of the students studying in matriculation school.” Is rejected. Hence, it may be inferred that the performance in the achievement of experimental group students studying in matriculation schools is higher than that of the achievement of the control group students in matriculation schools.

GRAPH – 2

Showing in the Comparison of the students achievement of the control and Experimental group in matriculation school.

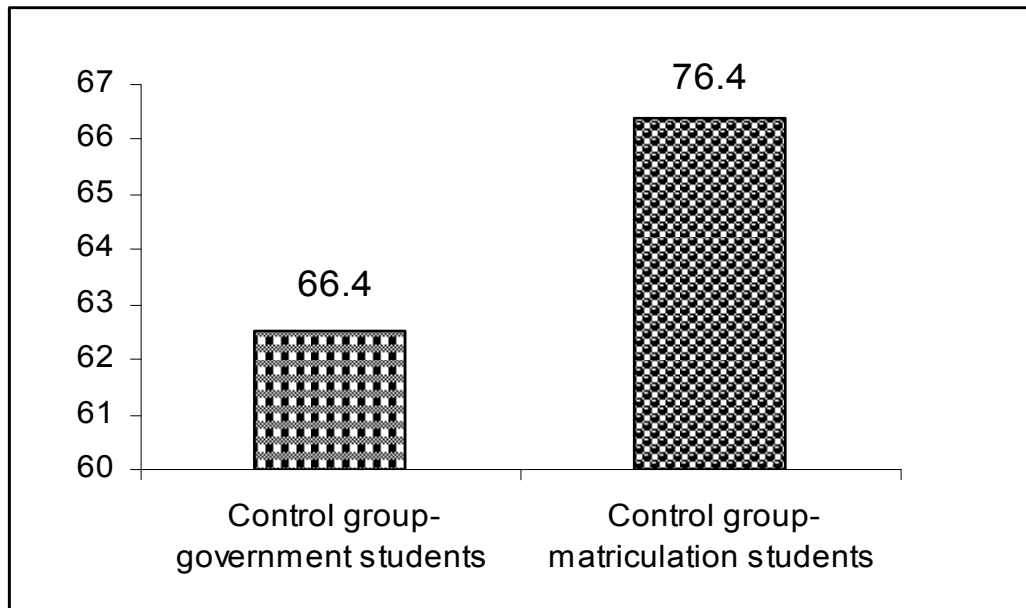


Table – 3

Comparison of the achievement scores of students of the control groups in Government and Matriculation school

Group	Mean	Standard deviation	't' value
Control group- government students	62.5	8.480	1.712
Control group- matriculation students	66.4	9.1488	

HYPOTHESIS

There is no significant difference between the achievement scores of students of control group in Government School and the control group of students in Matriculation School.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the achievement of the government and matriculation school students studying in control group.

The mean score of the control group students studying in the government school is 62.5 and that of control group students studying in the matriculation school is 66.4. The calculated 't' value is 1.712 which is less than the tabulated value at 0.05 level. It shows that there is no significant difference between the achievement of the government and the matriculation school students in control group in learning.

CONCLUSION

“There is no significant difference between the achievement scores of students of control group in Government School and the control group of students in Matriculation School.” Is tenable. Hence, it may be concluded that there is a similarity in the achievement of government and matriculation school students studying in control group.

GRAPH – 3

Showing in the Comparison of the achievement scores of students of the control groups in Government and Matriculation school

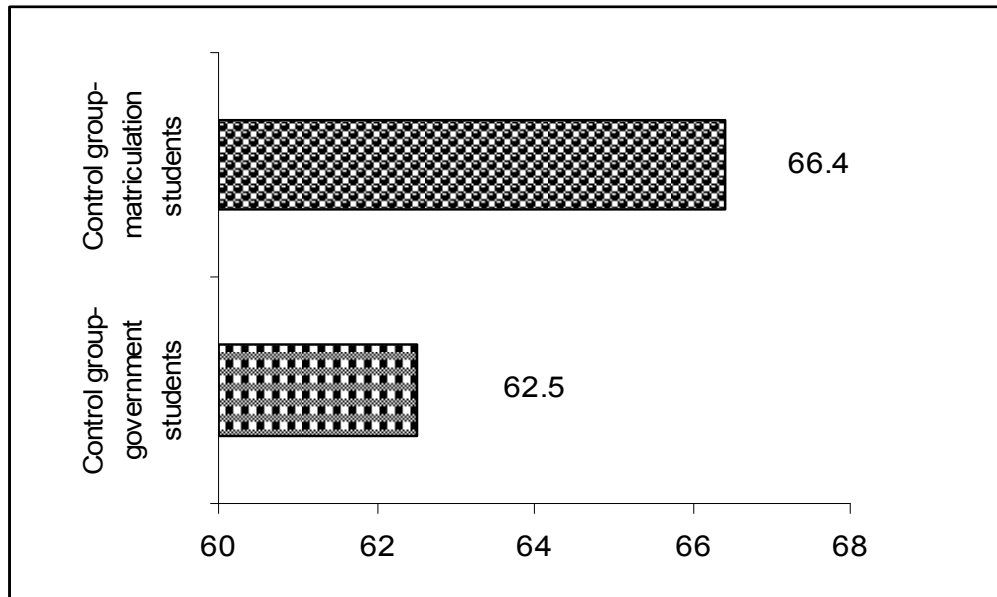


Table – 4

Comparison of the achievement score of students of the experimental groups in Government and Matriculation school

Group	N	Mean	Standard deviation	't' value
Experimental group - government	30	80.311	10.4137	1.7257
Experimental group - matriculation	30	76.04	8.678	

HYPOTHESIS

There is no significant difference between the achievement scores of Experimental group of studying in Government school and the experimental group of students studying in matriculation school.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the scores of the government and matriculation school students studying in experimental group.

