CHAPTER I
INTRODUCTION

1.1 EDUCATION

In a rapidly changing world, the development of a scientific base of society is of vital importance and that is why, the teaching-learning of science right from the school stage assumes great significance. Since Physics touches our daily lives in so many ways and has a high difficulty level, it is desirable to maintain a judicious blending of content and methodology for exactness of curriculum transaction. Indeed, an integrated approach for teaching Physics based topics would go a long way in developing appropriate learning.

In the words of the ancient Greek philosopher Diogenes, “The foundation of every state is the education of its youth”. Education is an investment into the future of the economy and the state. A decent education is a passport to a good, comfortable and secure life. It should provide hope and open avenues for a secure future for intelligent, hardworking and productive men and women of our society. It should enable youngsters to become contributing members of our society through knowledge, skills and character development, provide access to first rate training for people of all ages and backgrounds and make it possible for them to compete in a global economy.

To achieve this, our academic institutions must become incubators of new ideas and creative, independent thinking and testing grounds for research and development. According to the UNESCO, “Education is the organized and
sustained instruction designed to communicate a combination of knowledge, skills and understanding valuable for all the activities of life”. The teaching of science subjects, has encountered many problems in secondary schools many years. The problems are especially prevalent for subjects such as Physics and Mathematics. “The shortage of qualified and experienced teachers has seriously affected the standard of education provided at all levels of the system. Thus walking into the new millennium, our present educational system also needs to be remodelled and fashioned to suit the present needs, but the revision of curriculum must be helpful for both the teacher and the taught to achieve the teaching objectives without much difficulty.

1.2 AIMS AND OBJECTIVES

The School has a formal set of aims and objectives for all of the courses and programmes. The aims are the broad purposes, which we have in mind when designing and delivering our programmes of study.

Our aims are:

- To provide a high quality education which prepares students for further study and research in Physics and for a wide range of career opportunities in industry and commerce.
- To maintain an environment in a research-active department in which staff are committed to teaching Physics as a coherent and challenging subject.
To support teaching and learning with well-equipped laboratory, library and computing facilities.

To monitor, review and enhance educational provision to ensure that it remains intellectually demanding and relevant to the current needs of Physics students.

To provide the support and guidance that students need, and to encourage them to take on responsibility for their educational development.

To foster a friendly and stimulating learning environment in which students are motivated to reach high standards, to acquire real insight into Physics and to become self-confident, committed and adaptable graduates.

To continue to educate all students.

1.3 RECOMMENDATIONS OF COMMISSIONS AND COMMITTEES ON SCIENCE EDUCATION

The necessity for a drastic reconstruction of a science based education in coherence with the Indian culture and values and a radical improvement in the quality and standard of education is almost stressed by all the education commissions. The aims and objectives of teaching science at different stages have been summarized in the proceedings of the All India Seminar of the Teaching of Science, the Taradevi Report, published by the Ministry of Education in 1956. At higher secondary stage, the aims of general science teacher should be:
To familiarize the pupil with the world in which he lives and to make him understand the impact of science on society so as to enable him adjust himself to his environment.

To acquaint him with the scientific method and to enable him to develop the scientific attitude.

To give the pupil a historical perspective, so that he may understand the evolution of the scientific development.

The Indian Education Commission (1964-66) suggested that

- Science should be taught as a discipline of the mind and a preparation of higher education.
- There should be a diversification of courses and a provision for specialization.

Ishwarbhai Patel Committee (1977), stressed the following:

- Acquisition of the skills and habits of self-learning.
- Acquisition of a broad-based general education consisting of science, mathematics, social sciences, languages and socially useful productive work.
- Developing aesthetic appreciation and creativity through participation in artistic activities.
- Exploring the world of work and understanding the realities of life in order to prepare for a confident entry into the world outside the school.
The National Education Policy in 1986, paved way to the growth of science education. Diversification of courses, provision for specialization, vocationalisation of higher secondary education were the major changes brought at the higher secondary education based on the recommendations of the National Education Policy of 1986.

