Chapter – VI

Major Findings and Conclusion

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6.1 Introduction

Soon after achieving independent in the year 1942, educationists, planners and administrator in India observed that secondary science education in the country had been facing acute problems, both in terms of quantity and quality. As a small and backward state of this country Tripura also had facing a lot of problem in science education simultaneously in implementation of national level secondary physical science curriculum. The full fledged education department came into in Tripura from 1952. Education department is one of the largest departments in the Government of Tripura. It was also recognized that the existing system was resulting in large scale wastage and stagnation at the secondary level. The country also visualized the potential of secondary science education for inducing the growth and development of the individual as well as of the society. In accordance with these observations, the State Government made different commitments for the development of secondary education as well as science education in the state. Thereafter, the state has indeed witnessed considerable expansion of science education facilities, thereby making it more easily accessible to a larger section of the population. Attempt has also been made to streamline and strengthen the administration of secondary education by completely nationalizing the system at the secondary level. Another major event during this period was the work of the National Education Commission, which has endeavoured to specify the goals and ideals to be pursued and the direction in which the state should move for achieving these ideals. The Secondary Education Commission Report (1952-53) pointed out the different following drawbacks in school science curriculum in India which was implemented in Tripura also as follows:

i) The curriculum is narrow in conception.
ii) It is bookish and theoretical.
iii) It is overcrowded but not providing rich and significant contents.
iv) It lacks practical experiences and other activities.
v) It is bereft of technical and vocational subjects.
vi) It is dominated by examinations.

vii) It is cut off from the life around the child.

Until the late 1970s, school education had been on the *state* list, which meant that states had the final say in the management of their respective school systems. However, in 1976, education was transferred to the *concurrent* list through a constitutional amendment, the objective being to promote meaningful educational partnerships between the central and state governments. Today, the central government establishes broad education policies for school curricula development and management practices. These serve as guidelines for the states.

The process of curriculum development in India lies between the two extremes of centralization and decentralization. From time to time, the national government formulates the National Policy on Education which includes broad guidelines regarding content and process of education at different stages. These guidelines are further elaborated by the National Council of Educational Research and Training (NCERT). Using as its foundation the NPEs of 1968 and 1986, two curriculum initiatives have been launched by NCERT:

(a) The Curriculum for the Ten-Year School—a framework (1975);


The curriculum framework prepared at the central level provides a broad overview of the school curriculum, including general objectives, subject-wise objectives, suggested scheme of studies, and guidelines for the transaction of the curriculum and the evaluation of pupil outcomes. These detailed curricula, syllabi and instructional materials are developed at the national level. The NCERT has also developed the syllabi and instructional materials used in the schools run by central organizations. However, the states consider whether to *adopt* or *adapt* the NCERT syllabi and instructional materials or adopt state secondary board framed syllabi and instructional materials. But 97.6% secondary schools Tripura according to survey are under Tripura Board of Secondary Education (TBSE) adapt the TBSE frame syllabi and instructional
materials. Few schools here adapt the NCERT syllabi and instructional materials.

Thus, the NCERT curriculum framework is always a *suggestion* rather than *prescriptive* and it is not enforceable by law in the states. However, it is readily accepted by the states because of the NCERT's credibility and the participatory development approach it follows. (The NCERT curriculum framework is developed on a consensus basis; all the states and union territories are involved in the curriculum elaboration). An important development since the National Policy on Education was formulated in 1986 has been the acceptance across the country of a common structure of education and the introduction by most states of the 10+2+3 system. There are eight years of elementary education (five years of primary school and three years of upper primary/ middle schooling) and four years of secondary education (two years of general secondary and two years of higher secondary). The education system seeks to give due recognition and importance to the social organization, traditions, customs and value systems of the various communities, particularly Scheduled Castes and Scheduled Tribes. This is supported among other ways by the development of materials and curricula in their languages.