The mean score of the experimental group students studying in the government school is 80.311 and that of experimental group students studying in the matriculation school is 76.04. The calculated 't' value is 1.7257 which is less than the tabulated value at 0.05 level. It shows that there is no significant difference between the achievement of the government and the matriculation school students studying in experimental group in learning.

CONCLUSION

“There is no significant difference between the achievement scores of Experimental group of studying in Government school and the experimental group of students studying in matriculation school. ” is tenable. Hence, it may be concluded that there is a similarity in the achievement of government and matriculation school students studying in experimental group.

GRAPH – 4

Showing in the comparison of the achievement score of students of the experimental groups in Government and Matriculation school

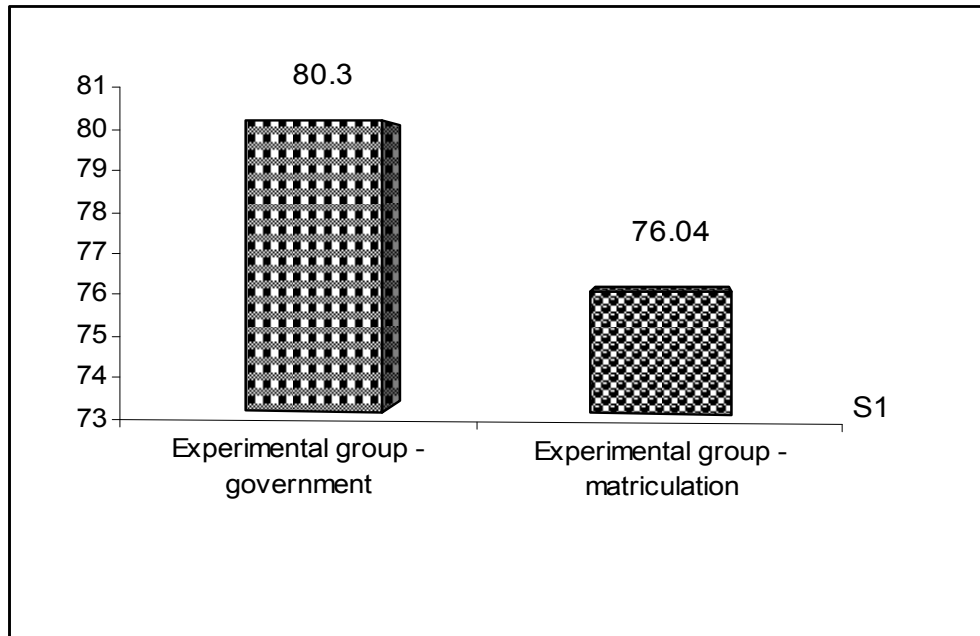


Table – 5

Comparison of the achievement scores of boys and girls in the experimental group studying in government school.

Group	Mean	Standard deviation	't' value
Experimental government boys group	71.8	8.230	7.5345
Experimental government girls group	89.4	3.7568	

HYPOTHESIS

There is no significant difference between the achievement of boys and girls in experimental group studying in Government school.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the achievement scores of the boys and girls of government schools in experimental group.

The mean score of the boys in government school in experimental group is 71.8 and that of the girls in government school in experimental group is 89.4. The calculated 't' value is 7.5345 which is greater than the tabulated value at 0.01 level. It shows that there is a significant difference between the achievement scores of the boys and girls of government schools in experimental group in learning.

CONCLUSION

There is no significant difference between the achievement of boys and girls in experimental group studying in Government school. Interpretation is rejected. Hence, it may be deducted that there is a similarity in learning between the boys and girls in the government school in experimental group.

GRAPH - 5

Showing in the Comparison of the achievement scores of boys and girls in the experimental group studying in government school.

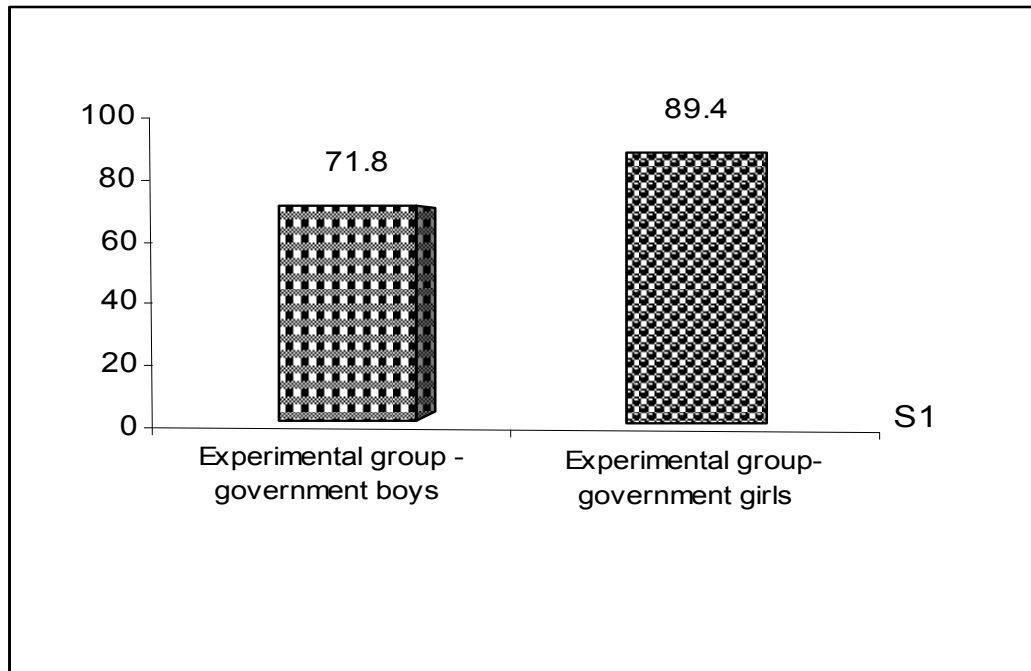


Table – 6

Comparison of the achievement scores of boys and girls of the experimental group of studying in matriculation schools .