1.4 IMPORTANCE OF SCIENCE IN THE SCHOOL CURRICULUM

“There is of course, one thing about which we feel no doubt or hesitation. Education, science based and in coherence with Indian culture and values can alone provide the foundation as also the instrument for the nation’s progress, security and welfare” - Indian Education Commission (1964-66)

The rapid advancement of science and technology and increasing need for scientists and technologists have made it all the more important to provide for science based education in schools. The Secondary Education Commission has recommended that every secondary school pupil should study general science as a compulsory subject, so that he gains a basic quantum of scientific knowledge as a part of his general education.

The Scientific Policy Resolution of the Government of India 1958 stated: “The dominating feature of the contemporary world is the intense cultivation of science on a large scale, and its application to meet the country’s requirements.”

The primary goal of education should be the intellectual development of the individual. With its accelerating importance in our society, science has
become an increasingly important part of general knowledge. Scientific education is best fostered as a part of a general emphasis on intellectual activity. Science has now become a compulsory subject in the school curriculum because of its multifarious values to the individual as well as to the society.

i. Intellectual Value

The great value of science is that it has introduced us to new ways of thinking and reasoning. The chief part played by science in helping to develop consciousness of man is to be found in the new thoughts that it has made us think. Huxley’s statement, that scientific thinking is ‘organised common-sense’ is applicable to all life situations. The study of science has given us a real insight of ourselves, acquainted us with a new and valuable way of thinking, sharpens our intellect and makes us intellectual ones, critical in observation and reasoning and teaches us to arrive at conclusions without any emotional bias or prejudice.

ii. Utilitarian Value

We are now living in an age of science and technology. Right from the cradle to the grave, all our activities are controlled and fashioned by science. Man is no longer the helpless toy of the forces of nature. Scientists unveil the curtain of nature and peep into its mysteries. The Atomic Age says the Ex-President Truman of America “will either be one of complete devastation or one in which new resources of power will lighten the burden of mankind”. So it is very essential to have some elementary knowledge of science at least, for becoming a
useful member of the community. To raise the standard of living in any country, two things are needed – scientific knowledge and a population sufficiently educated to understand how to apply it in everyday life.

iii. Vocational Value

The study of science forms the basis of so many studies which are purely vocational in nature, for example, a student of science can choose medical, engineering, agriculture or any other profession in which he is interested in and fit for. It forms the basis for many productive activities in his later life.

iv. Cultural Value

Science has played an important role in determining the culture and civilization of a country from time to time. It has a direct influence in dispelling many traditional beliefs and the adoption of others suggested by the success of the scientific method. "If science is to be pursued with full vigour and zest and is to become a mighty force in the Indian renaissance, it must drive its ‘nourishment’ from our cultural and spiritual heritage and not bypass it. Science must become an integral part of our cultural and spiritual heritage” – Report of the Indian Education Commission, 1968.

v. Moral Value

Of the great values that condition our activities and make our lives worth-living is goodness, beauty and truth. The moral integrity manifested in the
scientific work is due to the nature of the subject-matters. Science is truthful because it has practically no temptation to be anything else. In his work the scientific man has superb moral standard and he is only a seeker of truth.

vi. Aesthetic Value

It is in the aesthetic aspect that the whole charm of science lies. To a man of science, practical application is just a by-product of his autonomous activity. The scientist feels an intrinsic charm in revealing the harmony of nature. The search for universal laws and comprehensive theories is undoubtedly the manifestation of the aesthetic motive.

vii. Training in the Scientific Method

The study of science trains the students in attacking the problem according to a certain definite and distinct procedure called the scientific method.

viii. Development of Scientific Attitudes

The attitudes of a scientist involve critical observation, open-mindedness, suspended judgement, free from superstition and false belief. The attitude once developed in the student proves useful in the later life of the child. The teaching of science is also based on sound psychological footing. The principle of activity is the main basis of the teaching of science and satisfies the instincts of curiosity, creativeness, self-assertion and self-expression of the pupils. It has emerged as
almost a decisive force and its role in education needs to be adequately understood.

