CHAPTER - I
CHAPTER I
INTRODUCTION

1.1 INTRODUCTION

Around the globe, in both developed and developing countries, science education has become a very important field. In an era of science and technology our country can face the challenges of science only by making necessary provision for science education. Ninety percentage of eligible students in India do not have access to higher education. The government spends a minuscule of 0.5 percent of GNP (Gross National Product) in this field. The Indian National Science Academy requested the Government to take a fresh look at the country's science and technology system. Learning of science is viewed as possessing knowledge of facts about science and making its use in daily life. Educationists view of learning science is for the improvement in the quality of life, (i.e.) to provide better health, improved agricultural production, efficient food preservation, faster means of communication through exploitation of energy resources, better quality of clothing, dependable housing and so on. Educationists try to get a close relationship between science learning and the society. At times the demand is to have a close relationship between science learning, ethical and moral values and the existing set up of any society. With all aspects in the back ground, learning science has to be made relevant and flexible keeping in view of the students and environment they live in.

Teaching-learning process in science class room is mainly focused on the formation of concepts with an understanding of theories and principles of curriculum. The National Policy on Education (1986) has emphasized the need for change in the teacher's outlook of teaching and dissemination of instruction. It is also emphasized on the necessity of identifying the problems of the students and for planning the learning activities using the innovative methods for effective dissemination of instruction.
The most important and crucial stage of school education is the higher secondary level in India. It is the transition level from a generalization curriculum to a discipline based curriculum. Professional courses like Medicine, Engineering and Computer Science are based on optional subjects taken in the higher secondary level. In science subjects, especially Physics has unique place for getting into professional courses. Also Physics is the most essential subject in standard XI and standard XII and it determines the future of the younger generation. Optimum level of students who are studying in higher secondary schools in Erode District have the learning impediments in Physics. Hence the learning impediments of the students in Physics must be identified and eliminated through remedial measures.

1.2 ROLE OF EDUCATION

The challenges of the forthcoming century will be enormous and exorbitant. To welcome the 21st century, developments of human resources in all spheres of life are highly important and indispensable. Education plays an important role in development of human resources. Education is regarded as the transmission of values and accumulated knowledge of a society. It is the process of developing all round personality of an individual. Education seems to help in development of nation in two ways. First to enhance the stability of society by working towards economic growth and individual development. The second is to work towards the structural transformation of the society. The meaning of education is given as bringing up the inherent potentialities in a pupil.

1.3 SCIENCE EDUCATION

Science living in the present world invariably warrants to variable degrees, knowledge of scientific facts and law. Science has now become everyday science for everybody. Teaching of everyday science, everybody has become unavoidable part of general education. It is both a body of knowledge and process of acquiring
it (Frederic, 1960). It concerns with the fundamental knowledge of universe, the world and its environment. The scientific process combines aim of doing to the aim of understanding what is done.

In India there has been a remarkable change during the last 10 to 15 years in the perception of science and science education. Science has played a vital role in every sphere of human endeavor. It has been realized that in order to live in a science technology based society every student should study science. This has been stressed in the reports of all the education commission set up by the government of India and also in the National Policy on Education (1986). On the basis of these recommendations, the science curriculum at all the levels of school education has been redesigned so as to develop creation abilities in the cognitive, affective and psychomotor domains. To achieve the desired goals of science teaching, it is necessary to implement the science curriculum effectively. For this, we must analyse the drawbacks of science teaching in the past and apply the lessons learnt from them.

The important recommendations of the National Policy on Education (1986) in regard to science education in general are as follows: Science education should develop well-defined abilities and values such as the spirit of inquiry, creativity, objectivity, the coverage to question and aesthetic sensibility. The facts, methods and practices of science should be used as tools for attaining these abilities and values.

Science education programmes should enable the student to acquire problem solving and decision making skills and to discover the relationship of science with health, agriculture, industry and other aspects of daily life. Every effort should be made to extend science education to the vast numbers who have remained out side the pale of formal education.
Children with special talent or aptitude should be provided opportunities to proceed to a faster pace by making good quality education available to them irrespective of their capacity to play for it.

Educational technology should be employed in the speed of useful information for the training and retaining of teachers to improve quality. Also the National Policy on Education (1986) places complete trust in the teaching community. It calls for a substantial improvement in quality of teacher education. The policy also emphasis the teacher's accountability to the pupils, to their parents, to the community and to their own profession. The need for the teacher training arises from several sources such as the changing national goals, revision of school curriculum, additional inputs in the teaching learning system, inadequate background of teachers etc.