While the progress made in terms of quantitative expansion and administrative reorganization has been appreciated by all sections of the society, improvement in the quality of education has remained as enigmatic as ever. It is needless to say that the quality of education depends greatly on the nature of the curriculum and its implementation. An important criticism made against the TBSE physical science curriculum has been it lacks an empirical base as it is not rooted in actual conditions prevalent in the secondary schools of Tripura and the real life experiences of the community where the system is in operation. Such an empirical base can be provided only if the curriculum is subjected to continuous evaluation through research studies. This is not an altogether new observation. In fact the National Education Commission has made explicit recommendation to carry out curriculum evaluation studies on a continuous basis. However, it is an unfortunate fact the TBSE curriculum has
been implemented without being subjected to any such systematic evaluation. The TBSE recommended secondary curriculum has now been in operation for more than five years. But no scientific study has been conducted till to date either to analyse its objectives and contents or to assess the actual status of its implementation in the secondary schools of Tripura. It is essential to fill this gap that the present study was formulated. The study has addressed itself to some fundamental questions related to secondary education curriculum in Tripura. An attempt has been made in the following section to present the major findings and conclusions of the study. These have been presented under five sub-heads corresponding to the five specific objectives of the investigation. In order to facilitate easy reference, specific objectives of the study are mentioned below:

6.2 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, evaluation procedures, etc.

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

v) To study the academic performance of secondary level students of Tripura in Physical Science subject at Madhymik Examination for last five years.

6.3 Major Findings and Conclusions.

Successful implementation of any curriculum depends on variety of factors that operate in the actual field setting, i.e., at the secondary level of
schools. These include physical facilities, teachers and their background, library facilities, teaching methods and procedures adopted, assessment procedure adopted and so on. It also depends on the perception of the teachers as to the problem faced by them in implementing the curriculum. Finding and conclusion of the study with respect to all these factors have presented in the following

6.3.1 Process of Curriculum Development

The findings in this section are presented, essentially, in a comparative perspective. Objectives specified by the TBSE have been compared with those formulated by the National Education Commission and also with the secondary education objectives specified by two external sources namely, the NCERT and CBSE of this country that is India.

The National Education Policies observed that secondary science education was facing different problems, especially in some stated also, such as absence of realistic and life oriented curricular content, want graded and attractive textbooks and also lack of library facilities. Keeping in view these inadequacies of the curricular content and materials and in order to achieve the objectives state secondary curriculum committee recommended that appropriate content and materials should be prescribed which would be useful for the development of mental and physical personality and world of knowledge of science of students. The curricular framers’ tendency to make the syllabus more difficult and to include more than necessary and include the materials presented in Tripura secondary curriculum which more suitable for that state environment, materials should be checked through proper evaluation by the experts in respective areas. The curricular framers’ further stated that Physical Science (including Physics and Chemistry) and Life Science (including Botany, Geology and Physics) will be taught in separate two papers of each in 100 marks in class IX and X. In preparing the syllabuses for the secondary physical science the environment and life centric knowledge should be taken into consideration. The fundamental principles of curriculum should be reflected in the secondary science syllabus. The teaching learning procedure should be work-oriented, practical and project work should be
compulsory. Emphasis should be given on introducing an integrated and balanced syllabus.

There appears to be a contextual gap between the framing, implementation of objectives, process of curriculum development by the different secondary schools of this state and the preparation of the curriculum by TBSE. It also has been found some theoretical and practical implementation difference in the process of curriculum development between TBSE secondary Physical Science curriculums and CBSE curriculum. It would have been more appropriate if the TBSE had independently, made specific statements regarding the objective and process of secondary science education. The different reports neither make any such statement nor does it clarify whether the implemented process are to be taken in toto without any further elaboration or modification. The need for such clarification arises because of the decisions of the TBSE to introduce the study of physical science at secondary stage which in some cases does not get justification in terms of the objectives specified by the National Education Commission.

It was found that the processes of development of science curriculum of TBSE and the NCERT based CBSE were similar in character but different in perspective, particularly in their implications for the way in which these were to be achieved. The comparative analysis also relevant that there was close concurrence in emphasis laid on work-experience and vocational skills, in the curriculum specified by the TBSE and CBSE.

