Chapter — I
Introduction
CHAPTER I

INTRODUCTION

Education, as Dewey says, “is the development of all those capacities in the individual which will enable him to control his environment and fulfill his responsibilities.” Education is not just the transfer of information from the known to the unknown, but it is the comprehensive development of the human personality.

NEED OF EDUCATION

From the earliest times to the present day and in every country of the world one of the universal aims of education has been the developing of the abilities and tendencies of human beings in such a way that they may be able to achieve maximum adjustment, both personal and social.

It is believed by many modern educational philosophers, from Pestalozzi and Froebel of the west to our own Gandhiji and Swami Vivekananda, that every individual possesses latent powers which could be drawn out through the process of education.

In the modern context, education is regarded as an important tool for social change as it tends to work towards the structural transformation of the society. In the course of the evolution of mankind, scientific discoveries and inventions have enabled man to lead a civilized and comfortable living. Moreover, advancement in science and technology have accelerated the economic growth of the nation and thus enhanced the process of modernization. The rapid development of science is
revolutionising the conditions of life and society and its impact is now felt in every walk of our life. No one can deny the fact that science and technology have become the part and parcel of the modern society. Hence, science has gained a pivotal position in the modern educational scenario.

ROLE OF SCIENCE EDUCATION IN THE MODERN SOCIETY

The word ‘science’ comes from the Latin word ‘scientia’ that means ‘knowledge’. The term science, in the sense of knowledge, was used for long to include the entire subject matter of study.

Einstein says. “Science is an attempt to make the chaotic diversity of our sense experience correspond to logically uniform system of thought”.

Modernization is marked by industrialization, urbanization, vocationalization and use of technology in education, agriculture, communication, transport, etc. It is a proven fact that modernization has been possible mainly due to the development of science and technology.

According to Education Commission (1964-66), modernization aims at adoption of science based technology, keeping pace with explosion of knowledge and the quick rate at which social changes takes place. While describing the characteristics of modernization, M.Inklets lists development of scientific attitude as one of its major characteristics. Scientific attitude, which is the adoption of scientific method for solving day-to-day problems, can be developed through science education imparted as a skill based subject. In accordance with such views, Education Commission (1964-66) has stated that science
education must become an integral part of school education, and ultimately some study of science should become a part of all courses in the humanities and social sciences. The quality of science teaching is to be developed considerably so as to achieve its proper objectives and purposes. Main sources for the formulation of objectives are the needs and capabilities of the learner, the need of the society, the nature of the subject matter and the nature of the educational system. Objectives, which decide the teaching learning processes, should be based on the three domains, namely cognitive, affective and psychomotor domains so as to attain the expected learning outcome.

Among its various aims, vocational aim of education has been regarded as one of the important aims by many educationists. As a result of modernization, industrialization gets momentum and the industrial expansion makes new demands of skilled personnel at different levels. These personnel should possess a sound knowledge of science to fulfil their professional requirements. Since, learning science provides a wide scope for today’s youth in choosing their future career, science education finds a significant place in the modern society.

The important recommendations of the National Policy on Education, 1986 in regard to science education in general are; science education should develop well-defined abilities and values such as the spirit of inquiry, creativity, objectivity, the courage to question and aesthetic sensibility. The facts, methods and practices of science should be used as tools for attaining these abilities and values.
In today’s context, teaching science should be innovative and it should aim at developing scientific skills. Science education programmes should enable the learner to achieve problem-solving and decision-making skills and discovering the relationship of science with health, agriculture, industry and other aspects of daily life. It should also involve technology in developing scientific skills.

EDUCATIONAL TECHNOLOGY

Educational Technology principles are applicable to all topics and subject and hence to all curriculum development. Educational Technology is made up of two words (1) Education and (2) Technology. Before we consider the meaning and objectives of Educational technology it will be desirable to mention the concept of technology itself.

TECHNOLOGY

The word ‘technology’ is derived from, the Greek word ‘technic’ meaning art or skill and ‘logia’ meaning science or study. Thus technology is the science or study of an art or skill. ‘Technology of things’ is the application of scientific knowledge to practical tasks by organisation that involves 2M’s-men and machines.