Further the National Policy on Education (1986) has emphasized the child centered and activity based learning approach to the transaction of the curriculum which requires greater participation of the pupils in the teaching learning process. Thus there has been a categorical departure from the practice of teaching in which the pupils remain passive listeners.

1.4 SCIENCE EDUCATION IN SCHOOL CURRICULUM

Science, it is said, speaks to the mind. Science education, on the other hand, ought to speak to mind as well as to the flesh (hand). In the universe there are innumerable things with different properties. We acquire some knowledge about each of them by observations and experiments. All knowledge thus accumulated is arranged and classified in a rational way, like putting things together and grouping them. Knowledge thus systematized is called “science’’.
The knowledge thus gained about the universe is science. But this knowledge is so vast that human mind cannot comprehend it completely. Hence science is divided into different areas like Physics, Chemistry, Biology etc.

In the universe we have different kinds of matter. The parts of investigation are the nature, state, density, melting point, colour, odour, elasticity, conductivity, arrangement of atoms and possible applications etc. The data accumulated is systematically arranged, classified, correlated and explained. Thus the systematic study of science is called as the science of Physics.

1.5 ROLE OF SCIENCE IN HIGHER SECONDARY SCHOOLS

Science has pivotal role in day-today life of every human being. It provides great success for the future generation and ensures to meet the challenges in their way of competitive world. Scientific knowledge and technical skills of the students can pave way to reach the job opportunities and help to compete with the developed countries. To form a strong foundation in science, the future generation has to be addressed with scientific temperament. Hence higher secondary schools are pertinent place to provide interest of scientific thought. The quality of science teaching at higher secondary level has to be improved by upgrading curriculum, developing infrastructure and equipping teachers with modern technology in teaching. The teaching of science at higher secondary stage should promote an ever-deepening understanding of basic principles, develop problem solving and analytical skills and ability to apply them to the problem of the material environment and promote the spirit of enquiry and experimentation.

1.6 EDUCATIONAL POLICIES AND SCIENCE EDUCATION

Shortly after India got independence, the “secondary education commission” was set in 1952, to make suggestions for improving education at the secondary level. The secondary education is the appropriate stage for initiation of
the future intellectual society. The secondary education is the bridge for school education and higher education. Kothari Commission (1964-66) has also rightly recommended "At the secondary level, science is the discipline of mind and preparation of higher education deserves a special emphasis". Simultaneously with efforts made to introduce science as a compulsory subject in the school curriculum, a continuous search was made for outstanding (Pandy, 1991). Later, the National Council for Educational Research and Training (NCERT) was established in 1961 as an autonomous body to assist and advise in implementing the educational policies of the government and to work for all-round improvement of school education in close collaboration with the states and union territories.

In Tamilnadu state, the formal education system is classified into four categories such as primary education (five year schooling), middle school education (eight year schooling), secondary education (ten year schooling), higher secondary education (twelve year schooling) and higher education (degree level, i.e. three years of education and above after higher secondary education). These schools in states are administered by the different government boards or administrative structures. In Tamilnadu, four types of systems are functioning viz, Central Board of Secondary Education (CBSE), State Directorate of Secondary Education, Inspectorate of Matriculation Schools (IMS) and Inspectorate of Anglo Indian Schools (IAIS). The government of India administers the CBSE and others by state government.

1.7 NATIONAL SCIENCE POLICY AND SCIENCE EDUCATION IN SCHOOLS

In most of the countries, the concepts of education was and still is in some cases, the preparation of trained manpower with priority given to secondary and higher level of education and to formal education. Most of the countries in Asia and Pacific has national science policy, usually linking scientific and industrial research with economic development and national goals.
• Efforts should be made to disseminate and popularize science using media such as documentary films, radio, television and popular science journals and magazines.

• The search for scientific talent should be started at the higher secondary school level.

• Efforts should be made to provide facilities for manufacturer of instruments and scientific apparatus required by the schools and colleges.

• Scientists in universities and laboratories should take active part in school science education. They should establish contacts with local educational authorities in advisory capacities.

