CHAPTER - I

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CHAPTER – 1

PROBLEM AND ITS PERSPECTIVE

1.01 INTRODUCTION

In confronting the many challenges that the future holds in store, humankind sees in education an indispensable asset in its attempt to attain the ideals of peace, freedom and social justice. Education has a fundamental role to play in personal and social development. Education is not a miracle cure or a magic formula opening the door to a world in which all ideals will be attained, but as one of the principal means available to foster a deeper and more harmonious form of human development and thereby to reduce poverty, exclusion, ignorance, oppression and war.

We are thinking principally about the children and young people who will take over from today's generation of adults, the latter being all too inclined to concentrate on their own problems. Education is also an expression of affection for children and young people, whom we need to welcome into society, unreservedly offering them the place that is theirs by right therein - a place in the education system, to be sure, but also in the family, the local community and the nation. This elementary duty needs to be constantly brought to mind, so that greater attention is paid to it, even when choosing between political, economic and financial options.

The hope for a world that is a better place to live in, where people will have learned to respect the rights of women and men, to show mutual understanding, and to use advances in knowledge to foster human development rather than to create further distinctions between people and mitigate their conflicts. Our century has been as much one of sound and fury as of economic and social progress - progress that in any
case has not been equally shared. At the dawn of a new century the prospect of which evokes both anguish and hope, it is essential that all people with a sense of responsibility turn their attention to both the aims and the means of education. Education is an ongoing process of improving knowledge and skills, it is also - perhaps primarily - an exceptional means of bringing about personal development and building relationships among individuals, groups and nations.

There is the central role of brainpower and innovation, the transition to a knowledge-driven society, the endogenous processes that make it possible to accumulate knowledge, to incorporate new discoveries and to apply them in different areas of human activity, from those related to health and the environment to the production of goods and services. It is also aware of the limits, and even the failures, of attempts to transfer technologies to the most impoverished countries, precisely because of the endogenous nature of methods for the accumulation and application of knowledge. This is why it is necessary, among other things, to become familiar at an early age with science and the uses of science, and with the difficult task of assimilating progress in such a way that human identity and integrity are fully respected. School should impart the desire for, and pleasure in, learning, the ability to learn how to learn, and intellectual curiosity. One might even imagine a society in which each individual would be in turn both teacher and learner. For this to come about, nothing can replace the formal education system, where each individual is introduced to the many forms of knowledge. There is no substitute for the teacher-pupil relationship, which is underpinned by authority and developed through dialogue. This has been argued time and time again by the great classical thinkers who have studied the question of education. It is the responsibility of the teacher to impart to the
pupil the knowledge that humankind has acquired about itself and about nature and everything of importance

"We want Shraddha, we want faith in our own selves. Strength is life, weakness is death. We are the Atman, deathless and free; pure, pure by nature. Can we ever commit any sin? Impossible!' — Such a faith is needed. Such a faith makes men of us, makes gods of us. It is by losing this idea of Shraddha that the country has gone to ruin."

Swami Vivekananda

In forming now Information Age economy knowledge and skills become the key factor of competition. New Knowledge Based Companies incorporates constant technologies' development and change as well as learning acquired skills in their production system. Internet and Global Information Infrastructure development in the world changes the main paradigm in Education and Research. Education should respond on global challenges of forming Information Society in providing necessary background for successful people living in this new knowledge based formation:

- forming base knowledge and motivation for constant improvement of knowledge and skills
- forming moral principles of coexistence in open information system accepting of majority of truths and inadmissibility of harmful actions because of its possible global impact in information environment
- setting up life-long learning self-motivation
- Provide free access for learning and training materials.
Students are learning in cooperative project based environment oriented on producing final results that help them to acquire knowledge in adjacent areas of common project group competence. The real challenge for countries with emerging technologies in Professional Education on IT and IT based courses is Constructivist instructional methodologies incorporating active position of teacher and students in tight interaction with global information environment:

- **Project or Problem Based Learning (PBL)** that is effective in information and knowledge rich environment with developed infrastructure.
- **Cooperative and Contributive Learning (CCL)** that is PBL adapted to the conditions of emerging technologies and developing communication and information infrastructure.