*Hierra, A., (1973)*: Technology is the set of instruments and skills which are used to satisfy the needs of the community.

*Page, T., (1976)*: Technology is the application of scientific knowledge to a practical purpose.
MEANING OF EDUCATIONAL TECHNOLOGY

Educational Technology is a system of 5 M's namely machines, materials, media, men and methods which are interrelated and work together for the fulfillment of specific educational objectives. 'Technology Explosion' has yielded several new machines, materials and media which have great potential for use in the educational enterprise. A judicious use of these together with new functions and roles of educational personnel can bring about more efficient and effective teaching-learning.

NATURE OF EDUCATIONAL TECHNOLOGY

Educational technology is often considered to be the intermix of two aspects—technology of education and technology in education.

Technology in education is the application of technology to any process of the educational enterprise. It refers to the use of the technological advancement in terms of various equipment, materials and machines for educational purposes. It involves the increasingly complex range of audiovisual equipment, hardware and sophisticated electronic
devices like projectors, films, radio, television, tape recorder, teaching machines, teletext, computer, projectors (OHP, LCD) for individualized and group learning.

Technology of education symbolizes a technological approach to education. It is the application of psychology of learning theories, principles of instruction, curriculum and learning to the process of education.

DEFINITIONS OF EDUCATIONAL TECHNOLOGY

Scottish council of Educational Technology: Educational Technology is a systematic approach to designing and evaluating learning and teaching methods and methodologies and to the application and exploitation of media and the current knowledge of communication techniques in education, both formal and informal.

The International Commission on the Development of Education: Educational technology is defined as, the intellectual and operational efforts to rearrange, to regroup or to systematize applications of scientific methods for the organization of (scientific method) equipment and material to optimise the learning process.

The Educational Technology department of the San Diego State University: Educational technology focus on the emerging technologies and behaviour/learning theories as Educational Technology is the application of research, learning theory, emergent technologies and child and adult psychology to solve instructional and performance problems.
U.S. President Commission of Enquiry (1979): Educational technology may be defined as a systematic way to designing, carrying out and evaluating a total process of teaching and learning in terms of specific objectives based on findings from research on human learning and communications.

NCERT defines educational technology as the means of development, application and evaluation of three different things: i) techniques, ii) system and iii) aids to improve the process of human learning.

GENERAL OBJECTIVES OF EDUCATIONAL TECHNOLOGY

Hillard Jason has stated the following major objectives of educational technology:

1. Transmitting information,
2. Serving as role methods,
3. Assisting the practice of specific skills, and
4. Contributing to the provision of feedback.

MACRO LEVEL OBJECTIVES OF EDUCATIONAL TECHNOLOGY

1. Identification of educational needs and aspirations of the community.
2. Determination of the aims of education, broad strategies and structure of education.
3. Developing a suitable curriculum with interaction of arts, human values and sciences.
4. Identification of man-material resources and strategies for achieving the desired aims of education.

5. Developing certain models leading to improvement in the process of teaching-learning.

6. Identification of major constraints in the environment and the ways and means of tackling them.

7. Assisting in extending vocational opportunities to masses especially neglected sectors of society.

8. Managing the entire educational system covering planning, implementation and evaluation phases.

MICRO LEVEL OBJECTIVES OF EDUCATIONAL TECHNOLOGY

1. Identifying and analysing the characteristics and educational needs of the students.

2. Determining the specific class-room objectives and stating them in behavioural terms.

3. Analysing the contents of instruction and organising them in proper sequence.

4. Identifying the available teaching-learning material and resources.

5. Identifying the nature of the interaction of the sub-systems like students, teachers, teaching-learning material, content of instruction and methodologies.
6. Evaluating the effectiveness of the class-room teaching in terms of the student’s performance or change in behaviour.

7. Providing appropriate feedback to the students as well as teachers to bring modification in the teaching-learning process.

SCHOOL SYSTEM IN TAMILNADU

To the ancient Greeks, the word “schole” (school) meant leisure or recreation and was used by them to describe those groups of leisured thinkers who gathered to pursue their enquiries into the nature of universal ideas.

A “School” is an institution meant for providing adequate knowledge and information that would enable a student to secure an appropriate slot in society ensuring a decent comfortable living.