In India, the science policy resolution, piloted by Jawaharlal Nehru, the first Prime Minister was adopted by parliament in 1958. It recognizes the importance of the study of science and its application not only as means of providing material and cultural amenities and service to every member of the community but as a method of influencing basic human values (United Nations Educational, Scientific and Cultural Organization, UNESCO, 1984). The policy resolution, also, mentioned the wealth and prosperity of a nation, largely depends on the effective utilization of its human and material resources through industrialization. The use of material resources for industrialization demands people’s education in science and training in technical skill (Sing 1993).

1.8 STATE OF ART OF SCIENCE TEACHING IN SCHOOL

The science education in India is more or less the same in all the states in the country. The following key statements regarding the present day status of affairs in science teaching are applicable to the whole country.

Science teaching has been and is still oral in character with demonstration occasionally thrown in. There is a very little practical work up to the secondary
education. The Kothari commission (1964-1966) and National Policy on Education (1986) also reconfirmed the mentioned defects in the secondary education science curriculum.

★ The present curriculum is narrowly conceived.
★ It is bookish and theoretical.
★ It is over crowd without provision of rich and significant contents.
★ It makes an adequate provision for practical and other kinds of activities which should reasonably find room in it, if it is to educate the whole of the personality.
★ It is dominated too much by examination.
★ It does not include technical and vocational subjects which are so necessary for training the students to take part in the industrial and economic development of a country (Marinara Vaidya, 1996).

1.9 OBJECTIVES OF SCIENCE TEACHING

The objectives of science teaching are twofold. One is transmission of theories, facts and principles and the other is to include the young minds into the process of scientific reasoning. Unfortunately, the legacy of our education system is to place emphasis on the transaction and retrieval of information rather than the meta cognitive aspects of learning. The acquisition of content has its own significance but in no way it means complete education. More accumulation of information devoid of algorithm by which the information has been processed will nurture only “School Skills” that determine the student’s success within the school system. It is also to be noted that evaluation of content through set answers to set questions often has the danger of distorting reality in the minds of students. Unless the teacher teaches them the process along with product, the agenda of developing proper human resources remain unsolved.
The present day world especially, the job market demands “real world skills” like decision making and problem solving ability from its work force. Competency in the process of scientific reasoning may help the students in that way.

1.10 OBJECTIVES OF TEACHING PHYSICS AT HIGHER SECONDARY LEVEL

The objectives of teaching Physics at higher secondary stage in the gazette/teacher’s hand book published by the Government of Tamilnadu are as follows:
★ To develop critical thinking.
★ To stimulate the pupils to acquire scientific knowledge.
★ To develop abilities such as collecting data, limitations, classifications etc.
★ To spell out the uses, benefits and limitations of science.
★ To develop an interest in modern technologies to understand the complicated topics in Physics like Modern Physics and Electronics.
★ To acquire scientific knowledge in Modern Physics and Electronics.
★ To develop the habits of concentration, self reliance and discovery.
★ To develop the powers of thinking and recurring.
★ To develop the powers of logical thinking.
★ To enable the students to solve the scientific problems of the day today life.

The instructional objectives of Physics as stated by Srivastava, and Shorrie, (1989) are as follows:
★ To acquire knowledge of terms, facts, concepts, definitions, fundamental laws, principles and process in the field of Physics.
★ To develop an understanding of terms, facts, concepts, definitions, fundamental laws, principles and processes in the field of Physics.
★ To apply the knowledge and understanding of Physics to unfamiliar situations.
★ To develop skill in the practical aspects of handling apparatus, recording observations and drawing diagrams, graphs etc.
★ To appreciate the contributions of Physics to scientific and technological development and human happiness.

★ To develop interest in the world of Physical Science.

★ To develop scientific attitude through the study of Physical Sciences.

1.11 TECHNOLOGY AND EDUCATION

The modern educational system has been increasingly exploiting the science and technology to make the educational process as a pleasant and problem free experience, sacrificing age old teaching apparatus, which monotonously speak to the taught. The accessibility of the scientific technologies has also minimized many of the teaching-learning problems. Thus, the modern educational planners willingly try to bring and use all the modern technologies in educational domain. So, from teaching to testing, the technology is availed to reap the best results. The scientific technology includes audio visual aids, computer, multimedia, internet, intranet, etc.

Recent progress in information technology and the spread of internet have opened a variety of new ways for performing the activities of field concern. Although these developments are slower in business, the education field has speedily migrated towards the working nature. These developments triggered an important shift from the teaching paradigm to the learning paradigm. The slow speed of internet hindered the fast learning environment. The latest trends are making use of increased bandwidths and integrating various media to enhance learning.

