Chapter – I

Emergence of the Study

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1.1 Introduction

The progress and prosperity of any nation determined by its standards in science and technology, which is an outcome of the science education provided to its youngsters. The advancement of the developed countries provides ample evidence for this fact. Understanding the prime importance of science education in the advancement of any nation, the developed and developing countries have been attempting to improve their science education by restructuring it to fit with the needs, challenges and expectations of its people.

Education in science serves three purposes. First, it prepares students to study science at higher levels of education. Second, it prepares students to enter the workforce, pursue occupations, and take up careers. Third, it prepares them to become more scientifically literate citizens. The relative priority and alignment of these three purposes varies extensively across countries and cultures. Regardless of the setting, a sound education in science emphasizes that science is both a way of knowing and a body of knowledge; it also emphasizes integrating scientific inquiry with scientific knowledge. National Policy on Education (1992) remarks, “Science educators have the role of providing such scientifically literate citizens to the nation. To fulfill its expectation, citizens should be scientifically literate, skilled in the processes of science, acquire scientific information in depth and cultivate an appreciation for science”.

There is a shift in emphasis in the teaching of science content to that of helping students develop competence in the science processes. Science processes are intellectual skills used in collecting and analyzing data to solve problems. In all modern educational systems, science education is given through actual scientific activities experimentation and organization of first hand knowledge obtained through experimentation.

Curriculum is a dynamic component of the complex phenomenon of education which itself keeps changing in response to the needs and values of
life in any society. Thus a full understanding of the curriculum can never be achieved by analyzing it in isolation from the changing historical context of education. The current practices reflected in any curriculum should invariably be seen as moulded through past events and experiences. Our country is also influenced by the innovations in framing science curricula. Indian Educationists and planners have come to the conclusion that the study of mathematics and science should be compulsory in secondary level of our schools. Several educational commissions, committees, seminars, have been established from time to time to review the educational system of India. Among them Kothari commission played an important role in revolutionizing the educational system of India. The major recommendations of the commission regarding the science curriculum at different stages are being outline as given ahead.

It is quit evident that the curriculum for secondary education specially for secondary science education in Tripura, a small state of India, in its present form did not emerge in a day. It looks its present shape with respect to contents, practices, structure, organization and quality through a long process of evolution. A number of past events and factors have had their direct or indirect influences on growth and development of secondary science school curriculum in Tripura. Therefore, if the researcher is earnest about studying the present curriculum of Tripura as a model, he cannot neglect the sphere of earlier thoughts and influences from which the curriculum has developed into its present form. Keeping the above consideration in view, a brief historical account of curriculum innovations of Tripura with particular reference to secondary physical science subject that is treated as science in secondary level has been presented in this study.

Physical Science education is one of the major parts of secondary education. Its growth has to be seen in the context of the past historical events. Physical science teaching in India is several decades old and, of course, it started on very slow foot. The reviews issued by Government of India in the year 1887-92 deplorably reflected the sorry and shocking state of affairs in physical science teaching of that period. Even unto beginning of the twentieth
In the present century there was considerable shortage of qualified science teachers and curriculum of science education. There however occurred considerable expansion in secondary education both in rural and urban areas after the recommendation of the Calcutta University Commission. But in present century there is considerable shortage of appropriate curriculum of physical science education and qualified teacher especially in the state Tripura.

It is a hard reality that science has revolutionaries our way of living to the extent that it is now termed as ‘modern living’. Our thinking, our attitude, our interest, our outlook etc. have undergone tremendous change. Man’s material environment has been radically transformed by magic wand of science. The average span of human life has been doubled. The release of nuclear energy and green revolution are far reaching benefits of physical science. Such observation about the unique importance of science led the Kothari Commission (1964-66) to remark as under:-

“The basic approach and philosophy underlying the reconstruction of education adopted by in this Report on our deep conviction that the progress, welfare and security the nation, depend critically on a rapid, planned and sustained growth in the quality and extent of education and research in science and technology”.

Therefore going discussion reveals that man’s future is stubbornly linked to scientific advances and development of productive activity. Obviously, therefore, science must find a respectable place in the school curriculum. The entire world over, this feeling is being generated. In India, through the efforts of National Council of Education Research & Training (NCERT), physical science has been made a compulsory subject through out the secondary school stage. The views of Kothari Commission and UNESCO’s in this connection are worth considering.