In Tamil Nadu state, the formal school education system are classified into four categories such as

1. Primary Education – 5 Years of Schooling
2. Secondary Education – 8 Years of Schooling
3. High School Education – 10 Years of Schooling
4. Higher Secondary Education – 12 years of schooling

These schools are administered by the different government boards or administrative structure. In Tamil Nadu, four types of systems are functioning viz. Central Board Secondary Education (CBSE), State Directorate of Secondary Education, Inspectorate of Matriculation School
(IMS) and Inspectorate of Anglo Indian schools (IAIS). The CBSE is administered by the central Government of India and other are by state government.

OBJECTIVES OF TEACHING SCIENCE AT HIGH SCHOOL LEVEL

National Policy on Education (1986) suggests that High school level education should prepare and train the students to be self motivated learners in order to become efficient functionaries in a larger system of the society. Since a student may enter the world of work or take up vocational or academic courses after high school education, it is deemed as the appropriate stage for the initiation of the future intellectual society. Developing scientific attitude which enables an individual to be competent in solving problems becomes necessary at this stage of education. Hence, the extended and intensified aims of teaching science at the high school level are to enable the students to recognize the role of science in day-to-day life, to promote interest in students to use science as an important tool for developing industries, agriculture and medicine and to develop in the students critical thinking and scientific attitude.

EDUCATIONAL TECHNOLOGY IN SCIENCE TEACHING

The advancement of science and technology which enhances the modernization of the society, has been found to play an important role in making teaching- learning process interesting and accessible to many people. Though the role of a teacher cannot be ruled out in a classroom situation, promoting new methods using educational technology to make education relevant and easy is important in today’s context. Educational
technology not only helps to overcome the difficulties faced by the teacher in the class but also improves the quality of education.

**APPROACHES TO TEACHING SCIENCE**

A variety of approaches has been proposed to teach science in order to develop practical skills effectively. However, any approach becomes successful only if the teacher is eclectic enough to combine all the methods judiciously so as to produce best results. Various methods should supplement and complement each other. In the modern educational context, the teaching-learning process has been moving from teacher-centered approach to learner-centered approach. While the laboratory-experimental method, problem solving method, project method, programmed learning, co-operative learning, computer Assisted Instruction (CAI) method, multi-media learning, Activity Based Learning (ABL) and Active Learning Method (ALM) follow child-centred approach. Chalk and talk method, demonstration method, historical method, biographical methods and the modern team teaching are considered to be teacher-centred in their approaches.

However, a single method cannot be stated as the best to teach science. Each method is unique in nature and it is necessary to use a variety of techniques to avoid boredom in the classroom in learning science concepts. Some techniques and strategies however, seem to be more suitable to achieve particular objectives in a particular class at a particular time. Moreover, learning to think is the major process goal among many other goals of teaching science but it can be hardly satisfied by resorting to a single mode of the teaching learning process.
INSTRUCTIONAL STRATEGIES AVAILED IN THE STUDY

CONVENTIONAL METHOD

Even after the availability of technology in education, the conventional method or chalk and talk method still finds its place in Indian classrooms. Owing to the flexibility of this method, the instructors adapt themselves to the subject matter, achievement level of learners, time limit, available apparatus and equipment in a very short notice. The interaction between the instructor and the learner is highly accelerated in this method. Ability to get the learners’ attention through voice-modulation suitable non-verbal communications such as gestures, posture and movement are considered to be the advantages of this method. Moreover, the physical environment of the conventional method may give security to some learners as they are doing the right thing by being present along with their co-learners at the right place, at the right time and respond to the instructor in one way or other. However, modern educational experts are of the view that the conventional method enhances more teaching, rather than learning in a classroom.

ACTIVITY BASED LEARNING (ABL)

Activity Based Learning is one of the latest trend in science teaching. The basis of Activity Based Learning (ABL) method is skill development. It considers 663 skills to be developed at school level. The word activity suggests that something is active. Learning takes place all the time when our senses are activated. Sometimes only one or two senses may be used. The greater the number of senses, as a rule, the better
is the quality of learning. John Dewey said, “we learn by doing and reflecting on what we do”.

