

**ATTITUDE OF HIGH SCHOOL STUDENTS TOWARDS  
COMPUTER BASED LEARNING IN SCIENCE**

*Dissertation submitted to Tamil Nadu Teachers Education University,  
Chennai, in partial fulfilment of the requirement for the award of the  
degree of*

**MASTER OF EDUCATION**

*By*

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**( RE-ACCREDITED BY NAAC WITH 'A' GRADE )**

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## **DECLARATION**

I hereby declare that this dissertation “*Attitude of high school students towards computer based learning in science*” submitted by me for the degree of Master of Education is the result of my original and independent research work carried out under the guidance of Mr. **K. Gireesh Kumar**, Assistant Professor in History, N.V.K.S.D. College of Education, Attoor and it has not been submitted elsewhere for the award of any degree, diploma, and fellowship of any other university or institution.

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## **CERTIFICATE**

This is to certify that this dissertation entitled “*Attitude of high school students towards computer based learning in science*” submitted for the M.Ed. degree by **Subin I Bose** is an original record of research work carried by him under my guidance and supervision. It is further certified that the work is an original one, free from any duplication.

**Place: Attoor**

**Date :**

**Mr. K. Gireesh Kumar**

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**Subin I Bose**

# CONTENTS

## LIST OF TABLES

<b>SI.NO.</b>	<b>CHAPTERS</b>	<b>PAGE NO.</b>
<b>I</b>	INTRODUCTION AND CONCEPTUAL FRAME WORK	1-10
<b>II</b>	REVIEW OF RELATED LITERATURE	11-38
<b>III</b>	METHODOLOGY	39-65
<b>IV</b>	ANALYSIS AND INTERPRETATION OF DATA	66-81
<b>V</b>	FINDINGS, CONCLUSIONS AND SUGGESTIONS	32-90

## REFERENCES

## APPENDICES

## LIST OF TABLES

<b>Table No.</b>	<b>Name of Table</b>	<b>Page No.</b>
<b>3.1</b>	Details of items selected and rejected based on Mathew item analysis	47
<b>3.2</b>	Reliability Analysis	50
<b>3.3</b>	Gender wise distribution of the sample	55
<b>3.4</b>	Locality wise distribution of the sample	56
<b>3.5</b>	Religion wise distribution of the sample	56
<b>3.6</b>	Community wise distribution of the sample	57
<b>3.7</b>	Type of school wise distribution of the sample	58
<b>3.8</b>	Distribution of students based on parental qualification	58
<b>3.9</b>	Distribution of students based on occupational status of parents	59
<b>3.10</b>	Type of family wise distribution of the sample	60
<b>4.1</b>	Arithmetic mean and standard deviation of the total sample	67
<b>4.2</b>	Percentage wise distribution of different levels of Attitude of high school studentts	68

<b>4.3</b>	Comparison of Attitude based on Gender	69
<b>4.4</b>	Comparison of Attitude based on Locality	70
<b>4.5</b>	Comparison of Attitude based on Religion	71
<b>4.6</b>	Result of Scheffe's procedure based on various religions	72
<b>4.7</b>	Comparison of Attitude based on Community	73
<b>4.8</b>	Comparison of Attitude based on type of School	74
<b>4.9</b>	Comparison of Attitude based on parental qualification	75
<b>4.10</b>	Result of Scheffe's procedure based on parental qualification	76
<b>4.11</b>	Comparison of Attitude based on Occupation Status of Parents	77
<b>4.12</b>	Result of Scheffe's procedure based on Occupation Status of Parents	78
<b>4.13</b>	Comparison of Attitude based on Type of Family	79

## **LIST OF APPENDICES**

<b>APPENDICES</b>	<b>CONTENTS</b>
<b>APPENDIX - A</b>	GENERAL DATA SHEET
<b>APPENDIX - B</b>	COMPUTER BASED SCIENCE LEARNING ATTITUDE SCALE ( <b>DRAFT FORM</b> )
<b>APPENDIX - C</b>	COMPUTER BASED SCIENCE LEARNING ATTITUDE SCALE ( <b>FINAL FORM</b> )



# CHAPTER – I

## INTRODUCTION

- Need and Significance of the study
- Statement of the Problem
- Operational definition of the terms
- Objectives of the Study
- Hypotheses framed
- Methodology in brief
- Delimitations of the study
- Organization of the report

## **CHAPTER - I**

# **INTRODUCTION**

The educational setup has passed through several changes during the decades, which have a definite impact on the various aspects of education along with those changes. The attitude of the student has also undergone a big change and some of the changes have been viewed as favourable while some acquire several modifications. This change has generated various shades of attitude in students.

The use of computer as a tool has affected almost every walk of life. The application of computer in education through started late, but has recently made deep inroads in this area. The conventional teaching methodology has undergone tremendous changes and has radically modified the role of a teacher. The terms like computer-based education, computer-assisted instruction and intelligent tutoring system have become quite common in the education sector.

Education sector later recognized the power of computer, but its significant role in the field of education and training was soon realized and has recently made deep inroads especially in the field of Computer Based Instructions (CBI) which is also referred as Computer Assisted Instruction (CAI). Today computers are being used on an ever-widening front in educational environments.

The computer based learning is an instruction between students, a computer controlled display and a response entry device for the purpose of achieving educational outcomes. It is developed, based on the principle of programmed learning. The concepts of audio-visual education, system analysis, data processing, communication and learning theories are also used in computer based learning. So it is considered to be a better teaching machine because of its better flexibility and usability.

Science has played a great role in our lives during the last centuries and it is now changing out all walks of life. Due to the influence of science and technology, so many changes have happened all over the world. By that science is an important subject in school curriculum. Science contains a number of basic concepts and these concepts are abstract and complex in nature. Therefore students consider science as a difficult subject to learn. The computer based learning gives relief from stress and study science in an interesting way. By the use of computer support in teaching learning process, the science subject can easily understand to students.

## **NEED AND SIGNIFICANCE OF THE STUDY**

Learning is a special process, where different levels of learners are accommodated in a learning sphere in individualized manner. In those days lecture method was used as an effective tool of instruction in schools even to teach science subjects. Many attempts were being made by researchers to explore the methods to drive the intended knowledge at different learning levels. The outcome of such research revealed that to meet the learner with their needs and make the learning as productive and meaningful. By that the role of technology in education is more important and it has to be implemented properly. Nowadays numbers of individualized instruction materials are prepared in accordance with the thirst and interest of the learner at different levels.

The rapid development of Computer Based Instruction (CBI) and its evolutionary path has mainly encouraged by society's pressures to educate large number of people, our knowledge about the psychological principles of teaching and learning and the availability of the computer. The large scale demand for education was identified as the major problem throughout the world. As more and more students arrived, the size of the classroom increased. The addition of more teachers, more classrooms staggered school sessions etc., though accommodate students, but did little to improve teaching or learning.

The declining achievement on the part of students of normal intelligence led to the emergence of an entire discipline of special education whose focus was those students who could not possibly survive in a regular classroom. It was argued that many students, who underachieve in regular classes, could benefit from special or improved learning environments. There is a need for cost-effective and training-effective methods of instruction. It was realized that computers can be used as an instructional tool to impart education and training giving rise to a new discipline called Computer Assisted Instruction (CAI). It provides the potential to impart instructions tailored to meet an individual student's needs, and at a low cost.

The learning becomes more effective in a positive attitude environment and the attitudes of the student are also important in computer based learning. Their attitude changes from one another according to their environmental and personal factors. It is a well known factor that not a single teacher is capable of giving up to date and complete information in his own subjects. Computer based instruction provide variety in the presentation of content and provides flexibility to the learners which are denied by the traditional method and process.

Many studies have been conducted regarding the use of computer as a learning tool on student's achievement, attitudes, learning rate etc. Studies were also conducted to find the effectiveness of computer based learning in the achievement of students. In conventional way of teaching, teacher can carry several charts, equipments, specimens for teaching a single topic in science.

Through the computer based science learning; the teacher can overcome these problems. The computer based learning gives relief from stress and study science in interesting way. By the use of computer supported things, the science subject can easily understand to students. For this the attitude of student is more important and if the attitude of the student increases, they try to know the basic principles, laws, and the working procedure in science. So the students may develop interest towards studying science and help to score good marks in science. Hence the investigator intends to study the attitude of high school students towards computer based learning science subjects.

## **STATEMENT OF THE PROBLEM**

The purpose of the study was to find out the attitude of high school students towards computer based science learning and is entitled as “**Attitude of High School Students towards Computer Based Learning in Science**”.

## **OPERATIONAL DEFINITIONS OF THE TERMS**

### **Attitude**

An attitude is a mental and natural set of readiness exerting the directive influence upon the individuals to all objects and situations with it is related.

- Alport (1969)

In this study attitude is a dispositional readiness to respond a certain situation, persons, objects or ideas in a consistent manner, which has been learned and has become one's typical mode of response.

### **High School Students**

High school students refer to the students studying in IX and X standard in different schools of state board of education in regular stream.

### **Computer Based Learning**

The computer based learning is an instruction between students, a computer controlled display and a response entry device for the purpose of achieving educational outcomes, based on the principle of programmed learning. The concepts of audio-visual education, system analysis, data processing, communication and learning theories are also used in computer based learning.

## **OBJECTIVES OF THE STUDY**

1. To construct and validate a Computer Based Learning in Science (CBLIS) scale to measure the attitude of high school students towards Computer Based Learning in Science.
2. To study the level of attitude of high school students towards Computer Based Learning in Science.

3. To find out the significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science with respect to the background variable namely

1. Gender
2. Locality
3. Religion
4. Community
5. Type of school
  
6. Educational qualification of parents
7. Occupational status of parents
8. Type of family.

## **HYPOTHESES**

1. There exists no significant difference in the mean scores of male and female high school students in their attitude towards Computer Based Learning in Science (CBLs).
2. There exists no significant difference in the mean scores of rural and urban high school students in their attitude towards Computer Based Learning in Science.
3. There exists no significant difference in the mean scores among Hindu, Christian and Muslim religion high school students in their attitude towards Computer Based Learning in Science.



4. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on community.
5. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on type of school.
6. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on educational qualification of parents.
7. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on occupational status of parents.
8. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on type of family.

## **METHODOLOGY IN BRIEF**

### **Method**

The method adopted by the investigator for the present study was Normative Survey Method.

### **Sample**

The sample selected for the present study was 400 high school students studying in different schools of Kanyakumari district.

### **Tools used**

1. CBLS attitude scale constructed and validated by the investigator  
(Subin I Bose & Mr. Gireesh Kumar, 2014)
2. General information sheet prepared by the investigator.

### **Statistical Techniques Used**

1. Mean
2. Standard Deviation
3. t-test – test of significance
4. ANOVA – Analysis of variance

### **DELIMITATION OF THE STUDY**

The scope of the study is limited in the following manner.

1. Only IX standard students were selected as sample for the present study.
2. The sample size was limited to 400 students only.
3. Questionnaire was the only tool used for data collection.
4. The sample was selected only from Kanyakumari district.

## **ORGANIZATION OF THE REPORT**

The present investigation is reported under five chapters.

### **Chapter: I**

contains introduction, need and significance of the study, statement of the problem, operational definition of key terms, objectives of the study, hypotheses framed, methodology in brief and delimitation of the study.

### **Chapter: II**

deals with review of related literature that contains two sections. Section: A - contains theoretical overview of the study and section: B - contains review of related literature containing Indian and foreign studies and a critical review of the study.

### **Chapter: III**

deals with methodology that contains two sections. Section: A - explains test development and Section: - B explains the plan and procedure of the study.

### **Chapter: IV**

explores the analysis and interpretation of the collected data.

### **Chapter: V**

contains the study in retrospect, finding, conclusion, educational implication of the study and suggestions for further research.