### 1.02 SCIENCE EDUCATION

“It is Science alone that can solve the problems of hunger and poverty, insanitation and illiteracy, of superstition and deadening customs and tradition, of vast resources running waste, of a rich country inhabited by the starving people. Who indeed could afford to ignore Science today? At every turn we have to seek its aid. The future belongs to Science and to those who make Friends with Science.”

Jawaharlal Nehru

The age of discovery, “new world commences” with the invention of the mariners compass, the western European nations virtually conquered the world with their supremacy over the sea. The changes brought in their society by the scientific discoveries not possible for those who remained untouched by the advance in science, of course all the advances made by science are automatically circumscribed by the
societal frame of political, cultural and economic institutions that exist in every country. These established institutions are “statuesque” and oppose scientist who dare challenge their gospel truths when new discoveries are made and yet advancement of humanity has become possible only because of the efforts of the scientists who have scientific outlook towards life and the world and who dare challenge the established institutions of the society. This is an age old confrontations between the two, yet throughout the history of man kind, we are a gradual but continuous advance in science and technology which now acquired a break – neck speed in our times.

The steady movement towards mechanization, industrialization, and urbanization lead the growth of society. The growth of every country depends on the use of science and technology in all areas of the society. In order to achieve these people well aware of about the use of science and technology. Education should play key role to develop Scientific Attitude, Knowledge, Process Skills and Scientific Outlook in the people .The existing education system and their objective also revitalized to a Competency Based Education.

Science education would be designed to develop the curiosity of young people about the natural world around them, and help them acquire a broad appreciation of the important ideas and explanatory frameworks of science and how scientific enquiry works. The processes and ideas of science are of great importance to everybody in three ways. The first is in their personal lives, for example so that they can validly identify the components of a healthy life-style. The second is in their civic lives, so that they take an informed part in social decisions, for example on future options for electricity supply. The third is in their economic lives, where they need to be able to respond positively to changes in the science-related aspects of their employment.
If the major purpose of science education is to increase the flow of specialist scientists, technologists and engineers, it could be argued that young people with a special talent in science should be identified as early as possible and provided with a separate, specialized, and highly focused science education. We do not agree such people share the general need for a broad science education and should not be cut off from it. In any case, there are no valid and reliable ways in which such young people may be identified. Some who show early promise subsequently fade, whilst the talents of others emerge later on. Young people today show an appetite for a broadly-based education based on themes of proven interest, and developing a range of transferable skills. They would resist any attempt to foreclose their choices. We believe that the best way forward is to provide the highest grade of ‘science education for citizenship’ for all students. If that education is sufficiently challenging and interesting, genuine high achievement will become more widespread and will become apparent through students’ creativity, lateral thinking, and persistence. The young people who demonstrate such achievement will be increasingly motivated to follow science-related careers. There must be a greater recognition of what students bring to their studies and how different teaching methods engage with their learning. The diversity in students’ learning strategies must be met by the use of suitable teaching methods.

The purpose of science education is to enable individuals to use scientific process skills, knowledge, attitude to be able to define the problem around them, to observe, to analyze, to hypothesize, to experiment, to conclude, to generalize, and to apply the information they have with the necessary skills. The scientific process skills, scientific knowledge, scientific attitude are a necessary tool to produce scientific information, to perform scientific research, and to solve problems. These skills, knowledge, and attitude can be gained by students through certain science education
activities (Harlon 1999, Happart, Homask and Lazaroycitz 2002). The students undertaking a scientific research study can learn the processes of science (Dhillon 1996).