Group	Mean	Standard deviation	't' value
Experimental group-Matriculation boys	79.733	9.617	1.046
Experimental group-Matriculation girls	76.6	6.5006	

HYPOTHESIS

There is no significant between the achievement of boys and girls in experimental group studying in Matriculation school.

INTERPERTATION.

The above table shows the mean, standard deviation and level of significance of the achievement scores of the boys and girls of matriculation schools in experimental group. The mean score of the boys of matriculation school in experimental group is 79.733 and that the girls of matriculation school in experimental group is 76.6. The calculated 't' value is 1.045, which is less than the tabulated value at 0.05 level. It shows that there is no significant difference between the achievement scores of the boys and girls of matriculation schools in experimental group in learning.

CONCLUSION

“There is no significant between the achievement of boys and girls in experimental group studying in Matriculation school” is tenable. Hence, it may be inferred that there is a similarity in learning between the boys and girls of matriculation school in experimental group.

GRAPH – 6

Showing in the Comparison of the achievement scores of boys and girls of the experimental group of studying in matriculation schools

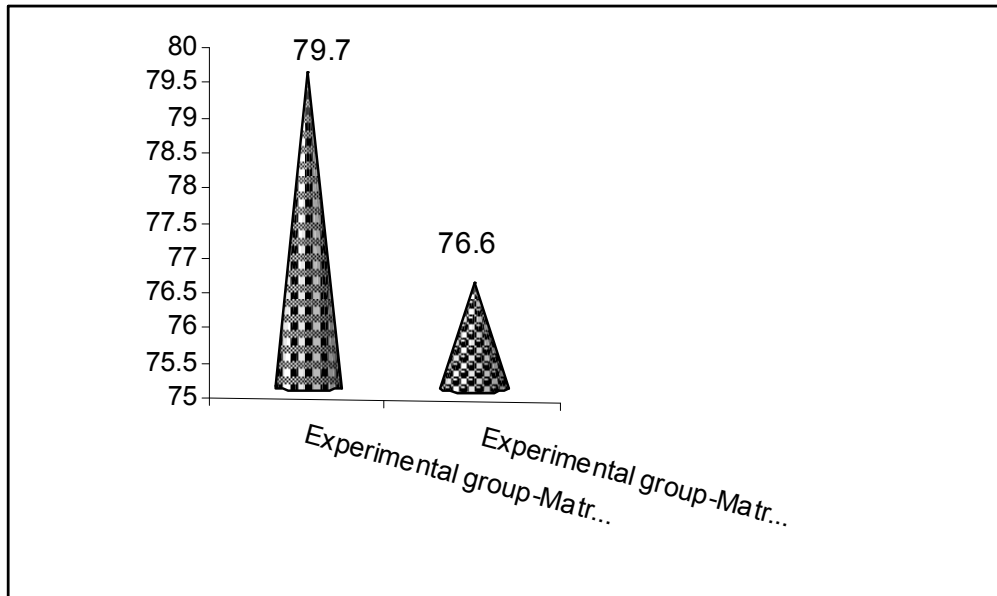


Table – 7

Comparison of the achievement scores of boys of the experimental groups in Matriculation school and Government schools.

Group	N	Mean	Standard deviation	't' value
Experimental group-Matriculation boys	15	79.733	9.6174	2.427
Experimental group-Government boys	15	71.8	8.2306	

HYPOTHESIS

There is no significant difference between the achievement of boys of experimental group in Government school and experimental group of boys studying in Matriculation school.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the achievement scores of the boys and girls of government schools in experimental group. The mean score of the boys of matriculation schools in experimental group is 79.733 and that of the boys of government schools in experimental group is 71.8. The calculated 't' value is 2.427 which is greater than the tabulated value at 0.05 level. It shows that there is a significant difference between the achievement scores of the boys of matriculation schools and the government schools in experimental group in learning.

CONCLUSION

“There is no significant difference between the achievement of boys of experimental group in Government school and experimental group of boys studying in Matriculation school” is rejected. Hence, it may be inferred that the boys in matriculation schools and government schools performed better in the achievement than that of the boys in government schools.

GRAPH- 7

Showing in the Comparison of the achievement scores of boys of the experimental groups in Matriculation school and Government schools.