1.12 THE ROLE OF TECHNOLOGY IN EDUCATION

Technology offers new instructional options for students and means for achieving transformations in which educational reformers advocate. There are several constrains in connection with the implementation and outcomes of
technology in educational settings. The pace of the technologies in educational setting has dramatically been accelerated during the past decade. The combination of computation, connectivity, visual and multimedia capacities, miniaturization and speed has radically changed the potential for technologies in schooling. These developments are now making it possible for technologies to be designed and deployed to produce powerful and linked technologies that can substantially address some of the core problems of education. Technology makes learning easier, more efficient and more motivating.

1.13 EDUCATIONAL TECHNOLOGY

Technology refers to the techniques as also the technical contrivances. A systematic way of applying the techniques to achieve an objective is as important as the use of technical equipment for the same. As a matter of fact, techniques are reckoned as the software and the equipment as the hardware of technology. Technology results in new designs and devices as also new ideas and processes. Each new physical device is accompanied by a new set of procedures and techniques. For example, the development of telephone has led to phone books, answering machines, fax, telephone shopping, etc. The 'hard' component (physical device) may be differentiated from the 'soft' component (methodologies) for the purpose of study.

Education, the act of process of acquiring and imparting knowledge, is crucial to the development of a learner with a view to his / her participation in the transformation of the world for a better tomorrow. Learning and understanding are basic to the definition of education. Educational technology is not a simple combination of these two words. It is usually thought of even more than the sum of the following two interpretations: i) Technology in education ii) Technology of education
Early developments referred to the role of technology in education which signifies the use of equipment, i.e., hardware in educational processes. Later developments recognize the concept of technology of education, i.e., techniques and methodologies of the learning process. This is indeed the software aspect of educational technology. The origin of software is closely associated with the courseware, i.e., instructional design and development of a subject. Use of technology in education results in increased effectiveness of the educational process. Use of technology in training results in increased productivity through enhanced human capability.

Audiovisuals have been on the move, for quite some time now. They have made an impact in many different situations, e.g. seminars, conferences, extension lectures, meetings, research and project report presentations. Classrooms are also beginning to feel their influence.

1.14 EDUCATIONAL TECHNOLOGY IN SCIENCE TEACHING

Educational technology is a systematic way of designing, carrying out and evaluating the total process of learning and teaching in terms of specific objectives and employing a combination of human and technical resources to bring about more effective instruction. The role of educational technology in the training of science-teachers is imperative, it has been a broad definition of educational technology which transcends media and devices such as television, films, overhead projectors, programmed learning materials, computers and other items of hardware and software. In other words, educational technology is a “systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives, based on research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction”.

1.15 COMPUTER ASSISTED INSTRUCTION (CAI)

It is general term referring to the fact that the computer aids the traditional instruction process in some manner. Various computers can be used to aid instruction include storage of information about learning resources, storage and analysis of data about learners, testing, prescription of lessons based on learners data, drill and practice, simulation and gaming, computational aid / problem solving, inquiry, tutorial instruction and dialogue.

1.16 MULTIMEDIA TECHNOLOGY

Multimedia technology means being able to communicate in more than one way. Delivering content via text, picture, video, animations, and audio is called multimedia technology. Multimedia program is designed to support the learning process. Multimedia offers the experience of listening, looking and doing in a computer-mediated settings. It can be interesting, motivating, exciting and helping students to achieve understanding in new ways. The use of sound, pictures, animation, and video enables the user to observe real world situations, which is just not possible with the more conventional methods of instruction. There is also a high level of interaction. The students are not passive but actively participating in this type of learning (Tay Vaughan, 1998).

1.17 TELECONFERRING

Teleconferencing offers a means of interacting with others at remote places by circumventing travel costs, time and associated problems. Educational applications pertain to communication with groups of learners at different campuses and in different organizations.

A teleconference is a real-time interaction between two or more persons at long distances. The technology required to permit teleconferencing is an order of
magnitude higher than that for one way process of telecommunications. At present, there are three basic types of teleconferencing systems, i) Video conferencing ii) Audio conferencing ii.) Computer conferencing.