## **CHAPTER – II**

# **REVIEW OF RELATED LITERATURE**

- Need for Review
- Significance of Review
- Purpose of the Review
- Theoretical Overview
- Review of Related Studies
  - Indian Studies
  - Abroad Studies
- Critical Review

## CHAPTER II

# REVIEW OF RELATED LITERATURE

*“Survey of related literature implies locating, reading and evaluating reports of research as well as reports of casual observation and opinion that is related to the individuals planned research projects”.*

*– J. C. Aggarwal (1996)*

Review of related literature plays a significant role in any type of research work. It allows the researcher to acquaint with current knowledge in the field or area in which the researcher is going to conduct his research. According to J.C Aggarwal, review of related literature implies “locating, reading and evaluating reports of research as well as reports of casual observations and opinions that are related to the individuals’ planned research project”. According to W.R Borg “The literature in any field forms the foundations upon which all future work will be built”. According to Carter.V.Good “The keys to the vast storehouse of published literature may open doors to sources of significant problems and explanatory hypotheses and provide helpful orientations for definitions of the problem, back ground for selections of procedure and comparative data for interpretation of results”. The investigator studied various educational journals books, articles and research studies published in India and abroad related to this study.

## **NEED FOR REVIEW**

Review of literature is considered as the most important pre-requisite to actual planning and conducting the study. It is one of the early steps in planning a research work. It is very essential for every investigator to be up-to-date in the information provided. It avoids the replication of the study of findings to take an advantage from similar or related literature. The review of literature indicates the clear picture of the problem to be solved.

## **SIGNIFICANCE OF REVIEW**

The importance of the review is,

- i. The review of the literature is the basis of most of the research projects in the physical sciences, natural science, social science and humanities.
- ii. A review of related literature gives the scholar an understanding of the previous work that has been done.
- iii. The result of the review actually provide the data used in research.
- iv. It enables us to know the means of getting to the frontier in the field of our problem.
- v. A review of the literature would develop the insight of the investigator.
- vi. It places the researcher in a better position to interpret the significance of their own result.

vii. The importance of the review is quite obvious in delimiting the research problem and in defining it better.

## **PURPOSE OF THE REVIEW**

The research for related literature is a fruitful phase of any research program. Their specific purposes are

- viii. The review of related literature enables the researcher to define the limits of his field.
- ix. By reviewing the related literature the researcher can avoid unfruitful and useless problem areas.
- x. It provides the sources for hypotheses the researcher can formulate research hypotheses on the basis of available studies.
- xi. It suggests method, procedure, sources of data and statistical techniques appropriate to the solution of the problem.
- xii. It locates comparative data and findings useful in the interpretation and discussion of results.
- xiii. It helps in developing expertise and general scholarship of the investigator in the area investigated.

**This chapter is divided in to two sections:**

Section A: Theoretical overview of the study

Section B: Review of related literature containing Indian and Abroad studies.

## **SECTION - A**

### **THEORETICAL OVERVIEW OF THE STUDY**

Technology has helped to improve the quality and pace of activity as well as productions in most aspects of Human Endeavour. Computer is one of the most important and powerful impact in the fiber of science and technology. Multimedia is a combination of several media to transport information in several forms from one point to another. Technology has enabled us to arrange that those points could be situated within one room within a city or country or located anywhere on the globe. The transport media could be of copper or fiber, radio or optical waves. The form of information could be text audio or video (still or moving) and the terminal could be fixed or mobile, projection screen or TV tube, notebook, computer or PC.

#### **The Computer**

The computer is an electronic machine working on the principle of prolonged learning that aim at individualized instruction to meet the special needs of individual learners. The computer is a flexible as well as powerful devise. The computer is equipped with electronic circuits, key boards, recorders and storage specialties. Also it is called as a “dignified calculation machine” or a “glorified calculator”. It has unique capacity of memorizing heaps of information and reproducing or retrieving them whenever necessary. The procedure and language used for recording and retrieving information are specific and peculiar.



Computer is known as electronic brain. The computer services take the decision about for instruction materials according to the entering behavior of the learner. Other teaching machine simply presents the instructional material systematically, but a computer has to decide the present the instructing materials according to the needs of learners.

### **The role of computer in the field of science Education**

The computer is now regarded of a super teaching machine. Its use in education has been tried as an innovation and it has provided its teaching efficiency in many developed countries. The computer has been helping the teacher in following areas.

- i. Evaluation of student's performance and classification of children according to abilities.
- ii. Preparation of time table and schedules.
- iii. Allocation of learning materials according to individual needs and interest.
- iv. Providing information/ data for guidance and reference.
- v. Provision of direct interaction pupils and subject matter.
- vi. Present diagrams easily.
- vii. Take classes in interesting way.
- viii. Explain difficult concept in easy way.
- ix. Avoid errors in teaching time.

## **Computer as an object of instruction**

The computers can be the object of instruction. It is nothing but learning about computers. Here, one is learning how to use a computer. The learner is learning about computer programming languages, operating system, application of software packages, etc.

## **Computer as a tool for instruction and learning**

Computer can be used as a tool during the instructional process. In the field of science education, computer can be used for various purposes. Teacher can use it as an effective pedagogical device for curriculum transaction. Moreover computers can be used for word processing and desktop publishing. By using it students can prepare assignments and other presentation materials. While teaching science studies the teacher can use computer based presentation for presenting topics like internet, E-mail, web-learning etc. Using computers the students can be made to communicate with other students around the world via electronic mail and gather data from a variety of sources for their project works, market surveys, etc.

## **Computer Assisted Instruction (CAI)**

It enables the students within an educational setting to use computer based materials that are carefully sequenced in the form of frames to achieve instructional objectives. There are many ways by which are proved to be effective in the instructional process are Tutorial Mode, Drill Mode, Simulation Mode, Discovery Mode, and Gaming Mode.

In the Tutorial Mode information is presented in small units followed by a question. The computer analyses the students' response and an appropriate feedback is provided.

In the Drill and Practice Mode, the learner is provided with a number of graded examples on the concepts and principles learnt earlier. The drill and practice method is very effectively applicable for the subject accounting at the high school level. It provides variety of questions with varied formats. The idea is to develop proficiency and fluency and uncorrected responses are diagnosed and corrected. The computer continues the drill until the learner achieves mastery.

In the Simulation Mode the learner is presented with scaled down simulated situations bearing correspondence with the real situation. It allows realistic practice without facing any risk as experienced in a real situation.

In the Discovery Mode the inductive approach to teaching and learning is followed. The learner is encouraged to proceed through trial and error approach, (ie) when solving a given problem, realizing where and how he when wrong, trying again and finally solving the complex problem.

In the Gaming Mode, the learner is engaged in playing with the computer or with another learner. The extent of learning depends upon the type of the game. It is a highly motivation method especially for the subjects science at the high school level. Games on spelling, names of places and general knowledge are some of the gaming mode.

### **Computer Managed Instruction (CMI)**

The use of Computer system to manage information about learner performance and learning resource options in order to prescribe and control individualized lessons. In CAI there is a direct interaction between computer and the learner, but under CMI is design it. There is considerable impetus for using CMI because of the increasing emphasis being placed on individualized instruction.

### **Computer Based Testing (CBT)**

Computers can be used to store test items. The test items can be filed based on subject content, objective measured, or level of difficulty. Items in the files can be readily updated and modified, new items can be added and old items deleted with minimum effort. From the pool of test items the instructor can choose the items to include in an examination. It can provide immediate feedback of the learner's achievement in the test. Better interpretation of scores also can be attempted through computers.

### **Computer Assisted Evaluation (CAE)**

CAE is another recent innovation whereby computers are employed to evaluate the learning of students in a comprehensive manner. Evaluation of learning is a multi stage process. It commences with the formulation of instructional objectives and proceeds beyond the announcement of results.

## **Integrated Learning System (ILS)**

ILS is the integration of hardware, software and management systems. A network of computer programmes providing instruction, conduction test, giving feedback, and keeping records number of students at the same time. ILS incorporates a wide variety of interrelated computer with respect to based instructional programmes. ILS can be used even at district or state also.

## **Computer Managed Learning (CML)**

Computer Managed Learning bridges the gap between transmitted mode and local modes computer mediated communication. In the local mode CML can individualize learning by prescribing resources and evaluating student progress. In CML the main role of the computer is record-keeping and it does not provide any direct instruction to the learner .It takes over the other responsibilities of the teacher like evaluating the response sheets of students, gathering and sharing information about each learner and updating the same periodically, finding the resource options available for every individual student to learn a topic, monitoring the learning of the student while he is making use of the instructional programme selected to suit his potentials and directing the learners what to do next. This type of instruction through indirect, help to assess the learner's present level of knowledge, weakness or gaps in his learning and remedial action possible.

## **COMPUTER-ENABLED LEARNING (CEL)**

The computer is the primary medium of teaching and learning. It offers interactive environment in which one can interact with the computer as learning materials are stored on the personal computer. Web-based learning provides integrated environments of various technologies to support diverse needs of the learners via the Internet. It is self-paced, highly interactive, results in increased retention rates and has reduced costs. Internet-based services and software provide a synchronous learning environment in which one has access to text-chart, web-conferencing, audio and video files and more. This technology can enable to share documents and applications with other users.

Computer conferencing connects two or more computers together to conduct information exchange. The learning materials delivered through a variety of ways include readings, handouts, audio-video components and traditional lectures. There is interactivity with the learners group. Computer conferencing allows communicating on topics of mutual interest. The necessary software is hosted on a multiuser computer system, which has sufficient disc space to store and retrieve all messages information that is written. Computer conferencing create a virtual-classroom for formal and informal contact between fellow learners and experts. One can use computer conferencing at almost any time, from anywhere and at one's own pace. The time may be mutually decided in consultation with the expert and fellow learners.

## **Advantages of E-journals**

- i. Inexpensive when compare to printed version
- ii. Available for download with or without paying fees
- iii. Available around the world.
- iv. Readily available for reference from any part of the world.
- v. Uses of Computers in Education

## **Instructions**

- i. Instructing the students using PowerPoint slides, Word documents or Web pages and using hyperlinks for better concept clarity.
- ii. Helps in improving pronunciation of students by using microphones, headphones, speakers, specially prepared software and special dedicated websites.
- iii. Video conferencing, chat and email helps in better communication, hence better concept clarity. Also concept of E-tutor has given access to teachers instantly and given teachers a better chance to earn.
- iv. Current syllabus can be viewed through website of the concerned school board; made available to students if teacher has made a website and uploaded using Internet; and up taking-using web could be done easily.
- v. Inspiring students to express their imagination using Paint Brush.
- vi. Encouraging the students to surf web pages and gather relevant detailed information through web pages.
- vii. Readymade software could give practice material to students.

## **Learning**

- i. Collecting notes/pictures/videos from web pages for detailed information and projects/assignments.
- ii. Saving documents as soft copy for future use.
- iii. Learning through animations, as they are much near to the students.
- iv. E-books/online libraries/online encyclopedias help to guide in minutes and save precious time and resources.
- v. Creating videos using images, albums for better power point slides.
- vi. Simulated Learning gives them an idea of the real situation.
- vii. Publication of pamphlet/brochures for awareness with institution and among community members.

## **Testing and Evaluation process**

- i. Keeping records of students for their academic scores
- ii. Keeping records in relation to personal history
- iii. Creating question bank for students
- iv. Using computers for testing by asking questions from question bank.
- v. Online Testing and Evaluation
- vi. Analysis and interpretation of the data
- vii. Previous year question papers and sample papers using web sites.
- viii. Guidance purposes



- ix. With reference to collective records of the students maintained year wise, stored in computers.
- x. Testing for aptitude, interest, psychology using computer data bases and internet.