The new curriculum emphasizes on process domain, application domain, attitude domain, creativity domain, and nature of science domain for achieving those objectives. Different types of activities are designed by the educational experts such as Group Activities, Project, survey, discussion, seminars, symposium etc. But in science education these activities not enough for develop the process competencies of the pupil. The process competencies are developing only by giving more importance to mental activities of the pupil.

1.03 NEED AND SIGNIFICANCE OF THE STUDY

“Learning to know, learning to do, learning to live together, learning to be are four pillars of education in 21st century”  

UNESCO

Learning to know implies learning how to learn by developing one's concentration, memory skills and ability to think. From infancy, young people must learn how to concentrate - on objects and on other people. This process of improving concentration skills can take different forms and can be aided by the many different learning opportunities that arise in the course of people's lives (games, work experience programmes, travel, practical science activities, etc.).UNESCO, four pillars of education, learning to know 2nd para.

In science education, earlier there is a notion that the concept, theories and principles are important in learning. Education simply neglect the way the scientist think, and discovered the theories of science. So science education in and around the product of science. But at the end 20th century UNESCO and AAAS(American Association for Advancement in Science) give stress of the process approach in
science education, they develop 13 process competencies in schools. These framework was restructured in 1990 by AAAS and develop a framework for science learning these are knowledge domain, attitude domain, process domain, application domain, creativity domain, nature of science domain. These domains are considered process competencies in science.

But the classrooms activities are still away from developing these process competencies in pupil, to develop these process competencies a new learning package will be develop; these help the pupil to concentrate on the activities which help to develop knowledge, skills and attitude. Here concentration is the various rays of mind are collected and focused on the object of concentration.

1.04 STATEMENT OF THE PROBLEM

In tune with importance of concentration and process competencies made by the UNESCO and American association for Advancement in Science (AAAS). The investigator made an attempt to, find out the effectiveness of Concentration Based Activity (CBA) in Science Teaching and their effect on Process Competencies among Secondary School Students.

Hence the problem under investigation is entitled as “effectiveness of Concentration Based Activities (CBA) in Science teaching on the development of Process Competencies among Secondary School Students”.

1.05 OPERATIONAL DEFINITION OF THE VARIABLES

(i) CONCENTRATION

Concentration is centering the mind on one single thought. During concentration, the various rays of the mind are collected and focused on the object of
concentration. There will be no tossing of the mind. One idea occupies the mind. The whole energy of the mind is concentrated on that one idea.

(ii) CONCENTRATION BASED ACTIVITY (CBA)

Any activity meant to impart learning and make right concentration to the pupil. It may be physical or mental in nature. These may range from handling a concrete aid to properly listening a talk. It may be participation in a project or conducting visit as well.

(iii) PROCESS COMPETENCIES

Process Competencies is the ability to do something at some level of proficiency, and is usually composed of some combination of Knowledge, Process Skills, Attitude, and Values.

(iv) SCIENTIFIC KNOWLEDGE

Knowledge can be defined as the body of facts and principles accumulated by human kind or the facts, concepts or state of knowing.

(v) PROCESS SKILLS

Scientific Process Skills (SPS) includes skills that every individual could use in each step of his/her daily life by being scientifically literate and increasing the quality and standard of life by comprehending the nature of science.

(vi) SCIENTIFIC ATTITUDE

NSSE (National Society of the Study of Education) Scientific Attitude can be defined as open-mindedness, a desire for accurate knowledge and the expectation that the solution of the problem will come through the use of verified knowledge.

(vii) SECONDARY SCHOOL STUDENTS

The students belonging the standard VIII, IX, AND X are considered as the secondary school students. In the present study standard IX is taken.
1.06 OBJECTIVE OF THE STUDY