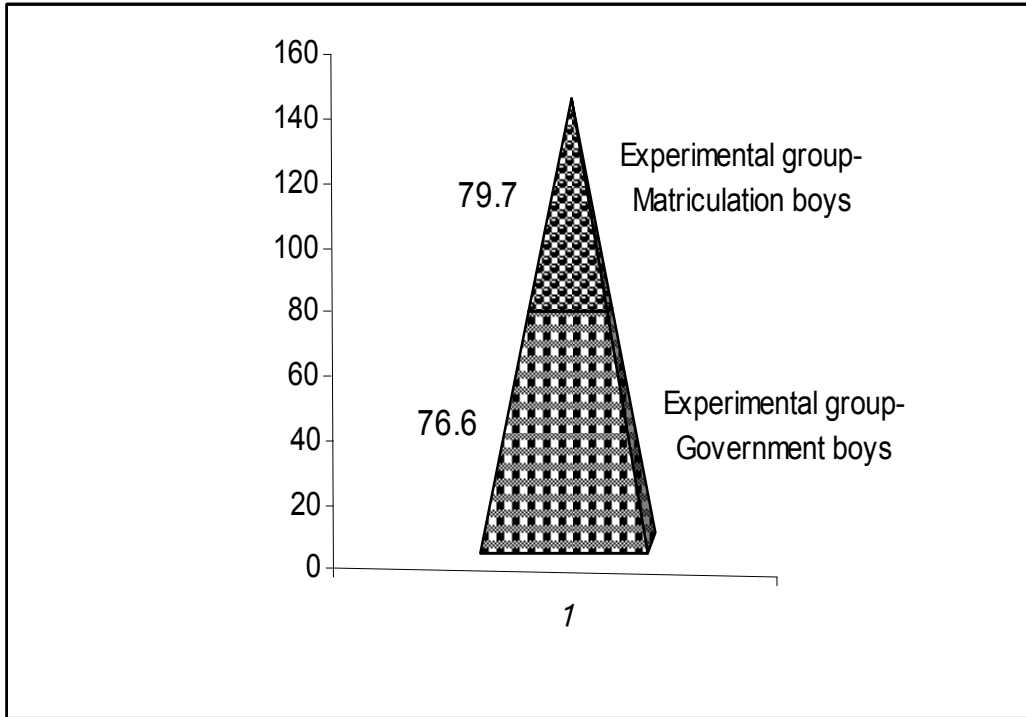


Table –8

Comparison of the achievement scores of girls of the experimental groups in Matriculation school and Government schools.

Group	N	Mean	Standard deviation	't' value
Experimental group- Matriculation girls	15	76.6	6.5005	6.6028
Experimental group- Government girls	15	89.4	3.7568	

HYPOTHESIS

There is no significant difference between the achievement of girls of experimental group studying in government school and experimental group of boys studying in Matriculation school.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the achievement scores of the girls in matriculation schools and government schools in experimental group. The mean score of the girls in matriculation schools in experimental group is 76.6 and that of the girls of government schools in experimental group is 89.4. The calculated 't' value is 6.6028, which is greater than the tabulated value at 0.01 level. It shows that there is a significant difference between the achievement scores of the girls of matriculation school and the government school in experimental group in learning.

CONCLUTION

“There is no significant difference between the achievement of girls of experimental group studying in government school and experimental group of boys studying in Matriculation school” is rejected. Hence, it may be inferred that there is no similarity in learning between the girls in matriculation schools and government schools in governmental group.

GRAPH – 8

Comparison of the achievement scores of girls of the experimental groups in Matriculation school and Government schools.

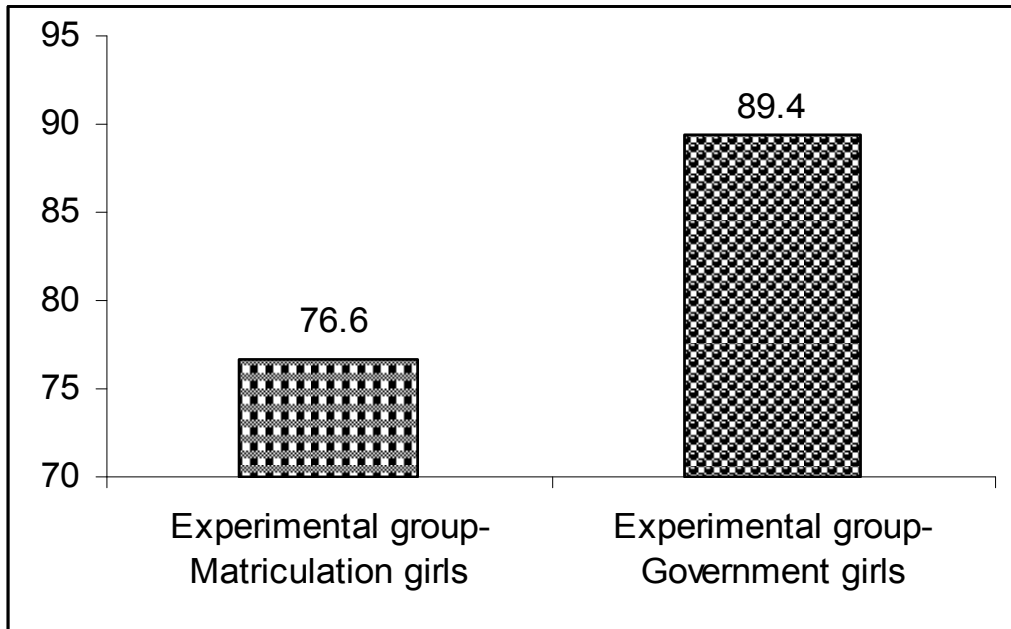


Table – 9

Comparison of the achievement scores of boys and girls of the control group in Government school.

Group	Mean	Standard deviation	't' value
Control group-Government boys	58.133	8.0876	3.253
Control group- Government girls	66.86667	6.534	

HYPOTHESIS

There is no significant difference between the achievement of boys and girls of control groups studying in government school.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the achievement scores of boys and girls of government schools in control group.

The mean score of the boys of government school in control group is 58.133 and that of the girls of government schools in control group is 66.86667. The calculated 't' value is 3.253 which is greater than the tabulated value at 0.01 level. It shows that there is a significant difference between the achievement scores of the boys and girls of government schools in control group in learning.

CONCLUSION

“There is no significant difference between the achievement of boys and girls of control groups studying in government school” is rejected. Hence, it may be conclude that the girls of government schools in control group showed better achievement than that of boys in the same group.

GRAPH - 9

Showing in the Comparison of the achievement scores of boys and girls of the control group in Government school.