### **Library**

- i. Documents stored as soft copy for students/faculty members use
- ii. Online magazines, journals, brochures, research articles
- iii. Records of the books/record of the books maintained using special library software.
- iv. Records of the issued and returns of the books.

### **Computer as an Instructional Aid**

The rapid development of Computer Based Instruction (CBI) and its evolutionary path has mainly been encouraged by society's pressures to educate large numbers of people, our knowledge about the psychological principles of teaching and learning and the availability of the computer. The large scale demand for education was identified as the major problem throughout the world. As more and more students arrived, class size increased. The addition of more teachers, more classrooms (often in tents or other makeshift arrangements where school construction was too slow or too costly) staggered school sessions (morning and evening shifts) etc. though accommodated students, but did little to improve teaching or learning. The demand for teachers and courses continued.

The declining achievement on the part of students of normal intelligence led to the emergence of an entire discipline of special education whose focus was those students who could not possibly survive in a regular classroom. It was argued that many students, who underachieve in regular classes, could benefit from special or improved learning environments. A need was realized for cost-effective and training-effective methods of instruction. It was realized that computers can be used as an instructional tool to impart education and training giving rise to a new discipline called Computer Assisted Instruction (CAI), CAI provides the potential to impart instructions tailored to meet an individual student's needs, and at the same time are relatively low cost.

### **Evolution of Computer Assisted Instruction**

Each discipline has its own history, traditions and an evolving practice. This is true with computer based education as well. Computer Assisted Instruction (CAI) started in the 1950s with 'linear programs'. A linear program is a stream of steps involving a question and its response based on the previous knowledge or by trial and error. The development of such programs was influenced by the prevailing behaviorist psychological theories and the programmed learning machines of the previous century.

You may be familiar with these experiments. In the early to mid-1950s, psychologists began to incorporate psychological principles of learning, derived from laboratory experiments with people and animals, into a practical framework for teaching courses. The pioneer in this area was B.F. Skinner, who

himself had conducted important laboratory research in animal learning. Skinner, suggested that effective teaching hinged on the mastery of small steps, each building on the proceeding step, active participation on the part of the student, and active participation on the part of the instructor to present the information in carefully sequenced bits and to assess the student's performance.

Skinner (1986) noted that Pressey in the early 1920s developed a mechanical testing device that administered multiple-choice items one at a time. In this, if the student gave the right answer, the next items appeared; otherwise, the student repeatedly answered the same question until the correct answer was selected. Pressey observed that learning occurred, and that perhaps the testing machines could also be used for teaching. In the 1950s and 1960s, Skinner and others developed mechanical devices that would present instruction. The benefit of teaching machines over programmed textbooks was that they helped assure that the student would answer all the questions in the lessons and not skip over important material.

### **Science and Education**

Education is the modification of behavior of the pupils in the desirable and useful direction. To live as an efficient member in the modern society, each citizen should be know some facts of the natural phenomena, laws, properties of matter, their application in the daily life. Science can claim its honorable

place in the school curriculum based on humanistic lines so that it may be of great value of all.

Teaching of everyday science for everybody has become an unavoidable part of general education. While learning science, the learner develops certain faculties through reasoning and experimentation which no other subject can provide. Science, as a teaching subject, possesses the various values as any other subject for which it is included in the curriculum as a teaching subject such as intellectual values, utilitarian values, cultural values, moral values, and aesthetic values. But in addition, the study of science inculcates certain other disciplinary values peculiar to it which cannot be provided through other subjects.

Science has opened innumerable avenues for pursuing different vocations. A student of science can study engineering and technology, medicine, agriculture or any similar subject and make his career in that profession.

### **Science as a Subject**

Science as a subject offers the widest range of knowledge to the learners. It has exposed the mankind to infinite avenues of knowledge in nature, living and non-living, the world we perceive and also the world beyond human perception thereby makes us conscious of the unknown to be explored. The study of science brings behavioral change in the learner and enriches his

character and personality. Science gives opportunity for creative thinking and constructive imagination.

Science learning provides training in scientific method and also helps to develop a scientific attitude of mind in the learner. The qualities imbibed by the learner through learning science are of great value to a citizen living in the society. Hence, science is now made a compulsory subject in every system of school education right from the elementary stage. While learning science, the learner develops certain faculties through reasoning and experimentation which no other subject can provide.

The learner develops the habits of searching for truth. These qualities affect the pattern of behavior of the learner. The significant aspect of science is that whatever the student learns has immediate application in the world around him. One of the very useful outcomes of learning science is the development of problem solving skill. If properly cultivated through the teaching of science, the student can apply this skill to solve problems in his personal or social life.

Considering the subject from the intellectual point of view, science is the most inexhaustible storehouse of knowledge. It is opening new horizons of knowledge every day and is continuously adding to the cultural heritage of mankind the ever-increasing new knowledge, new explorations, and new ideas. Along with acquisition of expanding knowledge, it makes man aware of the vastness of the unknowable universe.

## **Place of Science in School Curriculum**

In India through the efforts of National Council of Educational Research and Training (N.C.E.R.T), science has been made a compulsory subject throughout the secondary stage of the school.

According to UNESCO's International Education Commission (1972), "Science and technology must become essential components in any educational enterprises, they must be incorporated into all educational activity intended for children, young people and adults, in order to help the individual to control social energies as well as natural and productive ones thereby achieving mastery over himself, his choices and actions and finally, they must help a man to acquire a scientific turn of mind so that he becomes able to promote science without being enslaved by it."

According to National Policy on Education (1992), "Every effort will be made to extend science education to the vast number who have remained outside the pale of formal education"

According to Kothari Commission (1964-66), "We lay great emphasis on making science an important element in the school curriculum. We therefore, recommended that science and mathematics should be taught on a compulsory basis to all pupils, as a part of general education during the first ten years of schooling. In addition, there should be provision of special courses in these subjects at the secondary stage for students of more than average ability."

Science is a compulsory subject in most of the secondary schools in most of the states. Some state government has made it a compulsory subject in high school classes.

## **SECTION – B**

### **REVIEW OF RELATED LITERATURE**

#### **STUDIES CONDUCTED IN INDIA**

**Suresh and Pramila** (2000) made study on “*use of computer multimedia programme in learning trigonometry among high school students*”. The sample consisted of 65 IX standard students in Hindu senior secondary school, Madurai (32 students in experimental group and 33 students in control group). The major finding of the study in, there is no influence of computer based multimedia programme on the achievement in mathematics among high school students.

**Vasanthi and Hema** (2003) made a study to find the “*effectiveness of teaching chemistry for first year B.E. students through computer assisted instruction*”. The sample consisted of 60 students selected from 220 students of Sivnath Aditnagar College of Engineering, Tiruchendur, in Thoothukundi District on the basis of marks. The students were divided into two equal groups of 30 each on the basis of marks obtained in the class test. One group was taken as the control group and the other group was taken as the experimental group. A pre test and post test parallel group experimental design was used. The

experimental group was given the CAI software. Statistical technique like Mean, S.D and t-test computed to analyze the data collected. Major finding is, there is significant difference between the mean gain score of the control group taught through TTM and the experimental group administered by the CAI in all units put together.

**Joy and Shaiju** (2004) conduct a study on “*development of computer assisted teaching material in history at higher secondary level and its effectiveness*”.

The sample consisted of 162 (72 males and 90 females) eleventh standard student from 3 higher secondary schools of Thiruvananthpuram district randomly selected based on locality of the schools and management of schools. The major finding is, while both the methods led effective learning, the CAT method was found superior to the lecture method.

**Dange and Wahab** (2006) made a study to find the “*effectiveness of computer assisted instruction on the academic achievement of class IX student’s physical science*”. The sample of 32 students was divided into two equated groups of 16 students each. They are studying in IX Class of Sri Aurobindo High School, Shimoga. The control group of another 16 students was taught the same content by conventional method. Mean, standard deviation and t test were computed the data for finding results. Major finding is, there was significant difference between mean gain scores of pre test and post test of experimental group.

**Manivannan** (2006) conducted a study on “*attitude of teachers disabled graduates towards the computer application in teaching learning process*”.

The sample of the study in a total of 20 Locomotors impaired graduates, 20



visually impaired graduates and 20 college teachers. They selected as the sample through random sampling technique. The major findings of this study in computer technology should not be a remote access to persons with disabilities.

**Jyothi** (2007) conducted a study on the “*impact of computer –based learning on students of chemistry*”. The sample consisted of 40 students from IX standard of Little Star High School, Madannapet (20 students in control groups and 20 students in experimental groups). The major findings showed that there exist significant difference between the mean scores of pre-test and post –test course of experimental and controlled groups.

**Kaur** (2010) made a study on the topic “*effectiveness of computer assisted instructions in teaching of chemistry at secondary level*”. The sample for this study is 60 students. 30 are in experimental group and 30 are in control group. The major findings of the study are the experimental group, which are taught by CAI showed better learning.

**Denisia** (2010) conducted a study on “*effectiveness of computer aided learning in teaching science concepts*”. The sample consisted of 80 students of G.G.H.S.S Othakadai Madurai. 40 are in the experimental group and 40 are in the control group. The major findings of the study in, there are a significant difference between the post-test mean scores of control group and experimental group.

**Ponraj and Sivakumar** (2010) made the study on the topic “*computer assisted instruction in zoology in relation to learners personality*”. The sample

consisted of 40 students in Control Group and 40 students in Experimental Group. The major findings of the study in, achievement scores of Experimental Group students were higher than the Control Group students.

**Gnanalet and Krishnan** (2010) conducted a study to compare the “*effectiveness of multimedia programme in teaching environmental education with that of traditional method of teaching*”. The sample of this study consisted of 60 students studying in IX standard under the matriculation syllabus at Chennai District included both boys and girls. The findings of the study show that there is a significant difference between the experimental group and the control group in the learning of environmental education.

**Tholappan and kumar** (2011) made a study on the topic “*attitude of higher secondary students towards computer assisted instruction*”. The sample of this study is 300 higher secondary students in Trichy District. The investigator used stratified random sampling technique. The major findings of this study in both male and female students are having equal attitude towards CAI.

**Maya** (2011) conducted a study on the topic “*computer assisted learning and learning environment*”. The sample selected for the study in 42 higher secondary school biology teachers. Questionnaire and Rating scales are used for collecting data. The major findings of the study in that minority of higher secondary school biology teachers have received special training in the perception of Computer based Learning Materials.

**Uplane et al** (2011) conducted a study on the topic “*CAI: an effective instructional method for secondary school low achievers*”. The sample selected for the study is 70 English Medium Schools in Pune. The major findings of the study are, there is significant difference in the mean scores of pre- test and post -test of low achievers in Physics of VIII standard.

**Fehameeda and Jawad** (2012) conduct the study on the topic “*the effectiveness of CAI program in high school biology.*” The sample of the study was consists of IX standard students of two selected English medium schools of Gulbarga District. The major findings of the post test scores on achievement test are significantly higher than pre test scores, which means that the CAI program in effective.

**Sivaram and Ramar** (2013) conducted a study on the “*effect of CAI in teaching disadvantaged students in inclusive setting*”. The sample consisted of 75 students from S.S.Hindu Nadar Hr.Sec.School, Muhavur were selected. Each group consisted of 10 Socially disadvantaged students, 5 culturally disadvantaged students and 10 academically disadvantaged students. The major findings showed that there is significant difference in the pre-test and post-test performance among the control group students and the students of both the experimental groups.

## STUDIES CONDUCTED IN ABROAD

**Mioduser et al** (2000) conducted a study on the topic "*the learning value of computer-based instruction of early reading skills*". Forty-six children aged 5-6 attending six special-education kindergartens in the central region of Israel participated in the study. The major finding of the study is there was no difference between the groups for the initial vocabulary level.