In video-conferencing, electronic media simulate face-to-face communication using television and audio systems. It is a tool which can assist in delivering quality teaching and learning. It opens up possibilities for collaborative teaching and learning, to make best use of resources. It can provide "live" support for the students at remote sites. Video conferencing technology is used to shift from teacher-centered to student-centered. Audio conferencing is a natural extension of the person-to-person telephone call and it can be extended to more than two persons. Computer conferencing communicates text and graphics to participants who may access the control computer through typewriter terminals. In a teleconference aimed at total interaction, all three types of media are integrated to supplement one another. A state-of-the-art teleconferencing facility would have multi-directional video and audio transmission systems as well as some other means such as document transmittal electronic chalkboard and videotext.

1.18 EDUCATION ON THE INTERNET

The internet has long been used by researchers, professors and students as follows: A student can take credit-bearing courses without ever entering a classroom. The course can be taken and followed by a test via internet. New groups allow teachers and students to ask questions, request advice and share information. Virtual reality can be used to do things such as allow students to experience what it is like to steer the space shuttle, or let Biochemistry researcher create 3-dimensional models of molecules. Library facilities are also available on internet. Many libraries now make their card catalogues available so that a person on internet can search through the catalogues. Reservation of books is also possible for a card holder. Libraries also make available copies of their special historical collections. Scientists can also share information by sending files back
and forth. They can also use the resources of a super computer from their own desktop.

1.19 EDUCATIONAL SATELLITE (EDUSAT)

EDUSAT is the first Indian satellite built exclusively for serving the educational sector. It is mainly intended to meet the demand for an interactive satellite based distance educational system for the country. It strongly reflects India's commitment to use space technology for national development, especially for the development of population in remote and rural locations.

EDUSAT programme, the offspring of technology and education is the miraculous innovative technique that created a uproar in the field of communication. India is the first country that launched a satellite exclusively for the development of education. Communications is made easier and clear through this satellite. The highlight of this EDUSAT programme is, it has got 2 way audio and 2 way video that helps face to face interaction.

Tamilnadu stands first among the states that utilizes EDUSAT programme to the extent. ‘Education for all’ movement makes use of this technological giant for imparting training and to monitor various activities. The key resource persons will be trained by DTERT (Directorate of Teacher Education, Research and Training) experts at top level and they in turn impart training to BRETES. They train up the teachers in their respective blocks.

Ensuring quality in education is the chief ideal of education for all - EDUSAT programme, helps a lot to achieve this noble goal. Activity based training is the revolutionary methodology introduced in Tamilnadu that will pump fresh blood into the arteries of elementary education. It is a new innovative child centered approach that ensures 100% attainment of skills of many children. Frequent training on ABC through EDUSAT helped the teachers a lot to know
about the concept and objectives of this innovative methodology and the strategies to be adopted. Through the demo classes the teachers came to know about the successful ways of handling the classes and the practical difficulties that would shoot up for implementing this creative methodology. They have also learnt how to overcome the hurdles that are on the way.

At upper primary level various content enrichment - programmes and laboratory skill development programmes that enabled both the teachers and students to have a clear knowledge of abstract ideas. Vague and abstract concepts made raiser through the EDUSAT with its unique two-way communicative approach. EDUSAT Programme is the boon for language teachers as they clarify their doubts regarding phonetics and other functional aspects of the language.

All the administrative level, EDUSAT plays a vital role. The directors at headquarters can directly contact the field works at the every nook and corner of the state and can get the first hand information about the progress of various activity carried out in the scheme periodical review conducted by the state officials steer this time-bound project in the right path. Education for all is a time bound mission and mere words cannot explain the role of EDUSAT towards the successful implementation of its objectives.

Apart from that, EDUSAT is the fastest means of communication. Within a wink of eye, data of progress made at ground level reaches the state official. Whenever a new strategy is followed, it is reviewed and monitored easily through EDUSAT. In short EDUSAT is inseparable from SSA (Sarva Siksha Abhiyan-Education for all) and its success cannot be imagined without this technological giant.
1.20 GYAN DARSHAN

Gyan Darshan (GD), a fully digital 24 hour exclusive Educational TV Channel, is a digital bouquet of 4 channels. This 24-hour channel beams programmes produced by IGNOU (Indira Gandhi National Open University) and those from UGC (University Grants Commission), NCERT (National Council for Educational Research & Training), CIET (Central Institute for Educational Technology), NITTR (National Institute of Technical Teachers Training and Research), IIT (Indian Institute of Technology) and different ministries of government of India. This new programme series consisting of informative, culturally enriching and educational programmes reaches out to a large number of people across the country.