ABL ensures that each and every child participates fully in each activity. The gap between the students and the teacher is lessened and hence the teacher gets an opportunity to act as a facilitator, rather than a task master in the classroom. Teacher can spend more time with the slow learner.

Pupils learn at their own pace. Even if the pupil is absent on a particular day he can continue from the place where he was left after he comes back. Students are given full freedom to select the learning experience on their own. Self learning, group learning and peer group teaching are encouraged.

PRACTICAL SKILLS

The purpose of science teaching is not only to acquaint the students with the knowledge of scientific facts, concepts and principles pertaining to these subjects but also to develop practical skills and scientific attitudes in the students.

Doing with one’s own hands leads to better understanding about the processes of the science and will enable pupils to apply them in familiar as well as unfamiliar situations. A well-organized programme for practical work will develop interest among students and appreciation of environment. Unlike the objectives in the cognitive domain, psychomotor skills can be developed only by doing practical work. Therefore, development of skills is the most predominant objective of practical work in science. Psychomotor skills include manipulative skills, dissertational
skills, observational skills, drawing skills, reporting skills, etc. All these skills must be taken care of while teaching the science subjects.

The skills of science have been variously defined. Perhaps, the most widely accepted definitions are those given by the commission on science education of the American Association for the Advancement of Science. Within this system, which formed the basis for the Science-A Process Approach (SAPA), the skills for doing science are categorized into eight primary process and five integrated processes skills.

The primary process skills are observing, classifying, measuring, communicating, inferring predicting, recognizing space-time relations and recognizing number relations. The integrated process skills are formulating hypotheses, making operational definitions, controlling and manipulating variables, experimenting and interpreting data. The integrated process may be viewed as the combination of the primary process and are generally taught to children who have already acquired the primary process skills. The activities described are not necessarily from the SAPA programme, nor do they indicate the complete scope of the process skills.

**NEED FOR THE STUDY**

Up to now, teaching of science has been content-based with little importance given to skill development in high school. The present science curriculum is found to contain many defects regarding practical aspects. The National Policy on Education (1986) and Secondary Education Report (1952-53) have confirmed the defective nature of the present curriculum being narrowly conceived. It is bookish and
theoretical; it is overcrowded without providing rich and significant contents. It also does not cater to the various needs and capacities of adolescents, and is dominated too much by examination. These reports emphasize the need for giving more importance to practical skills in science at high school level.

Activity Based Learning is one of the latest trend in science teaching. The basis of Activity Based Learning (ABL) method is skill development. It considers 663 skills to be developed at school level. Prof. John Deway said “We learn by doing and reflecting on what we do. Activity method is not just messing around nor doing a little of this and a little of that in the hope that things will improve. Just as in the physical sciences, it implies a coherent body of ideas, a theory that gives direction to effort. Mere activity is not experience. A stream of meaningful experiences be provided. That kind of present experience should be selected and emphasized which lives fruitfully and creatively in the course of future experiences.” The above discussion establishes the need for the present study.

STATEMENT OF THE PROBLEM

Since time immemorial, the instructional activities in the classroom are based on the transfer of knowledge from the teacher to the learner. The advent of educational technology has dramatically changed the teaching-learning process. By reviewing various theories, the investigator is motivated to evolve a suitable strategy to develop appropriate practical skills needed for the students in the high school level. The present study
is “EFFECTIVENESS OF ACTIVITY BASED LEARNING (ABL) 
AS COMPARED TO CONVENTIONAL METHOD OF 
TEACHING IN THE CONTEXT OF DEVELOPING PRACTICAL 
SKILLS IN SCIENCE”.

SCOPE OF THE STUDY

The investigator, using the accumulated experience as a bachelor teacher in science handling classes from IX and X over a decade and working as lecturer in physical science in B. Ed College, has been able to observe the absence of practical skills in science in the students at high school level. The traditional method of science teaching at high school level has not produced the requisite skills among the students. Hence, the investigator has selected experimental research in finding out the effectiveness of ABL method compared to the conventional method at high school level.