Thus science education must be strengthened so as to develop in the child well-defined abilities and values such as a spirit of inquiry, creativity, objectivity, the courage to question and an aesthetic sensibility.

1.5 HIGHER SECONDARY EDUCATION

At the higher secondary stage there is a diversification of courses and there is a provision for specialization. Education at this stage leads the students in exploring the world of work and understanding the realities of life in order to prepare for a confident entry into the world outside the school. The knowledge gained at this stage should serve as a basis for further specialization. The general science stream of education offers Physics, Chemistry, Mathematics, Biology and Computer Science courses and the vocational stream of education prepares the individuals for a specific vocation.

Science Curriculum at Higher secondary Level

Science is a body of knowledge based on observation, experiment and inference. It is the organized attempt of making to discover how things work as casual systems. All the learning experiences that are given to the pupil is called curriculum or in other words the curriculum is the sum total of experiences of the pupil that he receives through the manifold activities that go in the school, in the
workshop, in the play-ground and in the numerous informal contacts between the teachers and the students. Science curriculum, a part of the whole curriculum plays an important role in the evolution of balanced personality of the students.

The UNESCO conference in 1982 suggested that in order to gain self determination and sustain development, the total population must be stimulated towards acceptance of science. So the science curriculum at the higher secondary level includes laboratory work and theoretical study of mathematics, physics, chemistry, biology, botany, zoology and computer science, which broaden the interest of students in science programme. The laboratory experience is a pleasure to the students as they can satisfy their sense of curiosity.

**Higher Secondary Physics Curriculum**

Physics deals with nature and its manifestation and as it appears in the form of physical world, it has a major role to play in fulfilling the basic objective of science. When we look at everyday life, we find that all the things that a man needs can be ascribed to the field of physics. So it is natural that physics should find a place in the higher secondary curriculum. The higher secondary physics curriculum covers many of the branches of physics such as electricity, magnetism, sound, light, electronics, nuclear physics, properties of matter, mechanics, statistics and astronomy. Laboratory education is also included in the curriculum.
The curriculum for laboratory education contains electricity, magnetism, sound electronics and light experiments.

The study of physics can induce rational thinking, lifelong youthful enthusiasm and self control. The laboratory work helps the students to think about the physical phenomena in a way which can make physics as a part of their life and not of laboratory only.

1.6 DOMAIN OF PHYSICS

The domain of physics extends from the infinitesimal to the infinite and is largely undefined. At one end of the scale, there are quarks composing nucleons (neutrons and protons) and on the other end, there are galaxies, with sun-like stars as its constituents and a universe that we do not know much about.

In physics, domains are also defined in terms of various important attributes like speed, temperature and other physical quantities. In the domain defined by speed, we study both stationary objects and objects moving at very high speed, perhaps three – fourths of the speed of light. Thanks to the extraordinary efforts of scientists in the last two centuries that we now know some of the important bounds of nature. For example, the upper limit of speed is the speed of light in a vacuum. Similarly, the lower limit of temperature is 0 K. These are some of the highlights of the development of our basic understanding of nature and its extent.
The uncertainty about the domain of physics stems from the fact that new experiments and discoveries continuously break the bounds (limits) set before. An example: for many years, the charge on the electron was considered the smallest amount of charge, but today after the discovery of quarks, we know that these carry lesser amounts of charge than that carried by electrons. Thus, the extent of physics is actually changing as we learn more and more about nature.

1.7 METHODS OF TEACHING PHYSICS AT HIGHER SECONDARY LEVEL

“If science is poorly taught and badly learnt, it is little more than burdening the mind with dead information and it could degenerate even into a new superstition”. - Kothari Commission Report

The main aim of teaching is to bring about socially desirable behaviour change in the students and this can only be achieved if the teaching is effective and based on the principles of teaching. How effectively the pupils learn depends on the method of teaching the teacher adopts. There is a great world outside and mind within and it is the duty of the teacher to bring the two together. This process of interpreting the world of knowledge to the child’s mind is called the “Method of Teaching”.