6.3.2 Status of Science curriculum in secondary schools of Tripura

According to the survey it has been found that 97.6% secondary schools of Tripura state are under TBSE only 2.3% are under CBSE. So maximum students as well as schools are under TBSE and under State Government school education department. So in maximum secondary schools secondary
physical science curriculum has been recognized by TBSE under Department of School education of state Government.

According to the TBSE (Tripura Board of Secondary Education) recommended physical science curriculum the subject of Physical Science plays an important role in developing in children well-defined abilities in cognitive, affective and psychomotor domains. It augments the spirit of enquiry, creativity, objectivity and aesthetic sensibility.

Status of content

The present secondary physical science syllabus has contained 24 subject (items) for both IX and X standard out of 24 items 11items are physics related, 13 items are chemistry. But in NCERT based CBSE secondary science curriculum it has taken 32 items out of them 14 items are physics related, 11 items are chemistry related 27 items Life Science related. So in TBSE Syllabus chemistry content has given more stress than physics content.

In TBSE physical science syllabus physics and chemistry related content has been taken but in NCERT based in CBSE secondary science syllabus physics, chemistry and life science related subject matter has been taken. Other finding of the secondary physical science curriculum has given bellow

Status of them of subject matter

TBSE secondary physical science curriculum has been designed around six broad themes viz. world of measurement matter and its properties, how things work, moving things, natural phenomenon and concept of universe but some special care has been taken to conceptual learning and implementation of concept where as in CBSE science curriculum Food, Materials, the world of the living, how things work, moving things, people and ideas, natural phenomenon and natural resources but Special care has been taken to avoid temptation of adding too many concepts than can be comfortably learnt in the given time frame. No attempt has been made to be comprehensive.
Status of subject matter

In TBSE secondary physical science curriculum subject matter has been chosen from both concept of Physics and Chemistry. In examination curriculum marks also has allotted 50% for physics related concept and 50% for chemistry related concept but in CBSE curriculum subject matter has been chosen from both concept of Physics, Chemistry and Life science, in examination system marks has allotted 40.83% for physics related concept 30% for chemistry related concept rest for life science related concept.

Status of Examination system and weightage of marks

According to TBSE curriculum in an academic year each secondary school will take two written monthly examinations before half yearly examination either 20 or 25 marks then half yearly examination of 100 marks then after two monthly of 20 or 25 and final examination of 100 marks. All examination will conduct school self only for last of academic session of class X board will conduct state level Madhymik examination. In this examination Subject matter will come from class X syllabus and mark has allotted foe this paper is 100, minimum pass marks has allotted 30. No practical based examination will be there for secondary level. Other weightages of TBSE are given bellow

Weightage to forms of questions:

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Forms of question</th>
<th>Marks for each question</th>
<th>No of question</th>
<th>Total Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very short answer type</td>
<td>1</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Short answer type -1</td>
<td>2</td>
<td>15</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>Short answer type -2</td>
<td>3</td>
<td>.10</td>
<td>30</td>
</tr>
<tr>
<td>4</td>
<td>Long answer type</td>
<td>5</td>
<td>4</td>
<td>20</td>
</tr>
</tbody>
</table>

Total=49 Total=100

The expected length of answer and time taken under different forms of question is allotted as:
<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Forms of question</th>
<th>Expected length</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Very short answer type</td>
<td>One word to two sentences</td>
</tr>
<tr>
<td>2</td>
<td>Short answer type -1</td>
<td>Within 30 words</td>
</tr>
<tr>
<td>3</td>
<td>Short answer type -2</td>
<td>Within 40 words</td>
</tr>
<tr>
<td>4</td>
<td>Long answer type</td>
<td>Within 80 words</td>
</tr>
</tbody>
</table>

Weigtage to difficulty level to question:

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Estimated difficulty level</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Easy</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>Average</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>Difficult</td>
<td>20</td>
</tr>
</tbody>
</table>

Weigtage to learning out comes

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Learning out comes</th>
<th>Marks</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowledge</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>Understanding</td>
<td>38</td>
<td>38</td>
</tr>
<tr>
<td>3</td>
<td>Application</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>4</td>
<td>Skill</td>
<td>04</td>
<td>04</td>
</tr>
</tbody>
</table>

Scheme of option:

iv) There will be no over all option in the form of ‘Answer any five question or so’.

v) Internal choice (either or type) on a very selective basis may be given in one question of 2 marks and one question of 3 marks (may be physics or chemistry) and in two question of 5 marks (one from physics and one from chemistry).

vi) The question should be distributed in such a manner that all sub-units are touched.

v) In short and long answer type question internal breaking may be given.
viii) In half yearly examination of class IX respective schools may set question papers in the same pattern as given here with proportionate change in the marks covering the syllabus prescribed by them.

ix) The alternate question given by way of choice should be based on the same objective and the unit. It would have the same anticipated difficulty level and length of answer.