NCERT Guidelines on science teaching (1990), National Policy of Education (1986) and Report of Education Commission (1964-66) have also insisted on development of skills in children. It is a well established fact that ABL helps to achieve the educational goals. The present study tries to establish the effectiveness of ABL compared to conventional method in developing practical skills in science at high school level. The ABL package prepared for the present study has been tried out to test its authenticity and validity. The above discussion establishes the scope of the present study.
TITLE OF THE STUDY

The title of the study is precisely stated below:

“EFFECTIVENESS OF ACTIVITY BASED LEARNING (ABL) AS COMPARED TO CONVENTIONAL METHOD OF TEACHING IN THE CONTEXT OF DEVELOPING PRACTICAL SKILLS IN SCIENCE”.

OBJECTIVES OF THE STUDY

In any research in education there is a need to operationalise the objectives in behavioral terms. They should be achievable and measurable as well, with these things in view, the objectives of the study are stated as follows:-

1. To elaborate and examine the different instructional processes using conventional method and activity based learning (ABL) method as alternative strategies in teaching science for the development of primary process skills, integrated process skill and scientific communication skills among the IX Std students.

2. To study and develop the Activity Based Learning (ABL) package in science for the IX Std students for the development of primary process skills, integrated process skills and scientific communication skills.

3. To develop a CRT for assessing the achievement of primary process skills, integrated process skill and scientific
communication skills among IX Std students at demonstration and extension stages.

4. To find out the relative effectiveness among conventional and ABL methods of teaching in terms of development of primary process skills, integrated process skills and scientific communication skills in IX Std science at demonstration and extension stages.

5. To study whether the different instructional strategies viz conventional and ABL methods are effective in realizing the instructional objectives in science of IX Std students as measured by pre and post-test at demonstration and extension stages.

6. To study whether there is any significant difference among different instructional strategies viz conventional and ABL methods in terms of their effectiveness in science at IX Std level as measured by the post-test at demonstration and extension stages.

7. To study the relative effectiveness among conventional and ABL methods in terms of development of primary process skills, integrated process skills and scientific communication skills among the IX Std students as measured by the post-test.

8. To study the student’s reaction towards the Activity Based Learning (ABL) package.
9. To study the teachers attitude towards the Activity Based Learning (ABL) package.

HYPOTHESES OF THE STUDY

The hypotheses of the study are stated as follows:

1. There is significant difference between the students of the control and experimental groups in terms of their primary process skills, integrated process skills and scientific communication skills as measured by the mean scores of pretest at the demonstration stage of the study.

2. There is significant difference between the mean scores of the pre and posttest of the control group in terms of their primary process skills, integrated process skills and scientific communication skills at the demonstration stage of the study.

3. There is significant difference between the mean scores of pre and posttest of the students of the experimental group in terms of their primary process skills, integrated process skills and scientific communication skills at the demonstration stage of the study.

4. There is significant difference between the students of the control and experimental groups in terms of their primary process skills, integrated process skills and scientific communication skills as measured by the posttest at the demonstration stage of the study.

5. There is significant difference in the mean scores of performance in pretest of control group in terms of their primary process
skills, integrated process skills and scientific communication skills at the demonstration stage of the study.

6. There is significant difference in the mean scores of performance in posttest of control group in terms of their primary process skills, integrated process skill and scientific communication skills of the demonstration stage of the study.

7. There is significant difference in the mean scores of performance in pretest of experimental group among the primary process skills, integrated process skills and scientific communication skills at the demonstration stage of the study.

8. There is significant difference in the mean scores of performance in posttest of experimental group among the primary process skills, integrated process skills and scientific communication skills at the demonstration stage of the study.

9. The students show favorable reaction towards the learning package at the demonstration stage of the study.

10. There is significant difference between the students of the control group and experimental groups in terms of their primary process skills, integrated process skills and scientific communication skills as measured by the pretest scores at the extension stage of the study.

11. There is significant difference between the students of the control and experimental groups in terms of their primary process skills, integrated process skills and scientific communication skills as
measured by the scores of posttest at the extension stage of the study.

12. There is significant difference between the pretest and posttest scores of the students of the control group in terms of their primary process skills, integrated process skills and scientific communication skills at the extension stage of the study.

13. There is significant difference between the pre and posttest scores of the students of the experimental group in terms of their primary process skills, integrated process skills and scientific communication skills at the extension stage of the study.