It is the school to which the nation will always look for the future scientists and technologists or specialists in the field of science. The pupil must be given sufficient understanding of the facts of good and healthy living in the society.
They should be explained how the knowledge of science can be utilized for the benefit of the individual and the society. In science teaching, lecture method, lecture cum demonstration method and laboratory method are mostly used by the higher secondary teachers.

1.8 OBJECTIVES OF TEACHING PHYSICS

It is physics that forms the curriculum of science prescribed for high school and higher secondary classes. In fact physics constitutes the basis of the natural science. When we look at everyday life, we find that all the things that a man meets, can be ascribed to the field of physics. It is therefore natural that physics should find a place in the teaching of the education.

- To enable pupils to acquire the basic knowledge of science useful in day to day life.
- To enable them to develop the ability to apply the knowledge acquired.
- To enable them to develop skills such as manipulations etc.
- To enable the child to realize the inter-relationship between the various branches of science.
- To enable the pupils to appreciate the works of great scientists and the implications of science on the society.
- To promote a variety of interests and talents in students which will enable them to contribute to the rich cultural heritage of the world.
1.9 QUALITIES OF A SCIENCE TEACHER

“A poor teacher tells;
An average teacher explains;
A good teacher demonstrates;
And a great teacher inspires.”

Science is now one of the compulsory subjects in the secondary schools, because of its multifarious values. In the present state of affairs when the rockets are booming overhead and man has reached the moon, India cannot spare to lag behind in the race. For this we need some extensive programme through which we can impart scientific knowledge to the people of the country, in the background of our own culture, so that we can increase the wealth of the nation and promote a healthy international outlook.

For an effective and efficient teaching of science, we need well-equipped science laboratories and more important than this, we need well-qualified science teachers, for the quality of education depends mainly upon the quality of the teacher and not on the material facilities only. An efficient and resourceful science teacher can carry on his work quite efficiently even with inadequate science facilities. Science learning involves: Developing existing ideas, differentiating existing ideas, integrating existing ideas, changing existing ideas and introducing new ideas.
• The first requisite for a science teacher is that he should have a thorough grasp of the subject-matter that he has to teach.

• He should not expect that he must know the answer for all the questions posed to him by the students.

• The teaching should be pupil-centred rather than subject or teacher-centred and the approach should be inductive.

• Adequate opportunities should be provided for the individual laboratory work by the students.

• He should keep himself in touch with the latest developments in science.

• Teaching-learning process should be a co-operative endeavour of the teacher and the pupils. He should dispense knowledge to the students as well as learn with them.

• He should make good use of teachers’ manuals, laboratory guides, reference reading materials etc.

Teachers need to be aware of pupils’ existing ideas, of the learning goals and also of the nature of any difference between the two, when they are planning and implementing teaching. In planning teaching it is useful for teachers to think in terms of helping pupils to make a number of ‘small steps’ towards the big ideas. The sequencing of these ‘small steps’ can be informed by what is known about the progression of children’s understanding. However, it is important to
bear in mind that some of these ‘small steps’ may, in themselves, present learners with difficulties.

1.10 TEACHING AND LEARNING OF PHYSICS SUBJECT

Physics subject, because of their very nature, provide particular challenges for both the teachers and the students. Since the subject matter, as a general rule, keeps on evolving with new development fuelled by research and technology, the teachers have to keep up with these developments in order to carry out their task satisfactorily. Therefore, teachers need to continue learning as well in order to help students to learn properly.

In addition, the teaching of physics subjects necessitates the use of experiments and demonstrations to help students to understand the concepts. Thus teaching these subjects means not only classroom lectures but laboratory-based practical classes where students learn about the subject matter by carrying out experiments or by teachers demonstrating experiments. Students learn better if they can themselves ‘observe’ happening, such as being able to observe that the period of a simple pendulum is independent of its mass.

Helping students develop problem solving skills is a frequently cited goal of science educators. The National Science Teachers Association (NSTA), in its 1980 position statement, advocated that science teachers help students learn and think logically, specifying that high school laboratory and field activities
should emphasize not only the acquisition of knowledge, but also problem solving and decision making”.