1.21 GYAN VANI FM RADIO

This is a unique 'interactive mode' for enhancing and supplementing the teaching-learning process by reaching the learners through a low cost popular mass medium. Gyan Vani stations operate as 'media cooperative' with the day-to-day programmes being contributed by various educational institutions. NGOs (Non Governmental Organisations), government and semi-government organizations, UN agencies, ministers such as Agriculture, Environment, health, women and child welfare, Science & Technology, etc, besides national level institutions such as NCERT, NIOS (National Institute of Open Schooling) and State Open Universities.

Each Gyan Vani station has a range of about 60km and covers an entire city/town including the adjoining rural areas. Gyan Vani serves as an ideal medium for 'niche' audiences addressing the local educational, development and socio-cultural requirements. The favour of the channel is by and large local, and the medium is English, Hindi or language of the region. The broadcast duration
varies from station to station but the overall content pertains to different aspects and levels of education.

1.22 REMEDIAL MEASURES

Remedial measures can be given in the form of programmed learning activity, mixed learning exercise, mixed self motivated learning and learner friendly multimedia learning. It enchants the learners which kindle the interest of the learners and minimize the learning impediments. Learning package creates the pleasant atmosphere among the frustrated learners of rural area. It simplifies the strain of the teacher in the classroom transaction. Inexplicable context and materials can be viewed vividly through computer. Lab activities can be demonstrated in the classroom by using a prepared package. Hence remedial measures influence the slow learners, average learners and the gifted children learners from different localities and various management schools.

The present study enlightens the learning impediments of the learners in Physics at standard XI in Erode district, Tamilnadu, Southern India.

1.23 SIGNIFICANCE OF THE STUDY

The higher secondary students have to develop their knowledge in science to progress in higher education as well as in economic status through employment opportunity. The most important and crucial stage of school education is higher secondary which is the transition level from a generalized curriculum to a discipline base curriculum. Field of science has unique place to develop the country like India. To achieve the needs of the society, students have to acquire knowledge in science and technology. Professional courses are pertained to knowledge based subjects such as Physics, Chemistry, Computer Science, Mathematics etc. Physics is the most important subject in standard XI and XII. Most of the students in Erode District have no clear concept and perception in
Physics at standard XI, it is difficult to continue their higher education. Without understanding the concepts and only by memorizing the concepts make them to learn Physics difficult. Hence the study of Physics especially at the matured stage that is, at the higher secondary stage becomes indispensable. Considerable size of the standard XI students in Erode District does not record good achievement in Physics. It is found that a number of problems are being faced by the students. Identified problems can be eliminated by remedial measures given to the students of the Erode District. Hence the study is indispensable to find out the learning impediments of the students in Physics and to provide necessary remedial measures.

1.24 SCOPE OF THE STUDY

The present study tries to find the learning impediments of the students in Physics and applies suitable remedial course which can eliminate their learning barriers in Physics. It paves way to score more marks in higher secondary and gets the professional course in future. Remedial measures can cost a way to enroll more students in higher education. Rural students can acquire higher education. Dropout rates in higher education can be reduced by using educational technology in remedial teaching.

1.25 STATEMENT OF THE PROBLEM

The present study aims to identify and provide suitable remedial measures through educational technology for the general as well as the specific learning impediments in learning Physics at standard XI in Erode District. Science and technology are progressing and making great impact on the style of life of people in the world. It is the academic excellence that helps the students for making progress in science and the future world. Especially for making progress in science and technology, the study of Physics is indispensable. The students face common barriers in learning Physics which can be driven away by identifying the learning
obstacles and offering suitable remedial measures through educational technology. It is found that they have a number of problems in learning Physics and the students perform poor achievement in Physics. Hence the proper investigation on the problem and remedial measures become indispensable.

In this study, the researcher has selected the students of standard XI in Erode District and wished to develop the students who are learning Physics. Offering necessary and suitable remedial measures for the learning impediments in Physics would enrich the standard of the students of standard XI in Physics.

TITLE

“STUDY OF THE LEARNING IMPEDIMENTS OF THE STUDENTS OF STANDARD XI IN LEARNING PHYSICS AND REMEDIAL MEASURES THROUGH EDUCATIONAL TECHNOLOGY IN ERODE DISTRICT”.

1.26 DEFINITIONS OF OPERATIONAL TERMS

LEARNING

Longman Dictionary of contemporary Physics defines “learning means knowledge gained through reading and studying”. “Learning is a process that occurs when experience causes a behavior” – Woolfolk (1990). “Learning is a process by which experience or practice results in a relatively permanent change in what one is capable of doing”- Worchel and Shebilske (1986). Here learning refers to studying Physics by students. It signifies the learning of Physics of the students of standard XI.