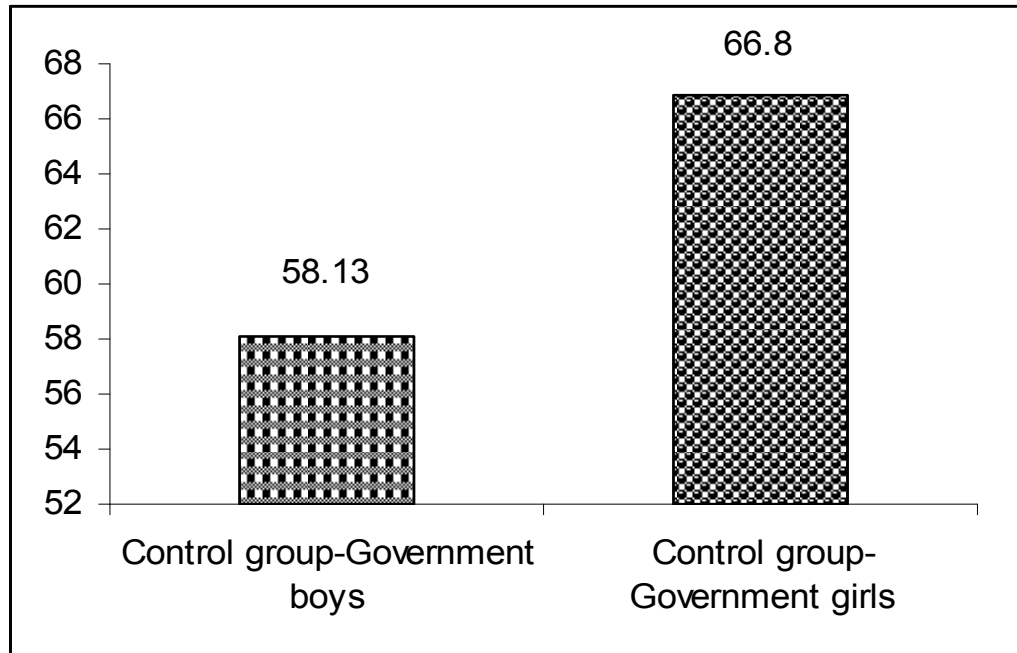


Table – 10

Comparison of the achievement scores of boys and girls of the control group in Matriculation school.

Group	N	Mean	Standard deviation	't' value
Control group-Matriculation boys	15	72.2	5.506	
Control group-Matriculation girls	15	68.4	10.03	1.2865

HYPOTHESIS

There is no significant difference between the achievement of control groups of boys and girls studying in Matriculation schools.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the achievement scores of boys and girls of matriculation schools in control group.

The mean score of the boys of matriculation school in control group is 72.2 and that of the girls of matriculation schools in control group is 68.4. The calculated 't' value is 1.2865 which is less than the tabulated value at 0.05 level. It shows that there is no significant difference between the achievement scores of the boys and girls of matriculation schools in control group in learning.

CONCLUSION

“There is no significant difference between the achievement of control groups of boys and girls studying in Matriculation schools” is tenable. Hence, it may be concluded that there is similarity in learning between the boys and girls of matriculation schools in control group.

GRAPH – 10

Showing in the Comparison of the achievement scores of boys and girls of the control group in Matriculation school.

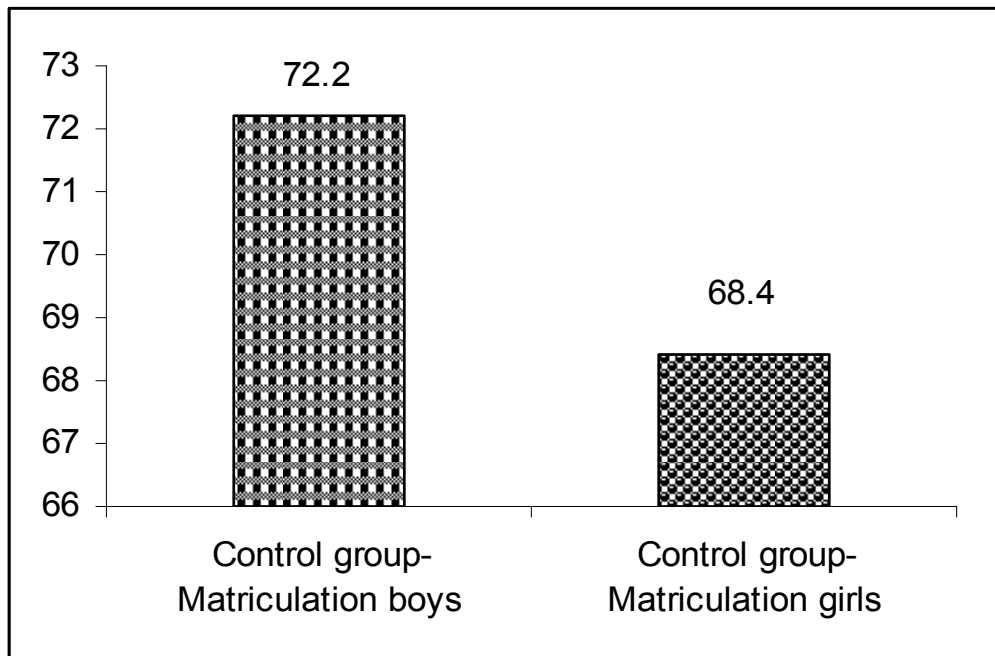


Table – 11

Comparison of the achievement scores of boys of the control group in Government schools and Matriculation school.