Problem solving means many things to many people. For some, it includes an attitude or predisposition toward inquiry as well as the actual processes by which individuals attempt to gain knowledge. Usually, when teachers discuss problem solving on the part of pupils, they anticipate pupils will become involved with the thinking operations of analysis, synthesis, and evaluation (considered as higher-level thinking skills).

### 1.11 WHAT CHARACTERIZES PROBLEM SOLVING RESEARCH IN SCIENCE EDUCATION?

Good and Smith (1987:31-36) provided a summary of problem solving research in science education. In the 1960’s, research on problem solving was focused on how people solve puzzles and games. In the early 1970’s, science education researchers tape recorded "think aloud" interviews to gather data. Current research on problem solving in science education involves information processing theory - the idea that solving a problem requires two processes: retrieval from memory of the pertinent information and proper application of the information to the problem. Research studies now published are frequently comparisons of expert and novice problem solvers in physics, biology, and chemistry.
The focus of problem solving research in science varies with the discipline. The following studies are some representative examples, grouped by biology, chemistry, and physics:

**Problem solving research in biology**: Most of the problem solving research in high school biology involves teaching genetics. In a recent article on teaching genetics, Stewart discussed ways how different problem types may contribute differentially to learning outcomes (1988:237). Stewart contends there are two main types of thinking involved in solving genetics problems: (1) reasoning from causes to effects, and (2) reasoning from effects to causes. Most high school or introductory college textbook genetics problems are cause to effect, with the difficulty of the problem varying with genetics content and wording. Such problems require content-specific algorithms. Cause to effect problems does not provide students with insights into the nature of science. However, effect to cause problems can be developed if computer-generated information is provided. The most important insight that students may gain from solving effect to cause problems may be the outcome of understanding science as an intellectual activity.

**Problem solving research in chemistry**: Chemistry courses and textbooks appear to focus on quantitative problems. There is interest in how chemistry students solve quantitative problems and also in the effects of different instructional strategies on students' success in problem solving. Many research
reports are focused on the use of algorithms, "...rules that can be followed more or less automatically by reasonably intelligent systems..." (Bodner, 1987:513).

**Problem solving research in physics**: Research in physics has gone in two directions: information processing research concerned with observable and measurable steps in problem solving and research in constructing solutions in which investigators are concerned with the internal cognitive processes that result in these steps. Much of the research on concepts and conceptual change in physics had been conducted against a background of problem solving in which pupils worked on problems found in the back of the textbook.

### 1.12 TYPES OF EXPERIMENTS/DEMONSTRATIONS

The experiments that are prescribed by the Curriculum Development Unit (CDU) for any subject at a particular level, are obviously meant to be carried out by the students. However, in reality, this is rarely achieved due to a number of reasons. The experiments reflect the contents of the subject and are meant to reinforce the concepts introduced in the theoretical sections. Thus, a certain number of experiments are prescribed, chosen in a manner with regard to the equipment and materials needed, which would allow schools to carry them out. In the event that a school does not have enough equipment to enable all the students to do the experiments in small groups (two or three each), the teacher could demonstrate the experiment to the whole class. Again, for various
reasons, even this is not done, or if it is, it is done in a rather perfunctory manner and students are not asked to write a report.

The experiments generally consist of two-hour exercises, with the teachers assembling the apparatus and the students carrying out the experiment according to instructions in the experimental handout or laboratory manual. Some of the common experiments consist of those in mechanics, statics, energy transformation, momentum conservation, forces, magnetic forces, electrostatics, and optics. The practical report that the students are supposed to write and which should be assessed consists of several sections which include the aim(s), equipment used, method, results, discussion and conclusions.

1.13 NEED FOR LABORATORY CLASSES

Theory and practice should go together as far as possible. Physics teaching involves passing on knowledge which was created by the use of extensive laboratory experimentation. Students must learn that most of the knowledge they gain by the study of science has come through experimentation. Thus they themselves should do experiments in order to see how these can be performed.