6.3.3 Process of implementation of science curriculum in secondary schools in Tripura physical facilities, teacher qualifications, training, teaching materials, teaching methodology, contents, etc.

Observations in the section are based on the data collected through information schedule and a questionnaire given to the all science secondary teacher working in the forty secondary schools surveyed were spread over four districts of Tripura. In each district there were surveyed 10 secondary schools. Successful implementation of any curriculum depends on a variety of factors that operate in the actual field setting i.e. at the secondary schools. These include physical facilities, teacher qualification and training, teaching materials, contents, assessment procedure adopted and so on. It also depends on the perception of the teachers as to the problems faced by the study with respect to all these factors have been presented in the followings:

Physical Facilities:

As far as physical facilities in the secondary schools of Tripura are concerned, the situation seems to not be quite disheartening. It was found that as per the enrolment figures ( data collected from education department of state Government) the classroom-student ration was 1:56 which reveals not highly but some inadequate condition were there in secondary schools with respect to the number of classrooms.
The schools were in general, break constructed i.e. pacca with tin roof but had very poorly furnished. The furnitures provided in the classrooms were inadequate that very often more than two students had to be seated on a single bench. The ventilation in the classrooms appeared to be satisfactory. However, in 87.5% of the schools were facilitated with drinking water. Very few exceptions no school had proper medical facility for students and staff of the school.

Libraries and Laboratories:

The Secondary Education Commission, NCERT as well as SCERT had emphasized the need for having a well equipped library in each school but in actuality only 30.9% schools had such a facility and even these libraries had very few physical science text as well as reference books in their stock. Also only 14.3% schools had facilities with trained Liberian foe smooth operation of library. There were 40% schools, mainly placed in urban part of the state having well equipped and running science laboratory. But facility of science laboratory which is very essential foe science teaching practically in rural part of the state was there in very poor condition.

Students and Teachers:

In general, enrolment in class IX and X was very high in urban part of all sub-division of the state comprisable not considerable less in rural sector also. This, in fact, should be considered as a positive point. However, in reality, it created a complex situation for the science teachers to take properly physical science class. For instance, teaching a physical science class of eighty or hundred students which happened to be the average size of class IX not only made management of the class difficult but also led to ineffective teaching and totally pre-empted the possibility of any individual attention. This position also resulted in a high rate of wastage and stagnation in the secondary science education.

According to the study of UNESCO the student teacher ratio of secondary level in India is 17.9:1 which is very hopeful for proper science
teaching. But the present study revealed that the average student-teacher for general subject in secondary level ratio was as high as 23:1 (according to education department of state government) and for science subject especially it was more than 43:1 which is very high with respect to whole of the country. In Right to Free and Compulsory Education Act-2009 it is mandated the students-teacher ratio would be required 35:1 to implement the act.

Teacher qualification and training: The minimum educational qualification according to the notification by NCERT dated 28\textsuperscript{th} April 2003 (F.No. 9-2/2001/NCTE) is

<table>
<thead>
<tr>
<th>Secondary /High School</th>
<th>Graduate with Bachelor of Education (B.Ed.) or its equivalent. OR Four years integrated B.Sc., B.Ed. or an equivalent course.</th>
</tr>
</thead>
</table>

So it was found that the qualification of all secondary teacher required by state government is either graduate or above of it. Another point is there for physical science teaching required qualification is Graduate in Pure science (with physics, Chemistry, Mathematics) with B.Ed. degree. But a major problem has found that (according to the Table5.3.5b.) Physical Science has been taught by B.Sc (pure) qualified teacher in 47.6 percent schools . Teaching of the same subject has been done by B.Sc(general) qualified teacher in 42.8 percent schools. Another shocking situation was there shown in Table 5.3.5a. It has obtained that in lower primary of school maximum percentage of teachers are trained(75.57%) but in secondary level only around 52% teacher are trained.