14. There is significant difference in the mean scores of performance in pretest of control group among the primary process skills, integrated process skill and scientific communication skills at the extension stage of the study.

15. There is significant difference in the mean scores of performance in post-test of control group among the primary process skills, integrated process skills and scientific communication skills at the extension stage of the study.

16. There is significant difference in the mean scores of performance in pretest of experimental group among the primary process skills, integrated process skills and scientific communication skills at the extension stage of the study.

17. There is significant difference in the mean scores of performance in posttest of experimental group among the primary process skills,
integrated process skills and scientific communication skills, at the extension stage of the study.

18. The students show favorable reaction towards the ABL package at the extension stage of the study.

19. The teachers show positive attitude towards the ABL package.

METHODOLOGY IN BRIEF

CONTROL GROUP

The group of students who are taught the content by the conventional method of teaching and do not receive any reinforcement through self instructional methods of teaching is called control group in the study.

EXPERIMENTAL GROUP

The group of students who learned the content and develop the skills through activity based learning method of teaching is called experimental group.

A research process consists of series of actions or stages necessary to carry out the research effectively and the desired sequencing of these stages. To fulfil the objectives of the study, it was carried out in five stages.
DEVELOPMENT OF ACTIVITY BASED LEARNING (ABL) PACKAGE

SELECTION OF CONTENT AREA FROM IX STD SCIENCE

Selection of content area is very important because some of the areas would not involve practical activities for the development of the skill. The area should be such that it should utilize their cognitive level. Keeping this in mind, the investigator has analysed and finally selected the following lessons for the preparation of Activity Based Learning package. The content analysis is given in the Appendix (1).

LESSONS

1. Measurements
2. Force and motion
3. Newton’s Law of Motion
4. Work, Power, Energy
5. Heat and Temperature
6. Wave motion and Sound
7. Light
8. Nature of Matter
9. Chemical Reactions
10. Coal and Petroleum
11. Reproductive Biology
12. Our Environment
SELECTION OF THE COMPONENTS OF SKILLS

In spite of the fact that the practical skills to be developed among the students are plenty, the investigator has selected a few skills for his study after reviewing the practical skills science a process approach (SAPA) format given in Science A Process Approach considering the age, nature and level of the students observation, Identification, Classification, Measuring and Inferring are considered as primary process skills whereas Formulation of hypotheses, Experimental setup, Testing hypotheses, Revision of hypotheses and Generalization are considered as integrated process skills and scientific communication skills include Inquiry, Tabulation, Drawing, Graphical, Representation and Interpretation.

STRUCTURE OF ABL PACKAGE

With the ultimate aim of promoting individualized instruction, this ABL package is developed, considering the level of students, materials and facilities available in the school considering the level of the students, materials and facilities available in the schools and attitude of the teachers. Fifteen scientific skills are identified to be developed in IX std students. The structure of ABL package specifies the title, defines the objectives, describes the activities and outlines the feedback followed by the post test.
DEVELOPMENT OF CRITERION REFERENCED TEST (CRT)

Criterion – Referenced Test (CRT) tells us about student’s level of proficiency in or mastery of some skills or set of skills. The investigator has selected test retest (pre-test, post test) method because it is the most often used technique for determining reliability and validity.

PILOT STAGE

INDIVIDUAL TRYOUT

In order to determine the effectiveness and feasibility of the ABL package, the programme was tried with a single student at a time and he was observed for his reaction and the part of the package that needed revision was found out. Six students of different levels namely two- bright, two average and two below average were selected through an interview from C.S.I Boys Higher Secondary School, Coimbatore. A pretest was administered to confirm that they do not process previous knowledge on the skills. Each activity of the ABL package was written on a sheet of paper. Correct responses for the practical activity, which will not be visible to the pupils, were given separately. Materials to be used while experimenting or learning were supplied to them. Bright students were selected first and they were given all the instructions which were in the written form. Average students were involved next and finally below average students were involved. The students were then asked to go through each activity. At the end of the programme, posttest was administered and the effectiveness of the learning packages was analysed.
DEMONSTRATION STAGE

The investigator had done the field work under classroom conditions at Sri. Baldevadas Kikani Vidya mandir Higher Secondary School, Coimbatore. 62 students from class IX were selected for the experimental treatment. The method used for the present stage was quasi-experimental design known as pretest-posttest, parallel equated group method. Group ‘A’ was considered as the control group which was treated with conventional method used by the regular school teachers. Group ‘B’ was considered as the experimental group which received the experimental treatment by the investigator using ABL package. The following tools were used in this stage.