Group	Mean	Standard deviation	't' value
Control group-Government boys	58.133	8.0876	5.766
Control group-Matriculation girls	72.7	5.5058	

HYPOTHESIS

There is no significant difference between the achievement of control groups of boys of studying in Government schools and Matriculation schools.

INTERPRETATION

The above table shows the mean, standard deviation and level of significance of the achievement scores of boys in government schools and matriculation schools in control group. The mean score of the boys in government school in control group is 58.133 and that of the boys in matriculation schools in control group is 72.7. The calculated 't' value is 5.766, which is greater than the tabulated value at 0.01 level. It shows that there is a significant difference between the achievement schools in control group in learning.

CONCLUSION

“There is no significant difference between the achievement of control groups of boys of studying in Government schools and Matriculation schools” is rejected. Hence, it may be inferred that the boys of matriculation schools in control group achieved better than that of the boys of government schools.

GRAPH – 11

Showing the Comparison of the achievement scores of boys of the control group in Government schools and Matriculation school.

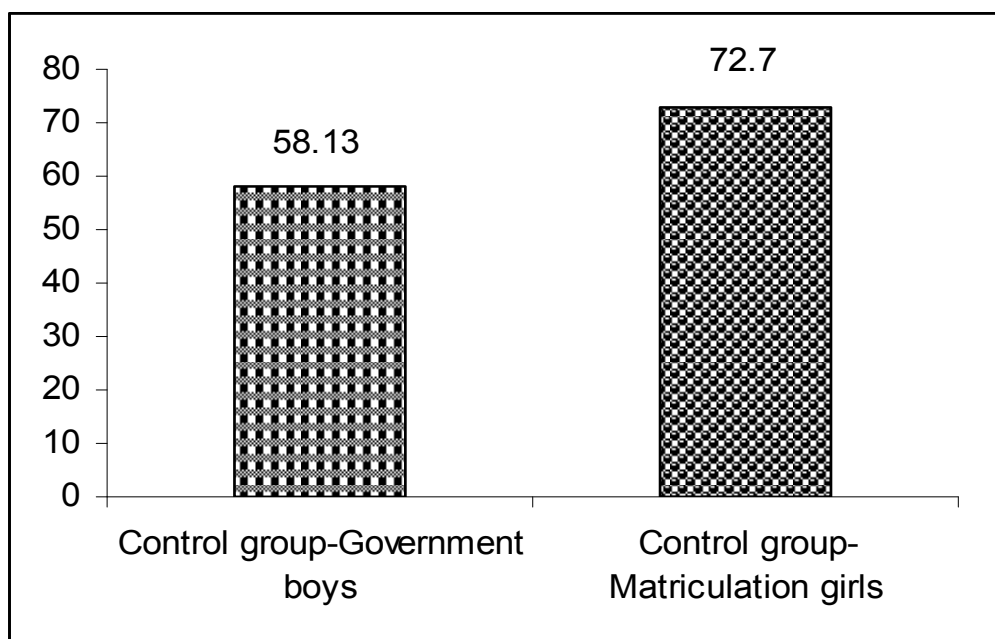


Table – 12

Comparison of the achievement scores of girls of the control group in Government schools and matriculation school.

Group	Mean	Standard deviation	't' value
Control group-Government girls	66.87	6.5341	
Control group-Government girls	68.4	10.027	0.496

HYPOTHESIS

There is no significant difference between the achievement of control groups studying in Government school and Matriculation school.

INTERPRETATION

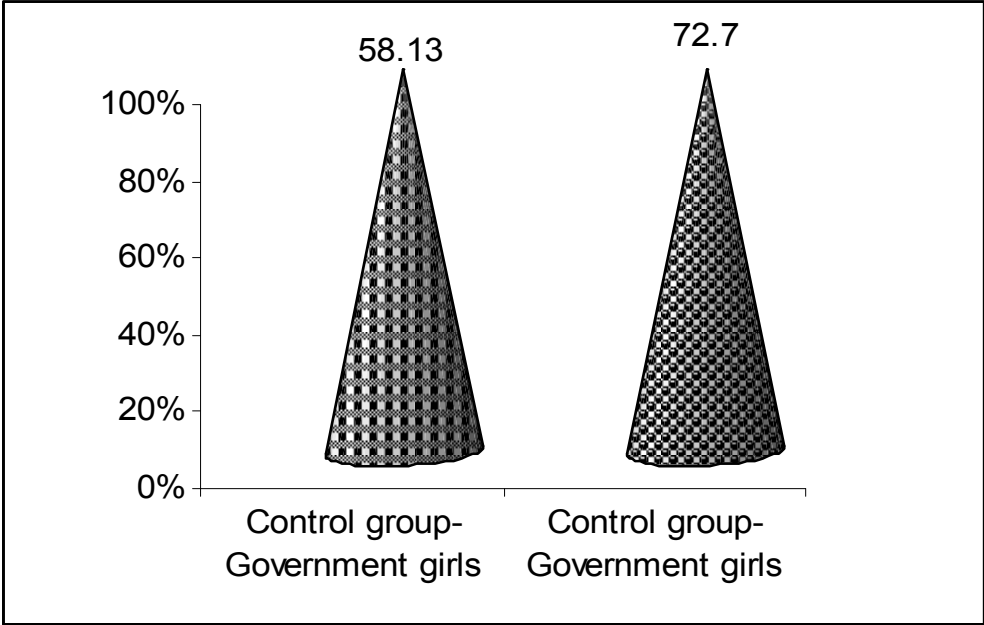
The above table shows the mean, standard deviation and level of significance of the achievement scores of girls in government schools and matriculation school in control group. The mean score of the girls in government school in control group is 66.87 and that of the in matriculation school in control group is 68.4. The calculated 't' value is 0.496, which is less than the tabulated value at 0.05 level. It shows that there is no significant difference between the achievement schools in control group in learning.