IMPEDIMENTS

Oxford Advanced students’ dictionary defines impediments means “something that delays or stops the progress of learning”. In this study impediment

EDUCATIONAL TECHNOLOGY

“Educational Technology is the application of scientific knowledge about learning and conditions of learning to improve the process of human learning.”

REMEDIAL MEASURE

Learning impediments in Physics indicate the learners’ problems and barriers faced in learning Physics at standard XI. Learning impediments can be eliminated by adopting various innovative educational technologies in the classroom transaction. Avoiding rote memory will help to extend the comprehension power of the learners. Completing the syllabus is not a motto of the course and it can create the innovative feeling in the mind of younger generation. Learning hurdles in learning Physics were identified by administering diagnostic test in the study. Identified problems were eliminated by using educational technology and remedial measure. Remedial measure influenced the learners and reduced the
learning impediments in learning Physics. It can be helpful to improve the learners of rural area.

STANDARD XI

Standard XI denotes the middle one year in 10+2+3 system of education followed in most of the states in India. This educational system is adopted in Tamilnadu also. The course of the study namely standard XI will come after the tenth standard level.

PHYSICS

Oxford advanced student’s dictionary defines “Physics is the scientific study of force such as heat, light, sound” etc. It is one of the subjects in higher secondary curriculum.

STUDENTS

Lengman Dictionary defines “Students refer those who are studying at schools”. Here students denote standard XI students in Erode District.

ERODE DISTRICT

Erode is one of the districts among 30 Districts in Tamilnadu of southern India. Erode is situated near to Coimbatore District.

1.27 OBJECTIVES OF THE STUDY

The researcher framed the following objectives for the study. The study aims to identify the problems of students of standard XI in learning Physics in Erode District.
1.27.1 GENERAL OBJECTIVES

1. To find out the general learning impediments of the students in learning Physics at standard XI.
2. To study the learning impediments of students with specific reference to the syllabus in Physics.
3. To find out the suitable remedial measures through educational technology to reduce the learning impediments in learning Physics.
4. To study educational technology available for learning Physics at higher secondary schools.
5. To study the various experiences provided by the teachers for the students for learning Physics.

1.27.2 SPECIFIC OBJECTIVES

1. To study whether there is any significant differences in achievement mean score in Physics with respect to sex, locality, type of management and community.
2. To study whether there is any significant association between the opinion of the teachers on the learning impediments faced by the students in Formulae and different variables such as sex and locality.
3. To study whether there is any significant association between the opinions of the teachers on the learning impediments faced by the students in Doppler Effect and different variables such as sex and locality.
4. To study whether there is any significant association between the opinion of the teachers on the learning impediments faced by the students in learning Physics due to not using Audio Visual Aids and different variables such as sex locality and type of management.
5. To study whether there is any significant association between the opinion of the teachers on the learning impediments faced by the students due to not
using CAL and different variables such as sex, locality and type of management.

6. To study whether there is any significant association between the opinion of the teachers on the learning impediments faced by the students due to not availability of Internet facilities in school and different variables such as sex locality and type of management.

7. To study whether there is any significant association between the opinion of the teachers on the learning impediments faced by the students due to not giving In-service training and different variables such as sex, locality and type of management.

8. To study whether there is any significant association between the opinion of the teachers on the learning impediments faced by the students due to not giving Remedial measures and different variables such as sex, locality and type of management.

1.28 HYPOTHESES OF THE STUDY

The following are the Hypotheses, generated to meet out the learning impediments of the students of standard XI in learning Physics at Erode District.

1.28.1 ALTERNATIVE HYPOTHESES – 1

Students have learning impediments in learning Physics in the following areas, Formulae, Lami’s theorem, Graphical Illustration, Co-efficient of Viscosity, Phase and Phase difference, Doppler Effect, Laplace’s correction, Dip and Declination, Moment of Inertia, Simple Harmonic Motion, Wave Motion, Plane and Spherical Mirrors, Tan A position, Tan B position and Hysteresis.
1.28.2 NULL HYPOTHESES

1. There is no significant difference in achievement mean score in Physics with respect to sex, locality, type of management and community.

2. There is no significant association between the opinion of the teachers on the learning impediments faced by the students in Formulae and different variables such as sex and locality.