1) ABL package
2) Criterion Reference Tests (Pre and Post tests)
3) Students Reaction Scale for ABL package

EXPERIMENTATION

Pretest

On the first day, control and experimental groups were diagnosed for their primary process skills through the pre test. While Integrated process skills were tested on the second day, scientific communication skills were tested on the third day.

The three divisions of skills consist of five skill components and each component carries a maximum of 4 marks and the time allotted was 45 minutes. A copy of pre-test question paper and scoring key are given in Appendix (4) and (5).
Treatment

The investigator had given the treatment to the experimental group using ABL package. The control group was taught by the concerned science teacher with regular lesson plan for the same content. Copy of ABL package is given in appendix (2).

Post Test

At the end of the treatments, the control and experimental groups were administered the post test by the same criteria as in the protest. A copy of post test and scoring key are given in appendix (6) and (7).

The scores obtained in the pre and post-tests by the 62 students were collected, tabulated (See Appendix -10A, 10B, 10C, 10D) and analyzed by the investigator.

EXTENSION STAGE

SAMPLING PROCEDURE

Ten high schools which follow State Board Syllabus were identified for the present study. Among the schools, one class each was selected from eight schools, two classes from the ninth school and four classes from the tenth school with a total number of 14 classes from 10 schools were selected for the experiment. Applying parallel equated group, technique, 822 number of students were taken from standard IX as the sample for the present study.
TOOLS

The following tools were used at this stage
1. ABL package
2. CRT (Pre and post-tests)
3. Student Reaction Scale for ABL package

EXPERIMENTATION

The investigator had arranged orientation program for science teachers from 10 experimental schools to train in ABL package, CRT and their procedures. The time slot was given as in the demonstration stage. These teachers were requested to adopt the procedure to give the ABL as well as conventional treatment to the needed students. Frequent visits were made by the investigator during the pre-test, treatment and the post-test activities to observe the experimentation and positive suggestions were made wherever needed. The scores obtained in the pre and post-tests by the 822 students from the 10 schools were collected, tabulated (See Appendix- 10E, 10F, 10G, 10H) and analyzed by the investigator.
TOOLS USED IN THE STUDY

i) Activity Based Learning packages

ii) Criterion referenced tests (pre and post-tests)

iii) Low cost improvised materials

iv) ABL package Evaluation Proforma

v) Attitude Scale for IX std Science Teachers

vi) Students reaction scale for ABL package.

STATISTICAL TECHNIQUES USED IN THIS STUDY

i) Mean and Standard Deviation

ii) t- test

iii) F- test

DELIMITATIONS OF THE STUDY

The following are the delimitations of the study

1. The study is limited to the performance of IX Std students only in science subjects.

2. Only a few units from IX Std science curriculum are considered for the study.

3. Due to the constraints of time, money and administrative difficulties, the investigator has decided to take only conventional and ABL method of instruction for research.
BRIEF RESUME OF THE SUCCEEDING CHAPTERS

The study is reported in six chapters as follows; In chapter I, the problem has been introduced and the need for the study has been highlighted.

In chapter II, conceptual framework of the study is elaborated. It includes the theoretical and conceptual background of the instructional strategies in development of practical skills.

In chapter III, brief notes related to some of the previous researches conducted in the related areas are presented.

Chapter IV explains the methodology adopted while conducting this research in detail. It explains the development of Activity Based Learning (ABL) package, procedure adopted for conducting the experiment, tools, sampling and the data collection techniques used in the study.

Chapter V represents the details of the data analyzed, their interpretations and the testing of the hypotheses.

Chapter VI summarizes the findings and conclusions drawn from the results of the study. Some suggestions for further research in Activity Based Learning instruction have also been given in this chapter.