**Bakar** (2007) conducted a case study on the topic "*english language activities in computer-based learning environment*". The purpose of conducting this study was to investigate and understand how computers were integrated in the classroom by looking at the types of activity carried out by teachers and students. The sample selected for the study is the girl students of two high school class in Malaysian secondary smart school. The major finding of the study is there are benefits and great opportunities for students to use second language in computer-based learning environment.

**Kursat and Mehmet** (2008) conducted a study on the topic "*opinions of mathematics teacher candidates towards applying 7E instructional model on computer aided instruction environments*". The purpose of this study was to determine opinions of mathematics teacher candidates towards applying 7E instructional model on computer aided instruction environments. The descriptive case study model was used in this study. The sample of the study consists of 52 mathematics teacher candidates which were selected randomly from Eskisehir Osmangazi University Department of Elementary Education students. Data were collected by "Applying 7E Instructional Model on

Computer Aided Instruction Environments" questionnaire and a demographical form. The major finding is teacher candidates whose affinity are at low level have high questionnaire scores, showing that they are willing to apply this model within environments based upon computer aided mathematics instruction.

**Saleh and Abdulgader** (2009) made a study to investigating the “*effect of computer-assisted language instruction on saudi students learning of english at king saud university*”. The sample of the study consisted of 60 students randomly selected from King Saud University and assigned to experimental and control groups. Data were collected within an eight-week period. The findings of the study indicated that using computer-assisted English language instruction alongside the traditional method has a positive effect on the experimental group students’ achievement.

**Kose** (2009) conducted study on the topic “*assessment of the effectiveness of the educational environment supported by computer aided presentations at primary school level*”. The objective of this study is to assess the effectiveness of the educational environment supported by computer aided presentations at primary school. The effectiveness of the environment has been evaluated in terms of students' learning and remembering what they have learnt. In the study, we have compared experimental group and control group in terms of learning and recalling what has been learned regarding the effect which computer aided learning environment imposes. The main finding of the study is the educational environment supported by computer aided presentations has

positive contributions to learning activity; it does not have effects on the permanence of what has been learnt.

**Serin** (2011) conducted a study on the topic “*the effects of computer based instruction on the achievement and problem solving skill of the science and technology students*”. The sample selected for the study is 53 (26 were placed in the experimental group and 27 in the control group) fourth year pupils in a primary school in Buca/Izmir in the 2008-2009 school year. The major finding of the study is there was a significant difference between the means of the corrected post test scores according to the control and experimental groups’ achievements and problem solving skills.

**Kurtulus** (2011) conducted a study on the topic “*effect of computer-aided perspective drawings on spatial orientation and perspective drawing achievement*”. The aim of this study is to investigate the effect of computer-aided Perspective Drawings on eighth grade primary school students' achievement in Spatial Orientation and Perspective Drawing. The study made use of pre-test post-test control group experimental design. The study was conducted with thirty 8th grade students attending a primary school in Turkey in 2009-2010 school years. The major finding is that computer-aided Perspective Drawings increased student achievement in Spatial Orientation and perceptivity.

**Liu et al** (2011) made a study on the topic “*learning residential electrical wiring through computer simulation: the impact of computer-based learning environments on student achievement and cognitive load*”. This study aimed to

determine whether students using computer simulations learned better than traditional classroom learners in the domain of residential wiring. A quasi-experiment was implemented with 169 high school students. The simulation group participated in a series of computer simulations, whereas the control group received lectures and demonstrations from an instructor. The finding shows that the simulation group learned significantly better and reported higher cognitive load than did the control group.

**Wang et al** (2012) conducted a study on the topic “*computer game-based learning: perceptions and experiences of senior Chinese adults*”. The purpose of this study was to investigate senior Chinese adults' potential acceptance of computer game-based learning (CGBL) by probing their perceptions of computer game play and their perceived impacts of game play on their learning of computer skills and life satisfaction. A total of 60 senior adults from a local senior adult learning center in Lishui, China participated in this study. Multiple data collection methods were applied, including a survey and a follow-up interview. The interview data was reported as a descriptive story to augment the survey findings. Results of the study disclosed that most participants perceived computer game play positively. They believed playing computer games contributed to their learning of computer skills and improved their life satisfaction.

**Ozgen et al** (2012) conducted a study on the topic “*examining student opinions on computer use based on the learning styles in mathematics education*”. The purpose of this study is to identify the opinions of high school students, who

have different learning styles, related to computer use in mathematics education. High school students' opinions on computer use in mathematics education were collected with both qualitative and quantitative approaches in the study conducted with a survey model. For this purpose, 388 high school students were included in the study. A learning style inventory, questionnaire form and interview questions were used as the data collection instruments. The results of the study showed that students with a diverge and accommodator learning styles have more positive opinions regarding computer use in the mathematics education compared to the students with assimilator and converge learning style.

## **CRITICAL REVIEW**

The researcher reviewed twenty five studies totally. Fifteen Indian studies and ten foreign studies. The population taken in those studies includes students of school and colleges, school teachers and special students. The researcher critically reviewed the reports and studied the design and method of these researchers, sampling techniques, method adopted, tools used, variable defined and their recommendations for further research. The review made evident various factors that influenced computer based learning. It also made clear that no attempts have been made by researchers in studying the attitude of high school students towards computer based learning in sciences.



# **CHAPTER – III**

## **METHODOLOGY**

- Introduction
- Section A: Test Development
- Section B: Plan and Procedure

## **CHAPTER – III**

# **METHODOLOGY**

Research is an essential and powerful tool in leading man towards progress. Research is an endless quest for knowledge or unending search for truth. It brings to light new knowledge or corrects previous errors and misconceptions and adds in an orderly way to the existing body of knowledge. The knowledge obtained by research is scientific and objective and is a matter of rational understanding, common verification and experience.

According to John W. Best (1978) “Research is considered to be the more formal, systematic, intensive, process of carrying on the scientific method of analysis. It involves a more systematic structure of investigation, usually resulting in some sort of formal record of procedures and a report of results on conclusion”.

According to Travers (1985) “Educational research is the activity which is directed towards development of a science of behavior in any educational situation, the ultimate aim of such a science is to provide knowledge that will permit the educator to achieve the goals by the most effective methods”.

The procedure by which researchers go about their work of describing, explaining and predicting the phenomena is called methodology. A well planned and well executed educational research programme saves time, money

and energy. It avoids a lot of frustration and leads us to the path of progress. The reliability and validity of the findings depend upon the method adopted.

The decision about the method to be employed always depends on the nature of the problem. A researcher should have a thorough understanding of all research methods, with particular reference to their strengths, limitations, appropriateness and applicability.

This chapter includes the following aspects.

**Section A: Test Development**

**Section B: Plan & Procedure**

**SECTION - A**

**TEST DEVELOPMENT**

Collection of relevant data is one of the most important steps in any research, especially in the field of education. An appropriate tool or instrument is very essential to serve this purpose. In certain researches the investigators use readymade tools to carry out the study. But such tools may not work suitable with the variables selected in certain cases. In such cases investigator has to prepare suitable tools which will work adequately with the variable selected for the study.

In the present study, after a through survey on the available tools the investigator decided to go for a suitable tool that will measure the attitude of high school students towards computer based learning in science.

The tool for the present study was constructed and validated by the investigator for measuring the attitude of high school students towards computer based learning in science. For the preparation of the tool, certain important considerations and procedures were followed. The major steps followed in the construction of this tool are described under different heads.

### **Steps in the construction of tool**

1. Planning of the test
2. Item writing
3. Item editing
4. Arrangement of items
5. Preliminary try out
6. Draft scale
7. Final try out
8. Scoring
9. Item analysis
10. Item selection
11. Format of the final inventory
12. Establishing reliability and validity

## **1. Planning of the test**

The computer based learning in science tool, prepared by the investigator aims at measuring the attitude of high school students towards computer based learning in science in Kanyakumari district. Due considerations were given to the variables tested and the different aspects involved.

## **2. Item writing**

Writing of suitable item is one of the important steps in the construction of any research tool. After a thorough and careful study of the literature available, the investigator prepared a number of positive and negative statements describing different aspects of computer based learning in science.

The scale covers the decisive features of the needed data. The method used in item writing was variable response (scale) method. Here the subject has to select his/her response out of the given responses such as **strongly agree (SA) / agree (A) / undecided (UD) / disagree (DA) / strongly disagree (SDA)**. An objective evaluation is possible through this method.

## **3. Item Editing**

Editing the item needs much care and it is the process of checking and scrutinizing items. The items were referred to the experts for modifications and suggestions. As per the suggestions, the ambiguous items were rewritten in simple and meaningful language.

#### **4. Item Arrangement**

The entire items prepared for the tool were ordered and located in a random manner in order to arouse interest and to maintain attention for responding.

#### **5. Preliminary Tryout**

The preliminary tryout of the test was arranged to find out the weakness and work ability of the items. The difficulties in responding the item and a rough estimate of the time limit for responding the item were noted. This step helped the investigator to modify certain items which were vague and questionable. For this purpose the scale was given to hundred high school students.

#### **6. Draft Inventory**

The first draft was prepared by printing the item with the provision to mark responses. It was printed in English. Necessary instructions for the respondent were also included. A sample copy of the draft inventory is given *Appendix - B*.

#### **7. Final Tryout**

The tool was administered to a sample of 400 (Four hundred) high school students of various schools in Kanyakumari district. They were selected randomly from the population. A sample copy of the final tryout is given in *Appendix- C*.

## 8. Scoring

The collected response sheets were scored with the help of scoring key prepared by the investigator. The response sheets were scored by assigning the score of '5' for strongly agree (SA), '4' for agree (A), '3' for undecided (UD), '2' for disagree (DA), '1' for strongly disagree (SDA) for positive items. The score is reversed for negative statements.

## 9. Item Analysis

Item analysis is an important step in a test construction. Item can be analyzed qualitatively in terms of their content and quantitatively in terms of their statistical properties. Qualitative analysis includes the consideration of content validity and the evaluation of items of effective item writing procedure.

Quantitative analysis on the other hand includes principles. The measurement of item difficulty and item discrimination is down in both the validity and reliability.

$P_U$  – Percentage of individuals in the lower tail making the keyed answer.

$P_L$  – Percentage of individuals in the upper tail making the keyed answer.

In the "*Mathew Item Analysis Table*", all indicates for the same value of  $P_L$  have been grouped together, so in order to read the indices of an item, the  $P_L$  value of the given item was located, find them in that selection of the  $P_U$  value of the item along the left margin was located and the corresponding 'phi' and 'p' values were read. Whenever the ' $P_L$ ' and ' $P_U$ ' values were inter

changed while reading the indices and then a negative sign was attached to the 'phi' coefficient. When 'P<sub>L</sub>' and 'P<sub>U</sub>' are equal, then 'phi' is zero.

## **10. Item Selection**

From the item having highest correlation (phi values) the required numbers of items were selected. The special feature about the phi value is that since 'phi' values tend to be high for item having medium 'p' value item selection based on 'phi' alone would give the desired result. Item with 'phi' values below of any test depend ultimately on the characterization of its items. High reliability and validity can be built into a test in advance thorough item analysis.

The method of item analysis used in the case of present investigation is the one developed by Mathew (1982) called the "*Mathew Item Analysis Table*". This table gives item criterion correlation (phi-co-efficient) and percentages of test making the keyed answer (p-value) One of the advantages of phi-co-efficient is that any convenient tail proportion can be made in order to use the same table. It is recommended regardless of the sample size.

The response sheets were arranged in the order of the criterion score. The criterion score is the total score of the tail form the test itself. Hundred response sheets having the lowest score were taken as lower tail, and hundred response sheets having the highest score were taken as upper tail.



The final percentage needed for reading the item indices from the table are the following.

The five percent of significance is not considered usually.