3. There is no significant association between the opinions of the teachers on the learning impediments faced by the students in Doppler Effect and different variables such as sex and locality.

4. There is no significant association between the opinion of the teachers on the learning impediments faced by the students in learning Physics due to not using Audio Visual Aids and different variables such as sex locality and type of management.

5. There is no significant association between the opinion of the teachers on the learning impediments faced by the students due to not using CAL and different variables such as sex, locality and type of management.

6. There is no significant association between the opinion of the teachers on the learning impediments faced by the students due to not availability of Internet facilities in school and different variables such as sex locality and type of management.

7. There is no significant association between the opinion of the teachers on the learning impediments faced by the students due to not giving In-service training and different variables such as sex, locality and type of management.

8. There is no significant association between the opinion of the teachers on the learning impediments faced by the students due to not giving Remedial measures and different variables such as sex, locality and type of management.
1.29 METHODOLOGY

The present study endeavors to find out the learning impediments of the students of Physics at standard XI in Erode District. Descriptive Normative Survey method was adopted for the present investigation. Survey studies are administered to establish the nature of existing conditions. The descriptive survey approach is commonly used to find the education problems. It may be the best test method used to obtain information about problems existing in a sphere. Stratified Random Sampling method is applied for the study.

1.30 SAMPLES SELECTED FOR THE STUDY

The proposed samples for the present study was 1000 students of standard XI but due to absentees of the students, 912 students were taken from 66 higher secondary schools (involving Government Boys, Government Girls, Government Higher Secondary and Aided) for the study in Erode District. Among 912 students, 429 were boys and 483 girls. Sixty six higher secondary Physics teachers were taken up for the study. Out of sixty six teachers, 51 were men and 15 women. 27 higher secondary schools from urban area and 39 higher secondary schools from rural area were involved in the study. Those who were studying under the group I & II having the subjects Physics, Chemistry, Mathematics, Biology in standard XI were taken in to consideration for the study.

1.31 TOOLS USED FOR THE STUDY

The main goal of the study is to collect the data on different aspects of students towards learning impediments in Physics at standard XI in Erode District.

The following instrumentations (tools) were selected for the study

1. Diagnostic test in Physics for the students.
2. Opinionnaire for the teachers.
The researcher prepared a diagnostic test question paper based on the blue print of government examination, Tamilnadu, and it was administrated towards the students to find out the learning impediments in Physics at standard XI. Learning impediments were located and identified through the diagnostic test.

About sixty six post-graduate Physics teachers (male 51, female 15) of Physics working in the higher secondary schools at Erode District were personally consulted by the researcher and their experiences regarding the learning impediments in the subject of Physics and their students were vividly discussed.

The researcher prepared an opinionnaire to confirm and locate the learning impediments of the students in Physics and it was administered towards the post graduate Physics teachers. The learning impediments of the students were discussed with experienced headmasters, professors of various universities, colleges and lecturers from District Institute of Education and Training (DIET). Hence the data were collected from different useful and relevant sources to have a first hand experience of the problem under the study.

1.32 VARIABLES

- Independent variables are
  Sex, Community, locality and type of management.

- Dependent variables are
  Achievement score.

1.33 DELIMITATIONS OF THE STUDY

This study had the following delimitations
1. This study was confirmed to the students of standard XI in Erode District.
2. This study was confirmed to 912 students only.
3. This study was confirmed to 66 post graduate Physics teachers in Erode District
4. This study was confined to syllabus of Physics framed by Tamilnadu text book only.
5. This study was confined to 27 urban and 39 rural higher secondary schools in Erode District.

1.34 A BRIEF RESUME OF THE SUCCEEDING CHAPTERS

A detailed conceptual frame work with respect to science curriculum, science education, teaching-learning of science, constructivism and pedagogy have been presented in chapter II.

In chapter III, an account of some of the previous studies related to this research work are abstracted and discussed. Based on these studies, a conclusion has also been arrived at the end of the chapter.

In chapter IV, the samples selected for the study and variables involved in the study have been presented. The establishment of reliability and validity of the tools have also been presented. The procedure adopted for conducting the study and methods for collecting data have also been discussed in this chapter.

In chapter V, the analysis of data is presented. Testing of hypothesis and their interpretations are also presented in this chapter.

In chapter VI, the summary of findings and conclusions are presented. Some suggestions for further research have also been given in this chapter.