CONCLUSION

“There is no significant difference between the achievement of control groups studying in Government school and Matriculation school” is accepted. Hence, it may be inferred that there is similarity in learning between the girls in government school and matriculation school in control group.

GRAPH – 12

Showing in the Comparison of the achievement scores of girls of the control group in Government schools and matriculation school.



CHAPTER – V

FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

1. A significant difference was found between control and experimental group students studying in Government schools.
2. A significant difference was found between control and experimental group students studying in Matriculation schools.
3. No significant difference was noticed between Government and Matriculation school students in control group.
4. No significant difference was found between Government and Matriculation students in experimental group.
5. A significant difference was noticed between boy and girls of government schools in experimental group.
6. No significant difference was found between boys and girls of Matriculation school in experimental group.
7. A significant difference was found between the boys in Matriculation school and Government schools in experimental.
8. A significant difference was noticed between girls in Matriculation schools and Government schools in experimental
9. A significant difference was noticed between boys and girls of Government schools in control group.
10. No significant difference was noticed between boys and girls of Matriculation schools in control group.
11. A significant difference was noticed between boys in Government schools and Matriculation schools control group.
12. No significant difference was found between girls in Government schools and Matriculation schools control group.

5.3. DISCUSSIONS

No difference was found between the pretest course of control group and experimental group. It means that both the groups performed equally in their achievement and it showed that samples are equal in nature before the treatment.

By the comparison of the scores of experimental group and control group the experimental group achieved better irrespective of the locality and the gender. Hence the authorities may provide suitable infrastructure for utilizing the modern devices and the teachers must come forward to adapt those techniques and devices in teaching. Thereby enhance conducive environment for teaching and learning.

While comparing the matriculation students and Government students in control group, the matriculation students performed better than that of the Government students. It means the matriculation students who received the contents through traditional methods achieved higher than that of the Government students in control group. But the Government students who received the content through CAI performed equally to that of the matriculation students. It may be concluded that the CAI approach enhanced the learning of the Government students. Hence the CAI may be provided to more number government schools than that of the schools and the teachers from the rural area are also motivated to utilize those techniques.

As far as the is concerned in control group the matriculation school students performed better than the Government schools students. But is was

not happened in the experimental group. In that group the performance of both matriculation school and Government school is similar. It implied that by providing CAI the performance gap between the matriculation school and Government schools may be reduced and the students from the Government schools received better on-per with matriculation schools.

Boys and girls of each group performed equally, but whether a boy or a girl who treated through CAI performed well than who treated through traditional method. Hence, whether it is rural or urban, matriculation or Government, Boys as well as girls performance in experimental group is higher than that of the control group. By providing multimedia we can reap good performance in teaching and learning.

5.4 RECOMMENDATIONS

1. All the schools should be provide with minimum number of CAI package and audio visual aids with TV, radio and computer.
2. Some type of schools do have electronics aids and projected aids, such schools may take steps to utilize the media properly.
3. The teachers are encouraged to utilize the CAI optimally.
4. The teachers must utilize projected aids a possible since it makes profound impact on teaching and learning.
5. As the effectiveness of multimedia depend upon the teachers, they should be well trained both in the utilization of media and application of knowledge.
6. The teachers must motivate the pupils to make more meaningful projected aids.

7. The computer assigned instruction should be implemented in more number of schools.
8. The government should allot more funds to buy audio-visual requirements
9. The teachers can approach philanthropists in their locality and request them to install whatever is needed for the schools.
10. The teachers must prepare a multimedia kit to encourage the students and also extract help from them.
11. The educational authorities like DEO and CEO may make frequent visit to the schools and try to fulfill the needs of the then and there.

5.5. Suggestions for further Research

1. A study could be made as a comparative study of the effectiveness of CAI approach for male and female teachers.
2. A survey can be conducted to find out the facilities available to teach various subjects through CAI.
3. A comparative study can be conducted on the views of teachers on effectiveness of CAI approach in primary, secondary and higher secondary level.
4. Teachers can carryout a study on the improvement of teaching methods by adopting the CAI in teaching.
5. The efficiency of any one of the multimedia over traditional method of teaching could be undertaken by choosing a lesson.
6. A study could be made as a comparative study of the effectiveness of CAI approach between different medium of instruction.
7. A study should be focused on the availability and utilization of CAI approach on the school.

CHAPTER – V

5.10 FINDINGS, RECOMMENDATIONS AND CONCLUSIONS

1. A significant difference was found between control and experimental group of students studying in Government schools.
2. A significant difference was found between control and experimental group of students studying in Matriculation schools.
3. No significant difference was noticed between Government and Matriculation school students in control group.
4. No significant difference was found between Government and Matriculation students in experimental group.
5. A significant difference was noticed between boy and girls of government school in experimental group.
6. No significant difference was found between the experimental groups of boys and girls of Matriculation school.
7. A significant difference was found between the experimental group of boys of Matriculation school and Government school.
8. A significant difference was noticed between the experimental group of girls of Matriculation school and Government school.
9. A significant difference was noticed between boys and girls of Government schools in control group.
10. No significant difference was noticed between the control group of boys and girls of Matriculation school.
11. A significant difference was noticed between the control group of boys of Government school and Matriculation school.
12. No significant difference was found between the control group of girls of Government school and Matriculation school.

5.20. DISCUSSION

No difference was found between the pretest course of control group and experimental group. It means that both the groups and performed equally in their achievement and it showed that samples are equal in nature before the treatment.