When 'phi' values of most items were high and the number of item large, item with some spread of 'p' values would be described. It may be mentioned here that 'phi' values were complied for every combination of ' $P_L$ ' and ' $P_U$ ' values of Guilford (1954) formula. For the present study the item having 'phi' value 0.14 and above are selected for final scale. Details of items selected and rejected were given in the table.

The sample copy of item selected in the attitude scale for computer based learning is given below.

**Table: 3.1**

<b>Item No</b>	<b>P<sub>L</sub></b>	<b>P<sub>U</sub></b>	<b>Phi</b>	<b>P</b>	<b>Item Selected</b>
<b>1</b>	91.5	99	0.17	96	*
<b>2</b>	37.5	56.5	0.18	47	<b>Selected 1</b>
<b>3</b>	74.5	98	0.34	87	*
<b>4</b>	33	48	0.15	41	*
<b>5</b>	66	97	0.4	82	*
<b>6</b>	46	62.5	0.17	55	*
<b>7</b>	71.5	97.5	0.36	85	*
<b>8</b>	41	88	0.49	65	<b>Selected 2</b>
<b>9</b>	73.5	99	0.37	87	*
<b>10</b>	29	78	0.49	54	<b>Selected 3</b>
<b>11</b>	71	99	0.39	85	*
<b>12</b>	29.5	86	0.57	58	<b>Selected 4</b>
<b>13</b>	62.5	95.5	0.41	80	<b>Selected 5</b>
<b>14</b>	31.5	67.5	0.36	50	<b>Selected 6</b>
<b>15</b>	68.5	98.5	0.41	84	*
<b>16</b>	40	82	0.43	61	<b>Selected 7</b>
<b>17</b>	70.5	80.5	0.12	76	*
<b>18</b>	35	69	0.34	52	<b>Selected 8</b>
<b>19</b>	60	96.5	0.45	79	<b>Selected 9</b>
<b>20</b>	27	78.5	0.52	53	<b>Selected 10</b>
<b>21</b>	68.5	92	0.29	81	*
<b>22</b>	43.5	89.5	0.49	67	<b>Selected 11</b>
<b>23</b>	57	95.5	0.46	77	<b>Selected 12</b>
<b>24</b>	40.5	55.5	0.14	48	*
<b>25</b>	64.5	97.5	0.43	82	*
<b>26</b>	39	83	0.45	61	<b>Selected 13</b>
<b>27</b>	60	98.5	0.48	80	<b>Selected 14</b>
<b>28</b>	36	75	0.39	56	<b>Selected 15</b>

<b>29</b>	59.5	91	0.36	76	<b>Selected 16</b>
<b>30</b>	41	86	0.47	64	<b>Selected 17</b>
<b>31</b>	56.5	96	0.46	77	<b>Selected 18</b>
<b>32</b>	16	75.5	0.6	46	<b>Selected 19</b>
<b>33</b>	70	86	0.19	78	<b>Selected 20</b>
<b>34</b>	36	65.5	0.3	51	<b>Selected 21</b>
<b>35</b>	55	89.5	0.39	73	<b>Selected 22</b>
<b>36</b>	34	48.5	0.15	42	*
<b>37</b>	53	90.5	0.42	72	<b>Selected 23</b>
<b>38</b>	34.5	86.5	0.53	61	<b>Selected 24</b>
<b>39</b>	66	93.5	0.35	80	<b>Selected 25</b>
<b>40</b>	42	86.5	0.47	65	<b>Selected 26</b>
<b>41</b>	57.5	89	0.35	74	<b>Selected 27</b>
<b>42</b>	45	86	0.43	66	<b>Selected 28</b>
<b>43</b>	82	93	0.17	88	*
<b>44</b>	27	75	0.48	51	<b>Selected 29</b>
<b>45</b>	64	89	0.3	77	<b>Selected 30</b>
<b>46</b>	36	65.5	0.3	51	<b>Selected 31</b>
<b>47</b>	68.5	94.5	0.34	82	*
<b>48</b>	33.5	71	0.37	53	<b>Selected 32</b>
<b>49</b>	59.5	97	0.45	79	<b>Selected 33</b>
<b>50</b>	34	74	0.4	54	<b>Selected 34</b>
<b>51</b>	62.5	87	0.28	75	<b>Selected 35</b>
<b>52</b>	20	83	0.63	52	<b>Selected 36</b>
<b>53</b>	72	85.5	0.17	79	*
<b>54</b>	33.5	46.5	0.13	41	*
<b>55</b>	59.5	92.5	0.39	77	<b>Selected 37</b>
<b>56</b>	34	82	0.49	58	<b>Selected 38</b>
<b>57</b>	60	90.5	0.36	76	<b>Selected 39</b>
<b>58</b>	26.5	61	0.34	44	<b>Selected 40</b>
<b>59</b>	53.5	84.5	0.34	70	<b>Selected 41</b>
<b>60</b>	38.5	66.5	0.28	53	<b>Selected 42</b>

*Star ( \* ) indicates rejected items*

## **11. Format of the Final Inventory**

The final inventory consists of 42 items with almost in simple and meaningful way. The language of the test is monolingual so that it can be used for subject having knowledge of English. A copy of the final inventory is attached in *Appendix - C*.

## **12. Establishing reliability and validity**

### **i) Reliability of the scale**

Reliability is the accuracy or precision of measuring instrument. According to John W. Best (1978) “A test is reliable to the extent that it measures accurately and consistently from one another”.

Reliability is the consistency of scores obtained by the same individual on different occasion or with different set of equivalent items. The reliability of a test can be assessed in different ways such as test- retest method, split half method, rational equivalence method etc.

In the present investigation, the reliability co-efficient was found out by split half method. It measures the degree of homogeneity of items. The reliability co-efficient of the test is calculated using Spearman Brown Prophecy formula was found to be 0.64 showing satisfactory reliability (N=100).

**Table: 3.2**

**Reliability Analysis**

Number of sample	100
Number of items	42
Correlation between odd half & even half	0.4696
Reliability of co-efficient	0.64

This reveals that the present scale possess a high degree of reliability

**ii) Validity of the scale**

A test is valid when it meets the purpose for which it was designed. The two main types of validity established for this tool were face validity and content validity.

**a) Face validity**

Face validity means that the given tool appears or seems to measure what it is to measure. The tool was submitted to a panel of experts and in their opinion it appeared to measure the objective of the tool. A close look on the items of the inventory reveals that each and every item is capable of reflecting the subject 'computer based learning in science'. This provided face validity for the tool.

## **b) Content validity**

Content validity of the test is also established by verifying the comprehensiveness of coverage of the content of the test using authentic literature and opinion of experts. On the basis of the opinion of experts from relevant field and that the tool has sufficient coverage of its content.

## **SECTION: B**

### **PLAN AND PROCEDURE**

Methodology is the technique used in research study. Research methodology is a scientific investigation used by the researcher to carry out any research work. Research methods are almost importance in a research process. Mainly methodology consists of tools, procedure and techniques followed by the researcher, mostly three are commonly used. They are,

#### **1. Historical Method**

It is a method of investigation to discover and interpret what existed in the past.

#### **2. Experimental Method**

Experimental research is the description and analysis of what will be or what will be or what will occur, under carefully controlled conditions.

### **3. Normative Method**

It provides a method of investigation, to study, describe and interpret what exists at present.

In the present study the investigator has selected normative survey method for investigation.

#### **METHOD ADOPTED FOR THE PRESENT STUDY**

The present study attempts to find out the “Attitude of high school students towards computer based learning in science”. Since the problem selected is concerned with survey type, the investigator has selected the survey method for conducting the present study.

#### **Normative survey method**

Normative survey or descriptive approach of research is also recent development in the field of investigation. In using this method many a times researcher gains insights into other aspects of the problem which otherwise may not be within the scope of his research performance. He also gains invaluable experience of conducting such enquires systematically and accurately.

According to Good Bar and Scales (1952), “The term Normative Survey is generally used for the type of research that attempt to find out the normal or typical conditions of practices at the present time.

Survey method attempts to describe and interpret what exists at present in the form of condition, practices, process, trends, effects, attitudes, beliefs etc. It is an organized attempt to analysis interprets and reports the present status of social institution, group or area.

### **Characteristics of Normative survey method**

1. It gathers data from a relatively large number of cases.
2. It is generally cross sectional.
3. It involves clearly defined problems.
4. It provides information useful to the situation of local problem.
5. Surveys may be quantitative and qualitative.
6. It requires expert imaginative planning.
7. It is more reliable.
8. It requires carefully analysis and interpretation of the data gathered.
9. It determined the present trends and solves current problems.
10. The existing theories and laboratory findings can easily be put to test in real situation.

The methodology deals with the aspects of the method followed in the investigation which includes,

1. The population and sample
2. Tools used for the study.
3. Data collection procedure



4. Scoring and Tabulation
5. Statistical techniques used.

## **1. THE POPULATION AND SAMPLE**

### **Population**

J.W. West (1996) says, “A population is any group of individuals that have one more characteristics in common that are of interest to the researcher.”

By population, the investigator means the total area taken for the study. Here the population consists of high school students of Kanyakumari district. The sample selection was based on the stratified random sampling technique.

### **Sample**

J.W. West (1996) defines “A sample is a small portion of a population selected for observation and analysis.”

Here the sample consists of 400 (Four Hundred) students, studying in various schools in Kanyakumari district. The sample for the study selected was stratified random sampling technique. The samples were based on gender, locality, religion, community, type of school, educational qualification of parents, occupational status of parents and type of family.

## **PERCENTAGE WISE DISTRIBUTION OF THE SAMPLE ON THE BASIS OF BACKGROUND VARIABLES**

### **i) Gender wise distribution of the sample**

The sample consists of both male (178) and female (222). The percentage corresponding to boys and girls students are 44.50 and 55.50 percentages respectively.

**Table: 3.3**

#### **Gender wise distribution of the sample**

<b>Gender</b>	<b>Number of students</b>	<b>Percentage</b>
Male	178	44.50
Female	222	55.50
<b>Total</b>	<b>400</b>	<b>100.00</b>

### **ii) Locality wise distribution of the sample**

The sample consists of both rural (235) and urban (165) students. The percentage corresponding to rural and urban students are 58.75 and 41.25 percentages respectively.

**Table: 3.4**

**Locality wise distribution of the sample**

<b>Locality</b>	<b>Number of students</b>	<b>Percentage</b>
Rural	235	58.75
Urban	165	41.25
<b>Total</b>	<b>400</b>	<b>100.00</b>

**iii) Religion wise distribution of the sample**

The sample consists of Hindu (201), Christian (163) and Muslim (36) religion college students. The percentage corresponding to Hindu, Christian and Muslim religion students are 50.25, 40.75 and 9.00 percentages respectively.

**Table: 3.5**

**Religion wise distribution of the sample**

<b>Religion</b>	<b>Number of students</b>	<b>Percentage</b>
Hindu	201	50.25
Christian	163	40.75
Muslim	36	9.00
<b>Total</b>	<b>400</b>	<b>100.00</b>

**iv) Community wise distribution of the sample**

The sample consists of FC (67), OBC (280) and SC/ST (53) high school students. The percentage corresponding to FC, OBC and SC/ST high school students are 16.75, 70.00 and 13.25 percentages respectively.

**Table: 3.6**

**Community wise distribution of the sample**

<b>Community</b>	<b>Number of students</b>	<b>Percentage</b>
FC	67	16.75
OBC	280	70.00
SC/ST	53	13.25
<b>Total</b>	<b>400</b>	<b>100.00</b>

**v) Type of School wise distribution of the sample**

The sample consists of both Govt school students (204) and Aided school students (196). The percentage corresponding to govt school students and Aided school students are 51.00 and 49.00 percentages respectively.