Teaching Material:

At the secondary stage the students should be engaged in learning science as a composite discipline, in working with hands and tools to design more advanced technological modules than at the upper primary stage, and in activities and analysis on issues surrounding environment and health. Systematic experimentation as a tool to discover/verify theoretical principles, and working on locally significant projects involving science and technology are to be important parts of the curriculum at this stage. But it was observed from some schools of
Tripura at secondary stage of science teaching 100% schools were facilitated by black board where model-chart were used in 35.7% schools, audio-visual aids in 38.1% schools and 26.1% schools were there none to be used as aids. Use of different types of teaching materials in different schools of Tripura are given in Table: 5.2.3

In general it was found that most of the schools did not have necessary teaching aids and materials required for imparting instruction in physical science teaching. Many of them did not even have such basic aids as charts, models, slides, specimen, sample, measuring devices etc. Nor did the teachers make any effort to prepare and use improvised tools in their teaching. The recommendations to use community resources to make teaching effective remind only on paper.

Teaching techniques adopted by the teachers were mostly traditional, non-innovative and uninspiring. Most of teachers taught their lessons through stereotyped lectures. Very few teachers, at least occasionally, used such techniques as discussion, demonstration and assignment. The situation was more disappointing with respect to the recommendation.

Text book and Content:

Commission we have known that In Indian school situation, the teacher is the principal focus and the next is the textbook. The Kotheri Commission said, “the question of the textbook is the most important and urgent one for our country”. So in different secondary schools of Tripura have followed these things. According to 50% teacher subject matter or contents taken in textbooks were based on natural phenomenon, views of 45.2% teachers were artificial phenomenon based. Concept of learning cycle is an important object for the selection of subject matter in textbook. So to know the which type of concept of learning cycle were there in board recommended textbook researcher has surveyed in some selected school and has taken views from science teachers. According to 23.8% teachers explore-concept application are there, 50% teacher said that Introduction-concept application are there and 23.8% teacher said that other application are there. Another important side incase of prepare textbook is way of topics arrangement. According to 57.1% secondary teachers science topics
are arrange there in board recommended textbooks in learning order, 35.7% teacher’s views in understanding order and 7.1% teacher’s views in application order. In order to find out relation of text topics between in paragraph as well as chapter researcher has got that 47.6% secondary teachers views were cause-effect, 40.5% secondary teachers views were problem-solving and 11.9% secondary teachers views were compare-contrast.

6.3.4 Problems in implementing the science curriculum:

Finding regarding the problems involved in implementing the curriculum were based on data obtained from teachers. Information from this source was collected with the help of a problem check list. It was found that almost all the science and other teachers perceived inadequate physical facilities at the secondary schools a general problem faced in the implementation of prescribed secondary physical science curriculum properly. The main reference in this regard was for insufficient accommodation followed by lack of furniture, class room, separate rooms for physical science laboratory or for physical science subject related devises and instruments, scientific instrument. Another problem was there some time faced by different schools in long time was scarcity of science teacher.

A surprising finding, quit contrary to common observations, was that many teachers did not consider that the prescribed syllabus and contents of physical science was heavy and causing problems in the implementation of the curriculum. Majority of teachers considered that Tripura Board of Secondary Education prescribed syllabus as well as secondary curriculum was not as standard as National curriculum. According to secondary science teacher of the state as far as availability of textbooks and teaching aids, instruments was concerned, the position seemed to be relatively better but far from satisfactory. This represents a serious problem in this state in view of the fact that these science resources textbooks are to be recommended by local secondary board of education but published and distributed through publishers and booksellers so different problems were faced by teacher as well as student to collect the
books, this is a major problem in rural areas compare to urban area. It perhaps requires further in depth investigation to analyse and pinpoint the malady underlying the nationalized production and distribution mechanism.