The other desirable end result is that students can understand and actually have a good feel for how the subject has developed and how it will continue to develop. An appreciation of the scientific method is obviously crucial for
students. By understanding the principles behind the experiment, students learn and understand the importance of measurements. At the same time, they also understand the importance of equipment and materials. An appreciation of the principles and operation of scientific equipment is fundamental to a good understanding of the subject.

Facilities Available at the Higher Secondary level for Theory and Practical in Physics

A well equipped laboratory and a library are the basic needs for good science teaching. Almost all the higher secondary schools have a physics laboratory. But a few schools have all the required equipments. The teaching–learning process of physics needs a variety of instruments for conducting experiments, demonstration kits and a spacious laboratory. But equipments and other resource materials are severely limited in most physics class rooms and laboratories. Mostly experiments are done in group which shows the non-availability of the required number of apparatus.

Good teaching needs good reference work and a good reference work needs a library with lots of standard books. Most of the schools have a small library with a very limited number of books. Audio visual aids such as over head projectors, slide projectors, televisions are not provided to the schools and even if they are supplied are found untouched in most of the schools.
1.14 PROBLEMS OF LEARNING PHYSICS AT HIGHER SECONDARY LEVEL

The aim of physics education is to produce students with creative thinking and an analytical mind. But the existing educational system and the memory based curriculum makes physics as a boring and dry subject to the students. There exists a wide gap between theory and practical in science subjects. So the students find it difficult to understand. The ‘black-box’ type of equipments takes away the joy of designing, assembling and belonging. The students’ curiosity continuously evaporates day by day and the lab course becomes dry to them. The conventional, routine and boring laboratory working prevents them from developing creativity. They feel that the existing system allows them to follow the mechanical ways of performing the experiments so they are not really experiencing physics in their surroundings.

The defective examination system generates frustration among the students. The students are never given the chance to use the library. Some of the observers have mentioned that many pupils did not prefer physical science due to the difficulty of the subject. So it is the duty of the educator to find alternative and innovative line of action to make physics interesting, easier and a part of their life.
1.15 PROBLEMS FACED BY THE HIGHER SECONDARY TEACHERS IN TEACHING PHYSICS

The Physics curriculum in general places importance on bookish knowledge. It is completely examination centred and does not cater for individual differences. So the teacher finds it difficult to develop the useful skills and to inculcate the right kind of interest, attitude and values. The overcrowded class rooms makes it impossible to give individual attention to the students.

Most of the higher secondary schools have only one teacher in physics irrespective of the number of students. So the teacher faces numerous problems in laboratory teaching and in developing laboratory skills in students. They joy of teaching is not enjoyed by the physics teachers for the fear of the forthcoming examinations and the result oriented administrators.

Barriers in the Teaching Process

The revised syllabus poses numerous difficulties that disrupt the teaching – learning process. Some of them are:

- Physical discomfort
- Day dreaming
- Inattention
- Students’ lack of interest in a particular subject or task
- Lack of intelligence
Lack of willingness

Unsuitable curriculum

Students’ aversion to problems

Unclear derivations

Insufficient diagrams

Difficulty in conducting practicals

Over-crowded classrooms

Very difficult problems

Explanations not clear

Besides these, there are various other problems faced by teachers such as insufficient apparatus, lack of co-ordination between theory and practicals etc.

1.16 CONSTRAINTS ON GOOD PHYSICS

General problems

There appear to be a few problems which are common to most schools. These include lack of resources (suitable funding for buildings, equipment, teaching aids, books and qualified and experienced teachers) as well as a lack of will to acquire resources. School may not be adequately funded or resourced. Indeed, the needs of the schools, as perceived by the community or church based management, may not necessarily be in accord with those of the staff and students. Such schools also naturally want to have a say in all aspects of their operation: the hiring and firing of staff, the admission of students, how the school
fits into the community and so on. The Ministry of Education may have views which may not always coincide with those of the school management. This can, and frequently does, create problems.

Also being community – funded and operated, the management needs to raise money for the schools over and above that obtained through school fees. Thus, quite often, students and staff are expected to raise funds for various purposes through efforts at the school and community levels. Some schools tend to go overboard with this activity at the expense of academic activities.