**Table: 3.7**

**Type of School wise distribution of the sample**

<b>Type of School</b>	<b>Number of students</b>	<b>Percentage</b>
Govt	204	51.00
Aided	196	49.00
<b>Total</b>	<b>400</b>	<b>100.00</b>

**vi) Distribution of students based on parental qualification**

The sample consists of high school students based on educational qualification of parents up to Hr. Sec (275), under graduate (91) and post graduate (34). The percentage corresponding to qualification of parents up to Hr. Sec, under graduate and post graduate are 68.75, 22.75 and 8.50 percentages respectively.

**Table: 3.8**

**Distribution of students based on parental qualification**

<b>Educational Qualification of Parents</b>	<b>Number of students</b>	<b>Percentage</b>
Up to Hr. Sec	275	68.75
UG	91	22.75
PG	34	8.50
<b>Total</b>	<b>400</b>	<b>100.00</b>

**vii) Distribution of students based on occupational status of parents**

The sample consists of high school students based on occupational status of parents such as government employed (50), private (33), business (35) and others (282). The percentage corresponding based on government, private, business and others are 12.50, 8.25, 8.75 and 70.50 percentages respectively.

**Table: 3.9**

**Distribution of students based on occupational status of parents**

<b>Occupational Status of Parents</b>	<b>Number of students</b>	<b>Percentage</b>
Govt	50	12.50
Private	33	8.25
Business	35	8.75
Others	282	70.50
<b>Total</b>	<b>400</b>	<b>100.00</b>

**viii) Type of family wise distribution of the sample**

The sample consists of both joint family (43) and nuclear family (357) students. The percentage corresponding to joint and nuclear family students are 10.75 and 89.25 percentages respectively.

**Table: 3.10**

**Distribution of students based on type of family**

<b>Type of Family</b>	<b>Number of students</b>	<b>Percentage</b>
Joint	43	10.75
Nuclear	357	89.25
<b>Total</b>	<b>400</b>	<b>100.00</b>

## **2. TOOLS USED FOR THE STUDY**

Tools are the instruments employed by the investigator to gather new facts to explore new fields. There are a large number of tools available for data collection in research. By keeping various objectives and purposes of the study in mind the investigator prepared the following tool for the data collection.

- i) General data sheet prepared by the investigator
  - ii) Computer based science learning attitude (CBLS) scale constructed and validated by the investigator (Subin I Bose and K. Gireesh Kumar, 2014).
- i) General data sheet**

The general data sheet serves to collect personal information. In this, students were asked to write their name, school name, gender, locality, religion,

community, type of school, educational qualification of parents, occupational status of parents and type of family.

A copy of the general data sheet is attached as *Appendix - A*.

**ii) Computer Based Science Learning Attitude Scale (CBLA)**

Computer based science learning attitude scale prepared by the investigator intends (Subin I Bose and Mr. Gireesh Kumar K.) to tests the attitude towards computer based learning in science among high school students. There were 60 statements in the draft scale. After item analysis, the final format consists of 42 statements, almost in equal number of positive and negative items. The reliability and validity of the scale was also established.

**3. DATA COLLECTION PRECEDURE**

Data were collected from 400 (Four hundred) high school students studying in different schools. For this purpose the investigator visited various high schools in Kanyakumari district and sought the permission of the head of the institution and met the students in person in the classes. A rapport was established with the students, in advance before the administration of the tool.

The students were first given direction to fill up the general data sheet. Then they were instructed to respond to the attitude scale prepared on computer based science learning. The responses sheets were collected from the respondents after making the response.



#### 4. SCORING AND TABULATION

The data collected from the subjects were scored systematically using scoring key manually by the investigator. In computer based science learning attitude scale, a score of 5, 4, 3, 2, 1 was given to the category strongly agree, agree, undecided, disagree, and strongly disagree for the positive statements. The score was reversed for negative statements. After the completion of scoring, the data was organized and tabulated for analysis and interpretation. Calculation was done with the help of computer assistance.

#### STATISTICAL TECHNIQUES USED

For the analysis of data collected, following major statistical techniques were adopted.

- i) Arithmetic Mean
- ii) Standard Deviation
- iii) Test of significance (t-test)
- iv) Analysis of Variance (ANOVA)

##### i) Arithmetic Mean

It is the most widely used measure for representing entire data by one value. It is the centre of gravity in a distribution and is useful for further statistical interpretation.

$$\text{Arithmetic Mean } \bar{X} = A + \frac{\sum fd}{N} \times C$$

$\bar{X}$	=	Mean
A	=	Assumed mean
f	=	Frequency of each class interval
d	=	Deviation of scores from the assumed mean
N	=	Total frequency
C	=	Class interval of the frequency distribution

## ii) Standard Deviation

It measures absolute dispersion. The greater amount of variability greater the standard deviation. It reveals high degree of uniformity of observation.

$$\text{Standard Deviation } \sigma = \sqrt{\frac{\sum fd^2}{N} - \left(\frac{\sum fd}{N}\right)^2} \times C$$

$\sigma$	=	Standard deviation
C	=	Class Interval
d	=	Deviation of scores from the assumed mean.
$d^2$	=	square of deviation of score from the assumed mean
f	=	Frequency of each class.

**iii) t-test (test of significance)**

It is used for finding significant level of difference between two groups of population. From the mean and standard deviation '+' value can be calculated.

The t-test is calculated using the formula

$$t = \frac{M_1 - M_2}{\sqrt{\frac{\sigma_1^2}{N_1} + \frac{\sigma_2^2}{N_2}}}$$

Where,  $M_1$  = Mean of the first sample

$M_2$  = Mean of the second sample

$\sigma_1$  = Standard deviation of the first sample

$\sigma_2$  = Standard deviation of the second sample

$N_1$  = Total number of frequency of first sample

$N_2$  = Total number of frequency of second sample

**iv) Analysis of variance (ANOVA)**

To find out whether there is any significant difference between the mean of random samples we use the 't' test. The analysis of variance is good when

there is any significant difference between more than three groups. This is calculated by the F-distribution of samples.

$$F\text{-ratio} = \frac{\text{Mean square variance between groups}}{\text{Mean square variance within groups}}$$

Where,  $F = \frac{V_b}{V_w}$

Here,  $V_b = V_t - V_w$

$V_b$  – Means square variance between groups

$V_w$  – Means square variance within groups.

$V_t$  – Means square variance of total groups

**v) Scheffe's procedure**

Significance obtained as the results of ANOVA, does not point out which of the three groups differ among themselves. In such cases, the comparison of the differences between means for any two groups is done using Scheffe's procedure (Scheffe's 1957). Scheffe's test is one of the well known multiple group comparison tests.

## **CHAPTER IV**

# **ANALYSIS AND INTERPRETATION OF DATA**

- Introduction
- Percentage wise Analysis
- Differential Analysis
- Tenability of Hypotheses

## **CHAPTER: IV**

# **ANALYSIS AND INTERPRETATION OF DATA**

Analysis and interpretation are basic components of research process. The data collected are to be discussed at length. “Analysis” of data implies studying tabulated material in order to determine inherent facts or meanings. It involves breaking down existing complex factors to simple parts, and putting the parts together in new arrangement for the purpose of interpretation.

Interpretation is the vital step in the total procedure of research, calls for the critical examination of the results of analysis in the light of all the limitations of data gathering. Interpretation is the search for broader meaning of research findings. Only through interpretation the researcher can expose the abstract principle that works beneath the findings.

According to Fransis Russels (1985), “The analysis and interpretation of the data involves the objective material in the possession of the researcher and his subjective reaction, and desires to desire for the data, the inherence meanings in their relation to the problem.

The data collected from 400 (four hundred) high school students were subjected to different types of statistical techniques like arithmetic mean, standard deviation, t-test and ANOVA. The details of analysis are presented in this chapter.

# **TEST OF SIGNIFICANCE FOR DIFFERENCE BETWEEN MEANS OF DIFFERENT GROUPS**

## **ATTITUDE OF HIGH SCHOOL STUDENTS TOWARDS COMPUTER BASED LEARNING IN SCIENCE**

### **1. Attitude of total sample towards computer based learning in science.**

The statistical values such as arithmetic mean and standard deviation of the attitude scores of 400 high school students are shown in the following table.

**Table: 4.1**

#### **Arithmetic mean and standard deviation of the total sample**

<b>SI. No</b>	<b>Category</b>	<b>N</b>	<b>Arithmetic Mean</b>	<b>Standard Deviation</b>
1	Total Sample	400	143.36	21.82

The arithmetic mean was found to be 143.36. The value obtained for standard deviation is 21.82. This value shows that there is a scattering of scores from the mean score. Hence the students have favorable attitude towards computer based learning in science.

## PERCENTAGE WISE ANALYSIS

**Table: 4.2**

**Percentage wise distribution of different levels of Attitude towards  
computer based learning in science**

<b>Attitude</b>	<b>Count</b>	<b>Percent</b>
Low	72	18.00
Medium	259	64.75
High	69	17.25
<b>Total</b>	<b>400</b>	<b>100.00</b>

From the above table, it is evident that, out of 400 high school students, 18.00% of high school students have low attitude, 64.75% of high school students have medium attitude and 17.25% high school students have high attitude towards computer based learning in science.

## DIFFREENTIAL ANALYSIS

**Comparison of attitude scores of various groups towards computer based learning in science.**

Students with regard to their background variables are compared using t-test and ANOVA.



**1. Gender wise comparison of students in their attitude towards computer based learning in science.**

**Null hypothesis: 1**

There exists no significant difference in the mean scores of male and female high school students in their attitude towards computer based learning in science.

Male and female students have been subjected for study as per the analysis given in the table.

**Table: 4.3**

**Comparison of Attitude of high school students based on Gender**

<b>Gender</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>	<b>t</b>	<b>p</b>	<b>Remark</b>
Male	140.87	20.64	178	2.07	0.039	Sig. at 0.05 level
Female	145.36	22.56	222			

The calculated value ( $t = 2.07$ ;  $p < 0.05$ ) is significant at 0.05 level. Therefore the null hypothesis-1 is rejected. The attitude of high school students towards computer based learning in science statistically differ with respect to gender. The mean value (145.36) shows that female students possess more favorable attitude than male students towards computer based learning in science.

## 2. Comparison of attitude towards computer based learning in science based on locality.

### Null hypothesis: 2

There exists no significant difference in the mean scores of rural and urban high school students in their attitude towards computer based learning in science.

Rural and urban area students have been subjected for study as per the analysis given in the table.

**Table: 4.4**

### Comparison of Attitude of high school students based on Locality

Locality	Mean	SD	N	t	p	Remark
Rural	146.96	21.42	235	4.01	0.000	Sig. at 0.01 level
Urban	138.24	21.41	165			

The calculated value ( $t = 4.01$ ;  $p < 0.01$ ) is significant at 0.01 level. Therefore the null hypothesis-2 two is rejected. The attitude of high school students towards computer based learning in science statistically differ with respect to the locality. The mean value (146.96) shows that rural students possess more favorable attitude than that of urban students towards computer based learning in science.

### 3. Comparison of attitude towards computer based learning in science based on religion

#### Null hypothesis: 3

There exists no significant difference in the mean scores among Hindu, Christian and Muslim high school students in their attitude towards computer based learning in science.

Hindu, Christian and Muslim religion students have been subjected for study as per the analysis given in the table.

**Table: 4.5**

#### Comparison of Attitude of high school students based on Religion

Religion	Mean	SD	Source	Sum of Squares	df	Mean Square	F	p	Remark
Hindu	144.14	20.56	Between Gp	4512.93	2	2256.47	4.83	0.008	Sig. at 0.01 level
Christian	144.75	22.41	Within Gp	185373.51	397	466.94			
Muslim	132.72	23.63	Total	189886.44	399				

The calculated value ( $F = 4.83$ ;  $p < 0.01$ ) is significant at 0.01 level. Therefore the null hypothesis-3 is rejected. It showed that there existed significant difference between students based on various religions in their attitude towards computer based learning in science.