It was observed that non availability of ordinary teaching aids like black board, chalk, duster, chart etc. were not a major problem in maximum schools but non availability of appropriate teaching aids related with physical science teaching like models, specimen, sample, devices, instruments etc. was a major problem which were uniformly faced by all science teachers in secondary schools was a major problem in implementation of secondary physical science curriculum. Also it was admitted by most of the teachers that they lacked the necessary skill in using teaching aids and also in improvising upon them. Teaching techniques adopted by the teachers were mostly traditional, non-innovative and uninspiring. Very few teachers, at least occasionally, used such techniques as discussion, demonstration and assignment. The situation was more disappointing with respect to the recommendation for science teaching.

A surprising finding, was that many teachers did consider that student attitude to the involvement towards physical science curriculum was poor due to various reasons like rigid timetable, timetable unsuited to local needs, inappropriate allocation of teaching periods in various subjects, physical science content item in present curriculum and another very important factor was financial condition of parent. Nearly all the teachers perceived the absence of active involvement of student in classroom activities as causing a serious problem in the successful implementation of the physical science curriculum.

6.3.5 Academic performance of secondary level students of Tripura in Physical Science subject at Madhyamik Examination for last five years:

From the records of Table: 5.5.4. to 5.5.10. and their graphical representations it is clear that academic performance of general category students are comparatively better than other category in physical science subject of secondary level from 2005 to 2009. In Tripura state it has also
found that the reasons behind of this type of difference in academic performance between general and other backward category were lack of proper facilities like library, laboratories, science room, staffroom, auditorium, study hall, canteen, playground, sufficient number of trained science teacher to take reasonable science teaching workload, execution of science based co-curricular activities in the schools, proper supplies of electricity, fuel gas and other science laboratories equipments etc. It has been studied that maximum backward community students were staying in rural place of different district of Tripura as a result these students were studying in the schools those were placed in remote or rural areas of the state. The schools those are placed in rural or remote areas practically were not well facilitated of physical science teaching as well as under proper implemented of physical science curriculum.

6.4. Analysis and Interpretation of Experts views

The researcher interviewed 15 experts who included subject specialist, experienced teachers and authors of textbooks. Personal discussions were held with them on the various aspects of curricular content and materials. For this purpose a specially designed interview schedule consisting of 15 items was used. If the individual disagreed with the question, he was asked to clarify his view regarding the aspect asked for and that was recorded in the interview schedule. The opinion and views experienced by the experts during the interview have been summarized and presented in the following section.

1. Out of 15 persons interviewed, nine categorically expressed the opinion that they were satisfied with the syllabus of physical science at secondary level but remaining persons are not exactly satisfied with the syllabus, according to them TBSE recommended syllabus is not as like as CBSE not as standard as National level.

2. Out of 15 persons interviewed, maximum of them (11 persons) were not clearly confident that modern Physical science curriculum is effective for the development of new growing citizen of India.

3. According to the maximum of interviewed persons the main constraints of present physical science curriculum are-

   i) The physical science curriculum is subject-centered and topical.
ii) It is very bookish and academic and lays more emphasis on acquisition of knowledge and pays very little attention to the applications to daily life.

iii) It is not conformity with the aims and objectives of science.

iv) The curriculum is confined to the cognitive domain and mostly to the knowledge specific objective.

v) It is examination ridden. The examination system continues to be terminal and tests are memory-oriented.

vi) The curriculum does not provide for a variety of experiences and activities. The teacher usually uses lecture or lecture demonstration method of teaching.

vii) It is not built on sound psychological principles and does not take into account individual differences.

4. According to maximum interviewed persons, standard of physical science curriculum in Tripura is not tuned with respect to CBSE ad ICSC standard.

5. Views of interviewed persons regarding the need of introduction of new physical science curriculum are-

   i) The topics chosen should be in conformity with aims of science teaching and should be able to achieve objectives under all the three domains i.e. cognitive, affective and psychomotor.

   ii) The curriculum should be flexible enough to cater to different groups of students.

   iii) Students should be taught ‘how to think’ rather than teaching them ‘what to think’.

   iv) Curriculum should provide a variety of experiences that leads to the all round development of the child i.e. interests, attitudes, skills in addition to knowledge.

   v) Curriculum should be ‘activity-centered’ as far as possible and dependence on single textbook must be done away with.
vi) The curriculum should be based on sound psychological basis and along a logical axis.

vii) The syllabus should be flexible so that teachers can frame their own experiences keeping local needs, resources and materials in mind.