By the comparison of the scores of experimental group and control group the experimental group achieved better irrespective of the, locality and the gender. Hence the authorities may provide suitable infrastructure for utilizing the modern devices and the teachers must come forward to adapt those techniques and devices in teaching. Thereby enhance conducive environment for teaching and learning.

While comparing the matriculation students and Government students in control group, the matriculation students performed better than that of the Government students. It means the matriculation students who received the contents through traditional methods achieved higher than that of the Government students in control group. But the Government students who received the content through CAI performed equally to that of the matriculation students. It may be concluded that the CAI approach enhanced the learning of the Government students. Hence the CAI may be provided to more number government schools than that of the schools and the teachers from the rural area are also motivated to utilize those techniques.

As far as theirs concerned in control group the matriculation school students performed better than the Government schools students. But is not happened in the experimental group. In that group the performance of both matriculation school and Government school is similar. It implied that by providing CAI the performance gap between the matriculation school and Government schools may be reduced and the students from the Government schools received better on-per with matriculation schools.

Boys and girls of each group performed equally, but whether a boy or a girl who treated through CAI performed well than who treated through traditional method. Hence, whether it is rural or urban, matriculation or Government, Boys as well as girls performance in experimental group is higher than that of the control group. By providing multimedia we can reap good performance in teaching and learning.

5.30 RECOMMENDATIONS

- ❖ All the schools should be provided with minimum number of CAI package and audio visual aids with TV, radio and computer.
- ❖ Some type of schools does have electronics aids and projected aids, such schools may take steps to utilize the media properly.
- ❖ The teachers are encouraged to utilize the CAI optimally.
- ❖ The teachers must utilize projected aids a possible since it makes profound impact on teaching and learning.

- ❖ As the effectiveness of multimedia depend upon the teachers, they should be well trained both in the utilization of media and application of knowledge.
- ❖ The teachers must motivate the pupils to make more meaningful projected aids.
- ❖ The computer assisted instruction should be implemented in more number of schools.
- ❖ The government should allocate adequate funds to buy audio-visual requirements
- ❖ The teachers can approach philanthropists in their locality and request them to install whatever is needed for the schools.
- ❖ The teachers must prepare a multimedia kit to encourage the students and to use in proper.
- ❖ The educational authorities like pay frequent visit to the schools and try to fulfill the needs of the students.

5.40. SUGGESTIONS FOR FURTHER RESEARCH

1. A study could be made as a comparative study of the effectiveness of CAI approach for male and female teachers.
2. A survey can be conducted to find out the facilities available to tech various subjects through CAI.

3. A comparative study can be conducted on the views of teachers on effectiveness of CAI approach in primary, secondary and higher secondary level.
4. Teachers can carryout a study on the improvement of teaching methods by adopting the CAI in teaching.
5. The efficiency of any one of the multimedia over traditional method of teaching could be undertaken by choosing a lesson.
6. A study could be made as a comparative study of the effectiveness of CAI approach between different medium of instruction.
7. A study should be focused on the availability and utilization of CAI approach on the school.

BIBLIOGRAPHY

Books

Aggarwal J.C (1995), Theory and Principles of Education, Eighth Revised Edition, Vikas, Jangpura, New Delhi.

Aggarwal J.C (1983), Landmarks in the History of Modern Indian Education, Vikas, New Delhi.

Aggarwal Y.P (1990), "Statistical Methods", New Delhi, Sterling Publishers Pvt. Ltd.

Anastani, Anne, Psychology Testing, New York: Macmillan Company, 1954.

Bam, David and Johnson, Educational Research and Appraisal, New York: J.B.Lippin and Co., 1953.

Carlton W.H.Frideson, Fundamentals of teaching with audio visual technology, New York: The Macmillan ompany, 1965.

Deny and J.Saunder, Visual Communications HandBook, GUidford: Lutternwnth, EducationalCo..1984.

Deceso, John, Educational Technology, New York: Halt Kenehd and Winston, 1964.

Goods and Hatt, Method of Social Research, New York: McGraw Hill Book Company, 1952.

John.W. Best., Research in Education, New Delhi: Prentice Hall of India Private Ltd.,1982

Kulbir Sing Sindu, The Teaching of Mathematics, New Delhi, 1988.

Lee C. Derglton (Ed), The Encyclopedia of Education,(n.P) (n.d)

Muchopadhyay, M. "Educational Technology Year Book 2000-2002", New Delhi. All India Association for educational technology, Lady Irwin College (1990)

Pe Beiffer, R.F and Cochran Lee, Manual of Audio Visual techniques, New Delhi, Prentice hall of India, 1968.

Rajammal P.Dedes, "Handbook of Research Methodology". SriRamakrishna Mission Vidyalaya College of Education, Coimbatore (1979).

Rajeshwari.C.,& Mohan S. (1995) , Multimedia Instructional Strategies Jurnal of Research in Education Media.

Sameas T., An investigation of the effectiveness of multimedia approaching teaching and learning environmental science of Primary level V standard.

Sampath K.,S. Santhanam: Introduction to educational Technology.

Sedighian.K & Klawe, M.M, 1996, An interface strategy for promoting reflective cognition on children. Human factors in Computing Systems: CHI'96, Association for computing machinery, Vancouver, BC, 177-178.

Sedighian. K & Sedighian, A.S(1996). Can educational computer games help educations learn about the psychology of learning mathematics in Children? Eighteenth Annual Meeting of he North American Chapter of the International Group for the Psychology of

mathematics Education, ERIC Clearing house for science, mathematics and environmental education, Panama City, FL, 573-578.

Skemp, R.R (1986). The psychology of learning mathematics (2nded.). Middlesex, England: Penguin Books.

Van Lehn, K (1991), Rule acquisition event in the discovery of problem-solving strategies. *Cognitive Science*, 15,1-47.