The Indian Education Commission (1964-66) has suggested the aims and objectives of teaching science at various levels. The recommendations for science teaching at Secondary stage are – at the secondary stage science should be taught as a discipline of the mind and preparation of higher
education. At the lower secondary level physics, chemistry, biology and earth sciences should be taught as compulsory subjects; at the higher secondary stage there should be diversification of courses and provision of specialization. Patel Committee suggested that education during the ten years of schooling should be capable of - Promoting an understanding and appreciation of our cultural heritage, while simultaneously stimulating desirable changes in our traditional culture-pattern; Molding the learning after the image of the citizen as visualized in the constitution; Releasing learning from it bookishness and elitist character so as to relate it closely to socially productive manual work and the socio-economic situation of the country; Encouraging rationalism and scientific attitude; Emphasizing the qualities of simplicity, integrity, tolerance and co-operation in all aspects of life; Being available to every individual irrespective of caste, creed, sex, age, and place of birth or economic circumstances and in such a way that working and learning can always be combined. NPE-1986 has a package of 157 recommendations and guidance under 12 heads. The recommendations for science education in the NPE-1986 are - Science education should be strengthened so as to develop in the child well defined abilities and values such as the spirit of inquiry, creativity and objectivity. The courage to question and an aesthetic sensibility; Science education programmes need to be designed so as to enable the learner to acquire problem solving and decision making skills and to discover relationship of science with health, agriculture, industry and other aspects of daily life. They also called for special efforts to extend science education to the vast members, who have remained outside the purview of formal education. On the bass of the National Curriculum Framework for school education, the NCERT brought out guideline and syllabi for all stages in 2001. The course offered at secondary stage was termed as science and technological attitudes and skills among children. The aims of science teaching suggested are - Understands the nature of science and technology; Understands the basic principles. Concepts and laws of science; Applies basic scientific principles in finding solutions to problems related to agriculture, energy, health, nutrition etc.; Develops problem solving and decision making skills; Inculcates values that underlie science and technology; Teaching of science has been introduced as a compulsory subject at the high school level in the present system of
education. Before the 10+2 system education science was taught with an integrated approach under the head “Teaching of General Science”. Now a day the teaching of general science has been bifurcated and taught fewer than two main heads. a) Physical Science b) Life Science. The methodology of Physical Science in Madhyamik level restricted to the study of physics and chemistry only.

The Education Commission popularly known as the Kothari Commission was constituted by the Government of India by resolution dated July, 14th, 1964 to advise Govt. on the national pattern of educational and on the general principles and policies for the development of education at all stages and in all aspects. Regarding the study of science and mathematics, the Education Commission has suggested their compulsory teaching to all pupils as a part of general education during the first ten year of schooling. Apart from this teaching at the primary stage is a general way for talented pupils separates branch of study should be developed for intensive study.

The National policy on education accords a high priority to the need for overhauling the system of planning and management of education. To bring about the required changes in the system, we must know its present working. The new education policy and programme of action and various report submitted by state level education commission and committees have brought about many changes in the educational activities specially, physical science education and how the development take place?

1.2 Rationale of the study

The purpose of science education in our school is to provide experiences through which young people can acquire the knowledge, skills and attitudes that lead to patterns of behavior acceptable to the attainment of the above a science teacher has to work towards the attainment of the following goals as well. The goals of science education are:
i. To create a functional understanding of the available generalization in the body of science. It enables knowing and understanding among students.

ii. To develop coping skills which are essential for making justifiable actions in response many problems they are to face in future life.

iii. To develop manipulative skills, science education should help students to react rapidly. Physical science teaching must include lost of “What…..it?”, “How?” and “What?” questions. They must permit the students to check, forecast and alter generalizations.

iv. Only a few students will become practicing scientists. But all of them will reap the benefits of science. Hence they need to be informed about the intellectual and technological base of scientific knowledge.

Thus the minimum result of science course should be to develop a rational world in which mankind has confidence. The Ministry of Education published the proceeding of the All India Seminar on the Teaching of Science in 1956. Following all aspects of secondary science teaching was held for the first time in the “All India Seminar on the Teaching” held at Tara Devi, Shimla Hills(All India Council for Secondary Education). Such a national level discussion became necessary as soon as general science was recommended as a core subject for the secondary stage of education. The aims and objectives of teaching science at High School and higher Secondary Level recommended by the Taradevi Committee are:

i. To familiarize the pupil with the world in which they live and to make him understand the impact of science on society so as to enable him to adjust himself in his environment.

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

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

The available literature is studied by the researcher reveals that, a large number of children dropout of school because of infrastructure of school,
curriculum, different school related reasons like attitude of teachers, irrelevant curriculum, sub-standard teaching, uninteresting curriculum, family background etc. In other words different recommendations and policies which are considered to implemented to development of science education in secondary level after independent, how much they considered in the frame of curriculum development of this state. Since the last two decades the educational system in Tripura has undergone great changes, also in its administration system. At present Tripura ranks fifteen in the country with regards to the literacy rate. There is quite expansion in the number of Educational Institutions which have brought about an increase in the work load resulting in number changes in science education at different levels which persuaded the researcher to use the following issues – The school building is adequate for existing needs. Whether the furniture and equipment are adequate or not? Whether the available staff is adequate or not? Whether the library facilities are adequate or not? Whether the laboratory facilities are adequate or not? Whether the existing curriculum and syllabus needs reshuffling and change or not? Whether the admission procedure needs any change or not? Whether the institution needs additional facilities and provisions like museum, different type of modern scientific models, film strips, compact disc etc. or not? Whether the examination system needs reform or not? The available research studies reveal that no study has been carried out to examine the status of science curriculum in schools of Tripura. To find out exact present status of secondary science curriculum and examine the problems of implementation of the secondary science curriculum in the state of Tripura the researcher has done the present study. Hence the present study is entitled – “A Study of Science Curriculum of Secondary Schools in the state of Tripura” with the following objectives –