The result does not help to identify exactly the pairs of groups which differ significantly. Hence Scheffe's multiple comparison is used for further analysis.

**Table: 4.6**

**Result of Scheffe's procedure based on various religion**

<b>Religion</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>	<b>Pair</b>	<b>Scheffe's p</b>	<b>Remark</b>
Hindu (A)	144.14	20.56	201	A Vs B	0.965	NS
Christian (B)	144.75	22.41	163	B Vs C	0.011	Sig. at 0.05 level
Muslim (C)	132.72	23.63	36	A Vs C	0.015	Sig. at 0.05 level

The result showed that the first pair Hindu and Christian (A Vs B) do not significantly differ in their attitude towards computer based learning in science. The other two pairs Christian and Muslim (B Vs C), Hindu and Muslim (A Vs C), significantly differ at 0.05 level in their attitude towards computer based learning in science. The mean value (144.75) shows that Christian students possess more favorable attitude towards computer based learning in science compared to that of Hindu and Muslim religious students.

#### 4. Comparison of students attitude towards computer based learning in science based on community

##### Null hypothesis: 4

There exists no significant difference in the mean scores of attitude of high school students towards computer based learning in science based on community.

Students of various communities such as FC, OBC, SC/ST have been subjected for study as per the analysis given in the table.

**Table: 4.7**

#### Comparison of Attitude towards computer based learning in science based on Community

Community	Mean	SD	Source	Sum of Squares	df	Mean Square	F	p	Remark
FC	146.4	22.97	Between Gp	769.6	2	384.81	0.81	0.447	NS
OBC	142.87	21.54	Within Gp	189116.8	397	476.36			
SC/ST	142.11	21.84	Total	189886.4	399				

The calculated value ( $F = 0.81$ ;  $p > 0.05$ ) is not significant at any level. Therefore the null hypothesis-4 is accepted. It showed that the attitude of high school students towards computer based learning in science based on community does not statistically differ at any level.

## 5. Comparison of students attitude towards computer based learning in science based on type of school

### Null hypothesis: 5

There exists no significant difference in the mean scores of attitude of high school students towards computer based learning in science based on type of school.

Govt and Aided school students have been subjected for study as per the analysis given in the table.

**Table: 4.8**

### Comparison of Attitude towards computer based learning in science based on type of School

Type of School	Mean	SD	N	t	p	Remark
Govt	140.16	22.00	204	3.03	0.003	Sig. at 0.01 level
Aided	146.69	21.16	196			

The calculated value ( $t = 3.03$ ;  $p < 0.01$ ) is significant at 0.01 level. Therefore the null hypothesis-5 is rejected. The attitude of high school students towards computer based learning in science statistically differ with respect to type of school. The mean value (146.69) shows that aided school students possess more favorable attitude than that of government school students towards computer based learning in science.

**6. Comparison of students attitude towards computer based learning in science based on parental qualification.**

**Null hypothesis: 6**

There exists no significant difference in the mean scores of attitude of high school students towards computer based learning in science based on educational qualification of parents.

Three groups of high school students based on their parent's educational qualification have been subjected for study as per the analysis given in the table.

**Table: 4.9**

**Comparison of Attitude towards computer based learning in science based on parental qualification**

Qualification of Parents	Mean	SD	Source	Sum of Squares	df	Mean Square	F	p	Remark
Up to Hr.Sec	141.91	19.8	Between Gp	5943.37	2	2971.69	6.41	0.002	Sig. at 0.01 level
UG	143.07	23.6	Within Gp	183943	397	463.33			
PG	155.91	28.27	Total	189886	399				

The calculated value ( $F = 6.41$ ;  $p < 0.01$ ) is significant at 0.01 level.

Therefore the null hypothesis-6 is rejected. It showed that there existed

significant difference in the attitude of high school students towards computer based learning in science based on educational qualification of parents.

The result does not help to identify exactly the pairs of groups which differ significantly. Hence Scheffe's multiple comparison is used for further analysis.

**Table: 4.10**

**Result of Scheffe's procedure for the sub-variable parental qualification**

<b>Qualification of Parents</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>	<b>Pair</b>	<b>Scheffe's p</b>	<b>Remark</b>
Up to Hr.Sec (A)	141.91	19.8	275	A Vs B	0.906	NS
UG (B)	143.07	23.6	91	B Vs C	0.013	Sig. at 0.05 level
PG (C)	155.91	28.27	34	A Vs C	0.002	Sig. at 0.01 level

The result showed that the pair up to Hr.Sec and under graduate (A Vs B) does not significantly differ in their attitude towards computer based learning in science. The other two pairs under graduate and post graduate (B Vs C), Hr.Sec and post graduate (A Vs C), significantly differ in their attitude towards computer based learning in science. The mean value (155.91) shows that students whose parental qualification post graduate possess more favorable attitude towards computer based learning in science than other two groups of students.



**7. Comparison of students attitude towards computer based learning in science based on occupational status of parents**

**Null hypothesis: 7**

There exists no significant difference in the mean scores of attitude of high school students towards computer based learning in science based on occupational status of parents.

Four groups of high school students based on their parent's occupational status have been subjected for study as per the analysis given in the table.

**Table: 4.11**

**Comparison of attitude towards CBLs based on occupation status of parents**

Occupation of Parents	Mean	SD	Source	Sum of Squares	df	Mean Square	F	p	Remark
Govt	143.84	24.5	Between Gp	7031.37	3	2343.79	5.08	0.00	Sig. at 0.01 level
Private	130.7	22.5	Within Gp	182855	396	461.76			
Business	139	22.38	Total	189886	399				
Others	145.3	20.68							

The calculated value ( $F = 5.08$ ;  $p < 0.01$ ) is significant at 0.01 level. Therefore the null hypothesis-7 is rejected. The attitude high school students towards computer based learning in science statistically differ with respect to their parent's occupational status.

The result does not help to identify exactly the pairs of groups which differ significantly. Hence Scheffe's multiple comparison is used for further analysis.

**Table: 4.12**

**Result of Scheffe's procedure towards CBLS based on occupational status of parents**

<b>Occupation of Parents</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>	<b>Pair</b>	<b>Scheffe's p</b>	<b>Remark</b>
Govt (A)	143.84	24.5	50	A Vs B	0.061	NS
Private (B)	130.7	22.5	33	B Vs C	0.470	NS
Business (C)	139	22.38	35	A Vs C	0.791	NS
Others (D)	145.3	20.68	282	A Vs D	0.978	NS
				B Vs D	0.004	Sig. at 0.01 level
				C Vs D	0.445	NS

The result showed that the pairs govt and private (A Vs B), private and business (B Vs C), govt and business (A Vs C), govt and others (A Vs D) and business and others (C Vs D) do not significantly differ in their attitude towards computer based learning in science. The pair private and others (BVSD) significantly differ at 0.01 level in their attitude towards computer based learning in science. The mean value (145.3) shows that students based on parental occupation status other than govt, private and bussiness posses more favorable attitude towards computer based learning in science.

## 8. Comparison of students attitude towards computer based learning in science based on occupational status of parents

### Null hypothesis: 8

There exists no significant difference in the mean scores of attitude of high school students towards computer based learning in science based on type of family.

Two groups of students based on type of family have been subjected for study as per the analysis given in the table.

**Table: 4.13**

### Comparison of attitude towards CBLS based on type of family

Type of Family	Mean	SD	N	t	p	Remark
Joint	139.33	22.22	43	1.26	0.21	NS
Nuclear	143.85	21.75	357			

The calculated value ( $t = 1.26$ ;  $p = 0.21$ ) is not significant at any level. Therefore the null hypothesis-8 is accepted. It showed that the attitude of high school students towards computer based learning in science does not statistically differ with respect to type of family.

## **TENABILITY OF HYPOTHESES**

1. The first null hypothesis, “There exists no significant difference in the mean scores of male and female high school students in their attitude towards Computer Based Learning in Science (CBLIS)” is rejected.
2. The second null hypothesis, “There exists no significant difference in the mean scores of rural and urban high school students in their attitude towards Computer Based Learning in Science” is rejected.
3. The third null hypothesis, “There exists no significant difference in the mean scores among Hindu, Christian and Muslim religion high school students in their attitude towards Computer Based Learning in Science” is rejected.
4. The fourth null hypothesis, “There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on community” is accepted.
5. The fifth null hypothesis, “There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on type of school” is rejected.
6. The sixth null hypothesis, “There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on educational qualification of parents” is rejected.

7. The seventh null hypothesis, “There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on occupational status of parents” is rejected.
8. The eighth null hypothesis, “There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on type of family” is accepted.

## **CHAPTER- V**

# **FINDINGS, CONCLUSION AND SUGGESTIONS**

- The study in Retrospect
- Findings
- Conclusions
- Educational Implications
- Suggestions for further research

## **CHAPTER- V**

# **FINDINGS, CONCLUSION AND SUGGESTIONS**

### **THE STUDY IN RETROSPECT**

In this chapter the investigator made an attempt to summarize all the findings and conclusions drawn from the present investigation. Educational implication of the study and suggestion for further research are also included.

### **STATEMENT OF THE PROBLEM**

The purpose of the study was to examine the attitude of high school students towards computer based science learning and is entitled as “**Attitude of High School Students towards Computer Based Learning In Science**”.

### **OBJECTIVES OF THE STUDY**

4. To construct and validate a Computer Based Learning in Science (CBLS) scale to measure the attitude of high school students towards Computer Based Learning in Science.
5. To study the level of attitude of high school students towards Computer Based Learning in Science.
6. To find out the significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science with respect to the background variable namely

9. Gender
10. Locality
11. Religion
12. Community
13. Type of school
14. Educational qualification of parents
15. Occupational status of parents
16. Type of family.

## **HYPOTHESES**

9. There exists no significant difference in the mean scores of male and female high school students in their attitude towards Computer Based Learning in Science (CBLs).
10. There exists no significant difference in the mean scores of rural and urban high school students in their attitude towards Computer Based Learning in Science.
11. There exists no significant difference in the mean scores among Hindu, Christian and Muslim religion high school students in their attitude towards Computer Based Learning in Science.
12. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on community.



13. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on type of school.
14. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on educational qualification of parents.
15. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on occupational status of parents.
16. There exists no significant difference in the mean scores of attitude of high school students towards Computer Based Learning in Science based on type of family.

## **METHODOLOGY IN BRIEF**

### **Method**

The method adopted by the investigator for the present study was Normative Survey Method.

### **Sample**

The sample selected for the study was 400 high school students studying in different schools of Kanyakumari district. The sample selected for the investigation differ in their gender, locality, religion, community, type of school, educational qualification of parents, occupational status of parents, type of family.

## **Tools used**

3. The tool used for the collection of data were Computer Based Learning in Science attitude scale constructed and validated by the investigator (Subin I Bose & Mr. Gireesh Kumar (2014))
4. General information sheet prepared by the investigator.

## **Statistical Techniques Used**

The major statistical techniques applied for the investigation were

5. Mean
6. Standard Deviation
7. t-test (test of significance)
8. ANOVA (analysis of variance)

## **MAJOR FINDINGS**

The Findings emerged from the analysis of data collected are summarized below.

1. Majority of the high school students have slightly favorable attitude towards computer based learning in science.
2. Gender has significant difference on the attitude towards computer based learning in science. Female students (mean=145.36) possess favorable attitude than male students towards computer based learning

in science. The finding is supported by the obtained result ( $t = 2.07$ ;  $p < 0.05$ ) significant at 0.05 level.