1. To compare the mean pre-test scores of Process Competencies of experimental and control groups

2. To compare mean pre-test scores and post test scores of Process Skills of experimental group

3. To compare the mean pre-test scores and post test scores of Scientific Attitude of experimental group

4. To compare mean pre-test scores and post test scores of Achievement in Biology Science of experimental group

5. To compare mean post-test scores of Process Skills of experimental and control groups

6. To compare mean post-test scores Scientific Attitude of experimental and control groups

7. To compare mean post-test scores of Achievement of Biology Science of experimental and control groups

8. To compare mean gain scores of Process Skills of experimental and control groups.

9. To compare mean gain scores of Scientific Attitude experimental and control groups

10. To compare mean gain scores of Achievement in Biology Science of experimental and control groups

11. To compare mean pre-post test scores of Process Skills of experimental and control groups

12. To compare mean pre-post test scores of Scientific Attitude of experimental and control groups
13. To compare mean pre-post test scores of Achievement in Biology Science of experimental and control groups

14. To study the development of Process Competencies between the pupils taught through Concentration Based Activities (CBA)

1.07 HYPOTHESES

The following hypotheses are formulated for the present study.

1. There is significant differences in the mean pre-test scores of Process Competencies of experimental and control groups

2. There is significant differences in the mean pre-test scores and post test scores of Process Skills of experimental group

3. There is significant differences in the mean pre-test scores and post test scores of Scientific Attitude of experimental group

4. There is significant differences in the mean pre-test scores and post test scores of Achievement in Biology Science of experimental group

5. There is significant differences in the mean post-test scores of Process Skills of experimental and control groups

6. There is significant differences in the mean post-test scores Scientific Attitude of experimental and control groups

7. There is significant differences in the mean post-test scores of Achievement of Biology Science of experimental and control groups

8. There is significant difference in the mean gain scores of Process Skills of experimental and control groups.

9. There is significant difference in the mean gain scores of Scientific Attitude of experimental and control groups
10. There is significant difference in the mean gain scores of Achievement in Biology experimental and control groups

11. There is significant differences in the mean pre-post test scores of Process Skills of experimental and control groups

12. There is significant differences in the mean pre-post test scores of Scientific Attitude of experimental and control groups

13. There is significant differences in the mean pre-post test scores of Achievement in Biology Science of experimental and control groups

14. There is significant differences in the development of Process Competencies between the pupils taught through Concentration Based Activities(CBA)

1.08 METHODOLOGY

Methodology adopted for the study was Non-equivalent Pre-test treatment – Post test design. A pre-test was administered to the pupil to test their Process Competencies before the experiment commenced in both sections. One division was exposed to the Concentration Based Activity (CBA) as experimental group, while other division was exposed to the normal teaching acted as the control group.

After that a post – test is administered to the pupil.

1.09 TOOLS TO BE EMPLOYED

The following tools will be administered for the present study:

a) Lesson transcript( based on Concentration Based Activity)

b) Lesson transcript ( based on Existing Syllabus)
c) Test of Process Skills

d) Scientific Attitude Inventory

e) Criterion Referenced Test

1.10 SAMPLE AND SAMPLING PROCEDURE

The proposed sample for the study consists of 96 students of standard IX from Secondary Schools in Thrissur district of Kerala state.

STATISTICAL TECHNIQUE

Analysis of the sample through following statistical techniques:

T-test, ANOVA, “Two Way Analysis of Variance”, ANCOVA

1.11 RESUME OF SUCCEEDING CHAPTERS

The rest of the chapter deal with Theoretical Overview, review of related literature or research studies, methodology adopted and made of data collection, analysis and interpretation of the data followed by summary and conclusion. The chapters are presented in the following order.

(i) Chapter II – Theoretical overview of the present study.

(ii) Chapter III – Review of the related literature looks into those studies that have a bearing upon the present study.

(iii) Chapter IV – Methodology of the study is discussed in detail with description of tools used for measurement, sample for the study, data collection procedure, scoring and consolidation of data, and the statistical techniques used for analysis.
(iv) Chapter V – Preliminary analysis, data is of the major statistical analysis of data, investigation of group difference and conclusion and interpretation are described.

(iv) Chapter VI – Contains a brief account of the study, major findings, tenability of hypotheses, Educational implications of the study and Suggestions for further research.