1.3 Objectives of the study

i) To study the process of curriculum development for science education of secondary level in Tripura.

ii) To study the status of Science curriculum in Secondary Schools.
iii) To ascertain the process of implementation of science curriculum in secondary schools in Tripura with regard to physical facilities, teacher qualification and training, teaching materials, contents etc.

iv) To study the problems of implementation of science curriculum in Tripura.

v) To study the academic performance in science subject at Madhyamik (Secondary) Examination for last five year.

1.4 Operational Definition of term

Science – Science is a systematic enterprise that builds and organizes knowledge in the form of testable explanations and predictions about the universe (from Latin: scientia meaning "knowledge"). An older and closely related meaning still in use today is that found for example in Aristotle, whereby "science" refers to the body of reliable knowledge itself, of the type that can be logically and rationally explained Since classical antiquity science as a type of knowledge was closely linked to philosophy. In the early modern era the two words, "science" and "philosophy", were sometimes used interchangeably in the English language. By the 17th century, "natural philosophy" (which is today called "natural science") had begun to be considered separately from "philosophy" in general. However, "science" continued to be used in a broad sense denoting reliable knowledge about a topic, in the same way it is still used in modern terms such as library science or political science.

In modern use, "science" is a term which more often refers to a way of pursuing knowledge, and not the knowledge itself. It is "often treated as synonymous with ‘natural and physical science’, and thus restricted to those branches of study that relate to the phenomena of the material universe and their laws, sometimes with implied exclusion of pure mathematics. This is now the dominant sense in ordinary use." This narrower sense of "science" developed as a part of science became a distinct enterprise of defining "laws of nature", based on early examples such as Kepler's laws, Galileo's laws, and Newton's laws of motion. In this period it became more common to refer to natural philosophy as "natural science". Over the course of the 19th century, the word "science" became increasingly associated with the disciplined study of
the natural world including physics, chemistry, geology and biology. This sometimes left the study of human thought and society in a linguistic limbo, which was resolved by classifying these areas of academic study as social science. Similarly, several other major areas of disciplined study and knowledge exist today under the general rubric of "science", such as formal science and applied science.

**Science Education** – Science education is the field concerned with sharing science content and process with individuals not traditionally considered part of the scientific community. The target individuals may be children, college students, or adults within the general public. The field of science education comprises science content, some social science, and some teaching pedagogy. The standards for science education provide expectations for the development of understanding for students through the entire course of their K-12 education. The traditional subjects included in the standards are physical, life, earth, and space sciences. Science education is an important component of the education system, which contributes in the solution of the problems of the country by developing desirable understanding, skills, abilities and attitudes.

**Secondary School** – Secondary school means that type of school where pupils of age group 11 years to 15 years are reading in the different classes from VI to X.

**Physical Science** – According to the Tripura Board of Secondary Education the subject Physical Science refers such courses of science curriculum related to which involves the contents of both physics and chemistry.

**Tripura** - Tripura is one of the seven states in the north eastern part of India located between 22 degree and 56 minutes and 24 degree and 32 minutes north latitude and between 90 degree and 09 minutes and 92 degree and 20 minutes east latitude

**Tripura Board of School Education** - Tripura Board of Secondary Education was established in 1973 by an Act (Tripura Act. No.12 ) called Tripura Board
of Secondary Education Act, 1973 as passed by Tripura Legislative Assembly. The Board started its functioning from the 1st January, 1976. Intervening period was spent in framing Rules and Regulations, Curricula and Syllabi, and such other guidelines which were being necessary for smooth and active conduct of the business of the Board. Tripura Board of Secondary Education now conducts 2(two) major Public Examinations --- Madhyamik Pariksha (Secondary Examination) and Higher Secondary (+2 stage) [ both General and Vocational courses ] Examination since 1981. With the passage of time the core curricula were also changed from time to time and ultimately adopted the syllabi as per NCF, 2000 guidelines from 2006. The Syllabi and Question Pattern as per guidelines of NCF, 2005 are under active consideration of the Board. The Tripura Board of Education has introduced the Madhyamik Madrassa Education in 2009.

1.5 Delimitation

1. Science curriculum in this study means physical science curriculum practically which was applicable in the State of Tripura under Tripura Board of Secondary Education.

2. The present study is confined only in physical science curriculum for standard of IX and X of the secondary schools under Tripura Board of Secondary Education

3. Secondary The study is delimited in physical science subject of class IX and X.

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