**Lack of Suitably Qualified Teachers**

There can be no denying that many schools lack suitably qualified teachers in various subjects, but perhaps more so in physics.

**Lack of facilities for Practical Work in Physics:**

There is clear evidence that many schools, particularly in rural areas, lack decent laboratories and equipment to carry out practical work. The quality and range of laboratory equipment is rather limited. Many schools lack basic equipment and even when they have it, there is not enough for more than one demonstration set-up.
Lack of Motivation on the Part of Teachers

It is difficult to ignore comments and criticisms from school principals, the Education Ministry, students, other teachers, and the general public that there is a lack of motivation on the part of teachers to teach properly and with the best interests of students at heart. There appears to be some justification for such criticisms. Certainly it is true that some teachers do not wish to be transferred to schools that have a reputation for producing poor academic results. Equally, there may be some substance to the claim that a few teachers take a transfer to a school merely for promotion rather than to strive towards excellence for the schools. Some teachers have also been severely criticised for down-right unprofessionalism for not completing the required syllabus or for not doing enough in preparing students for final examinations, and so on.

Perception that the Facilities for laboratory Work are not Essential

Many schools do not consider physics practicals as important. This is due to a lack of understanding of what physics teaching involves. Principals and school management with non-science backgrounds are often of the view that students can learn physics, as they do other subjects, through classroom teaching only. Consequently they do not give as much prominence and support to the teaching of science subjects as these deserve. This quite often translates into a lack of funding for equipment and materials for practical work. This is often
compounded by the perception that having some equipment is sufficient as students could be given demonstrations.

**Examination-Driven Teaching in Schools**

It is an unfortunate fact that many schools are examination-driven. That is, school, by and large, consider the passing rate in external examinations as the most important aspect of school activities and encourage maximum pass rates. This leads to teachers and students thinking along these lines and teaching and learning merely for the purpose of passing external examinations. This is obviously a very unsatisfactory state of affairs as other aspects of learning and teaching are sacrificed, ignored or paid lip-service to. One aspect of this is the reorganization of laboratory practical work, wherein, only those practicals that may be examined (based on previous years’ examination papers) are covered, and as demonstrations rather than as individual or group experiments. Therefore, students are not given the experience and confidence of carrying out experiments for themselves, which would be extremely valuable for them.

**1.17 DELIMITATIONS AND SCOPE OF THE STUDY**

Though the population of the present study is the higher secondary students of Tuticorin District, the stratified representative sample was constituted from higher secondary schools in Tuticorin Educational District only. This is consciously done by the investigator, since it is construed that Tuticorin
Educational District typically reflects the State of Tamil Nadu in terms of Socio-economic-cultural-educational contexts. This way, it is a delimitation of the study.

Though the present study might include courses at various levels, Primary, Middle School, High School and College students, the present study has involved the learners of higher secondary courses only. This is another delimitation of the study.

The present study has involved seven population variables and has identified thirty three problems for teachers and thirteen population variables and recognized forty problems for students, there may be some more variables and problems witnessed in the curriculum transaction of Physics. Hence, it may be construed as yet another delimitation of the study.

The present study, it is hoped, would throw light on the associations between the problems faced by teachers and students based on which, suitable strategies can be thought of for the reduction of the same, according to the necessity.

1.18 CONCLUSION

Science is one of those human activities which man has created to gratify certain human needs and desires. As society faces an increasing number of new challenges, which arise from the globalized context, it is indispensable to bridge the gap between the actual needs and the present system of education.
Therefore, if our present educational system is to become contemporaneous with the rest of the world and yield the desired results, what is needed is a major remoulding and the periodic revision of the syllabi and the curricula.

It will not only make the present education relevant and related to life, but will also further encourage the student community to make constant and consistent efforts so that excellence could be achieved in education. But, restructuring the syllabus and the acute paucity of funds poses other difficulties such as infrastructure, equipping the library with more books, setting up good laboratories etc. Thus the investigator is interested in tracing the problems encountered by the teachers and students and so this study is sought.