3. Locality has significant difference on the attitude towards computer based learning in science. Rural students (mean=146.96) possess favorable attitude than urban students towards computer based learning in science. The finding is supported by the obtained result ( $t = 4.01$ ;  $p < 0.01$ ) significant at 0.01 level.
4. Religion has significant difference on the attitude towards computer based learning in science. Christian students (mean=144.75) possess favorable attitude than Hindu and Muslim religion students towards computer based learning in science. The finding is supported by the obtained result ( $F = 4.83$ ;  $p < 0.01$ ) significant at 0.01 level.
5. Community has no significant difference on the attitude towards computer based learning in science. The finding is supported by the obtained result ( $F = 0.81$ ;  $p > 0.05$ ) not significant at any level.
6. Type of school has significant difference on the attitude towards computer based learning in science. Aided school students (mean=146.69) possess favorable attitude than government and private school students towards computer based learning in science. The finding is supported by the obtained result ( $t = 3.03$ ;  $p < 0.01$ ) significant at 0.01 level.

7. Three groups of high school students based on their parents educational qualification shows significant difference on their attitude towards computer based learning in science. The high school students based on parental qualification is post graduation (mean = 155.91) possess more favorable attitude than the students on parental qualification is up-to Hr.Sec and undergraduate towards computer based learning in science. The finding is supported by the obtained result ( $F=6.41$ ;  $p<0.01$ ) which is significant at 0.01 level.
8. Three group of high school students based on their parents occupational status shows significant difference on their attitude towards computer based learning in science. The high school students based on parental occupational status in others occupation (mean=145.3) possesses more favorable attitude than the students based on occupational status of parents such as government, non-government and business towards computer based learning in science. This finding is supported by the obtained result ( $F=5.08$  and  $p<0.01$ ) which is significant at 0.01 level.
9. Student based on type of family do no significantly differ on attitude towards computer based learning in science. The finding is supported by the obtained result ( $t=1.26$ ;  $p > 0.05$ ) not significant at any level.

## **CONCLUSION**

1. In this study, it is concluded that majority of high school students possess slightly favorable attitude towards computer based learning in science.
2. The study revealed that gender, locality, religion, type of school, educational qualification of parents, and occupation status of parents have significant influence in the attitude of high school students towards computer based learning in science.
3. Community and type of family have not significantly influenced in the attitude of high school students towards computer based learning in science.
4. Female students and the rural area students possess favorable attitude towards computer based learning in science than the male and urban area students.

## **EDUCATIONAL IMPLICATION OF THE STUDY**

1. The present investigation has helped to develop an instrument for measuring the attitude of high school students towards computer based learning in science.
2. The findings of the study helped to develop a positive and stimulating attitude among high school students towards computer based learning in science.

3. This study mentioned the responsibility of the authorities to take necessary steps to use proper technologies in learning process.
4. To boost the attitude among high school students towards computer based learning new innovative technologies should be materialized.

## **SUGGESTIONS FOR FURTHER RESEARCH**

To fulfill the present study meaningful and effectiveness, similar studies should be conduct in this area. The desirable areas of further research are following.

1. The present study has no dimensions. So further studies can be conducted including more aspects of dimension wise questions.
2. The present study is only finding the attitude of high school students' further studies can be conduct to find out the effectiveness of computer based learning in science and also in other disciplines.
3. The present study was conducted on a sample of four hundred samples from only one district. Further studies should be conducted by selecting more samples by including more districts.
4. The study can be conducted by selecting more variables and by applying more statistical techniques.
5. This study can be applied to higher level of education to know the awareness and attitude of technology in teaching-learning process.

The finding and implications of the study help to understanding the attitude towards computer based learning in science of different high school students in current set up. Even though there are many limitations in the present investigation, the study helps to the educationalists, psychologists and sociologists for understanding the current situation of our high school education system and helps then for further investigation and takes necessary steps to improve the education system.

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# **APPENDICES**

# **N.V.K.S.D. COLLEGE OF EDUCATION**

ATTOOR – 629191

## **GENERAL DATA SHEET**

### **Instruction**

Certain personal matters related to you are required for my research purpose. Kindly write below or put a tick mark (✓) whenever necessary. Your response will be kept confidential.

1. Name of Student :
2. Name of School :
3. Gender : Male / Female
4. Locality : Rural / Urban
5. Religion : Hindu / Christian / Muslim
6. Community : FC / OBC / SC / ST
7. Type of school : Govt. / Aided / Pvt.
8. Educational qualification  
of Parents : Up to Hr. Sec / Degree / P.G
9. Occupation Status of Parents : Govt. / Pvt. / Business / Others
10. Type of family : Joint / Nuclear

## Appendix - B

# ATTITUDE SCALE

For  
COMPUTER BASED SCIENCE LEARNING

(Prepared by Subin I Bose and K. Gireesh Kumar)

(2013-2014)

**(Draft Form)**

### Introduction

Certain statements related to Computer based science learning are given below. Read carefully and put a tick mark (✓) against **Strongly Agree (SA)** / **Agree (A)** / **Undecided (UD)** / **Disagree (DA)** / **Strongly Disagree (SDA)**. Attend all statements without any omission. Your response will be kept confidential and used only for research purposes.

Sl. No	STATMENTS	SA	A	UD	DA	SDA
1	Learning through computer increases the quality of science learning.					
2	Computer is not suitable for learning all the scientific aspects.					
3	Interpretation of scientific data is easy through computer based learning.					
4	Computer based science learning is very costly.					
5	Self learning is improved through computer based science learning.					
6	Creative thinking is reduced through computer based science learning.					
7	Learning through computer is easy to understand than learning through traditional way.					
8	Computer cannot store scientific data easily and quickly.					
9	Tables can be easily drawn through computer.					
10	Science learning through computer is a time consuming process.					
11	Learning through computer enhances effective science learning.					



Sl. No	STATMENTS	SA	A	UD	DA	SDA
12	Practical knowledge of scientific principles cannot be developed through computer based learning.					
13	The symbols of physical components are clearly identified using computer.					
14	Critical thinking is not developed through computer based science learning.					
15	Science learning through computer creates pleasure among learners.					
16	Science subjects cannot be perfectly learned through computer.					
17	Computer based science learning motivates students to change their life style.					
18	The total aspects of scientific principles cannot be learned through computer.					
19	Newton's third law of motion can be easily understood with computer.					
20	Micro bacterial aspects cannot be easily learned through computer.					
21	The working principle of a generator can be easily understood by computer.					
22	Solar system cannot be presented through computer.					
23	The movement of electrons in orbit is easily understood by using computer.					
24	Computer based science learning affect teacher-student relationship.					
25	Science projects can be easily prepared through computer.					
26	Nuclear fission cannot be understood by using computer.					
27	Science subjects can be studied in a wide range through computer.					
28	Process skill cannot be developing through computer based learning.					
29	Wrong interpretation about scientific principles can be cleared through computer based learning.					
30	The chemical bonding cannot be studied perfectly using computer.					
31	Computer supported software is very helpful in science learning.					
32	Computer based science learning is not highly interactive.					

Sl. No	STATEMENTS	SA	A	UD	DA	SDA
33	The mental stress is reduced through computer based science learning.					
34	Problem solving ability cannot be developed through computer based learning.					
35	Technical skills are developed through computer based science learning.					
36	Teacher has minimum role in computer based science learning.					
37	Scientific aptitude can be exposed through computer based learning.					
38	Computer is not relevant in learning science concepts.					
39	Scientific issues can be easily identified through computer based learning.					
40	Computer gives wrong scientific interpretation.					
41	Computer based science learning provide opportunity to engage in investigation.					
42	Graphical interpretation cannot be easily learned through computer.					
43	Slow learners can easily understand the scientific formulas through computer based learning.					
44	Comparative study is not applicable in computer based science learning.					
45	Manipulation ability is developed through computer based science learning.					
46	Computer based learning affects class organization and time management.					
47	Computer based science learning helps to score high marks in examination.					
48	Divergent thinking not occurs through computer based science learning.					
49	The doubts about scientific facts can be immediately clarified using computer based learning.					
50	Chain reaction is difficult to drawn through computer.					
51	Computer based science learning develops curiosity towards environmental studies.					
52	Principles of scientific working models cannot be learned easily though computer.					
53	Recalling capacity of students is increase through computer based science learning.					

<b>Sl. No</b>	<b>STATMENTS</b>	<b>SA</b>	<b>A</b>	<b>UD</b>	<b>DA</b>	<b>SDA</b>
54	Computer cannot be a substitute for effective science teaching.					
55	Virtual experiments can be easily experienced through computer based science learning.					
56	The various types of food chain cannot be easily learned though computer based learning.					
57	Rote learning is avoided through computer based learning.					
58	Computer based science learning reduces the laboratory skills of students.					
59	Direct experience of scientific principles is possible through computer based learning.					
60	Communication skill is reduced through computer based science learning.					

**ATTITUDE SCALE**  
For  
**COMPUTER BASED SCIENCE LEARNING**

(Prepared by Subin I Bose and K. Gireesh Kumar)  
(2013-2014)

**(Final Form)**

**Introduction**

Certain statements related to Computer based science learning are given below. Read carefully and put a tick mark (✓) against **Strongly Agree (SA)** / **Agree (A)** / **Undecided (UD)** / **Disagree (DA)** / **Strongly Disagree (SDA)**. Attend all statements without any omission. Your response will be kept confidential and used only for research purposes.

Sl. No	STATEMENTS	SA	A	UD	DA	SDA
1	Computer is not suitable for learning all the scientific aspects.					
2	Computer cannot store scientific data easily and quickly.					
3	Science learning through computer is a time consuming process.					
4	Practical knowledge of scientific principles cannot be developed through computer based learning.					
5	The symbols of physical components are clearly identified using computer.					
6	Critical thinking is not developed through computer based science learning.					
7	Science subjects cannot be perfectly learned through computer.					
8	The total aspects of scientific principles cannot be learned through computer.					
9	Newton's third law of motion can be easily understood with computer.					
10	Micro bacterial aspects cannot be easily learned through computer.					

Sl. No	STATMENTS	SA	A	UD	DA	SDA
11	Solar system cannot be presented through computer.					
12	The movement of electrons in orbit is easily understood by using computer.					
13	Nuclear fission cannot be understood by using computer.					
14	Science subjects can be studied in a wide range through computer.					
15	Process skill cannot be developing through computer based learning.					
16	Wrong interpretation about scientific principles can be cleared through computer based learning.					
17	The chemical bonding cannot be studied perfectly using computer.					
18	Computer supported software is very helpful in science learning.					
19	Computer based science learning is not highly interactive.					
20	The mental stress is reduced through computer based science learning.					
21	Problem solving ability cannot be developed through computer based learning.					
22	Technical skills are developed through computer based science learning.					
23	Scientific aptitude can be exposed through computer based learning.					
24	Computer is not relevant in learning science concepts.					
25	Scientific issues can be easily identified through computer based learning.					
26	Computer gives wrong scientific interpretation.					
27	Computer based science learning provide opportunity to engage in investigation.					
28	Graphical interpretation cannot be easily learned through computer.					
29	Comparative study is not applicable in computer based science learning.					
30	Manipulation ability is developed through computer based science learning.					
31	Computer based learning affects class organization and time management.					

<b>Sl. No</b>	<b>STATMENTS</b>	<b>SA</b>	<b>A</b>	<b>UD</b>	<b>DA</b>	<b>SDA</b>
32	Divergent thinking not occurs through computer based science learning.					
33	The doubts about scientific facts can be immediately clarified using computer based learning.					
34	Chain reaction is difficult to drawn through computer.					
35	Computer based science learning develops curiosity towards environmental studies.					
36	Principles of scientific working models cannot be learned easily though computer.					
37	Virtual experiments can be easily experienced through computer based science learning.					
38	The various types of food chain cannot be easily learned though computer based learning.					
39	Rote learning is avoided through computer based learning.					
40	Computer based science learning reduces the laboratory skills of students.					
41	Direct experience of scientific principles is possible through computer based learning.					
42	Communication skill is reduced through computer based science learning.					