6. Out of 15 persons interviewed, maximum of them were not clearly confident that the text books, reference books of Physical science are written in accordance with the recommendation made by Indian Education commission (1964-66).

7. Out of 15 persons interviewed, eight categorically expressed their opinions that they were hopeful with that the Physical science curriculum in Tripura strengthened so as to develop in the child well defined abilities and values such as the spirit of enquiry, creativity, objectivity, the courage to question and an aesthetic sensibility but seven interviewed were gave their opinion just against of that.

8. Maximum interviewed persons’ comments that the present practice of Physical science curriculum in Tripura is not in tune with the objectives of secondary level education of the country as recommended in the NPE-1986.

6.5 Postscript

Tripura is a small state of India and a developing state of North-East of India. It has behind it a rich and long heritage in all respects including education. Education in Tripura has developed at a very fast pace since its formation on 21st January 1972. The beautiful small state of Tripura offers immense opportunities for students from within and outside the region. To carry on the smooth operation of the education system at all levels in the state the Department of Education was formed. The department was further divided into three sections such as School Education, Higher Education and Social Welfare and Social Education Department.

As per the census of 2001, literacy rate of Tripura is 73.66%. The Government of the state has taken a number of steps to develop the
educational set up of the region. A free and compulsory education policy was introduced by the government that caters free education to the students who fall in the age group of 6 to 14 years of age. The education system of Tripura can be divided into four stages, they are the primary stage which comprises of Classes I-V, the middle stage consisting of Classes VI-VIII and the secondary stage comprising of Classes IX-X. Classes XI and XII are the higher secondary stage of education.

Yet, paradoxically, today Tripura continues to be among one of the backward states within the country with respect to both quantitative and qualitative aspects of education specially in science education. In fact, the lesson to be learned from this historical experience is that it is not enough to make proclamation and recommendations, nor is it productive to invest resources without proper planning. Thus, it calls for making plans and taking action based on concrete evidences collected through systematic research studies. It may be mentioned, at this point, that educational research is a relatively new phenomenon in Tripura. This is particularly true of researcher in the field of secondary physical science education. Even the few studies conducted on secondary education in Tripura focus on the quantitative aspect. Understanding and improving qualitative aspects would require investigations dealing with the curriculum of secondary education. Viewed in this background, the present study attempts to bridge this crucial gap with respect to secondary physical science education in Tripura State.

Attempting to conduct a curriculum research study in the absence of an already set traditional of research did pose some complicated problems. First of all, with no precedence of such research, the investigator had to independently develop a rationale for the study in terms of its value for development of secondary physical science education in the state. Secondly, the usual guidance a researcher would get through review of previous studies, and his experienced research guide in this field in deciding the direction but scope of the investigation was there completely absent. It is under such dilemmatic conditions that the present investigation had to be conceived and implemented. Looking back, it appears that at least some aspects of the study
could have been carried out in a different way. Nevertheless, the real value of
the study can be known only when its findings are translated into remedial
actions and implemented in the secondary level of schools in Tripura. The
study has brought to light some vital characteristics regarding the curriculum
its objectives, contents and implementation, which is being currently used in
the secondary schools of the state. But, the study, definitely, does not and
cannot give a final verdict on the curriculum. Rather it only marks the
beginning of research studies with respect to this area. There a number of
research problems to be investigated, some of which can be derived directly or
indirectly from the findings of the present study.

A problem highlighted through the present study is about inadequate
physical facilities available in secondary schools. This has been pointed out as
one of the factors affecting the quality of instruction. It should be interesting to
conduct in-depth investigations for finding out how and to what extent the
physical facilities really affect the instructional work carried out in the
schools.

Several critical observations have been made regarding the textbooks,
their contents as well as physical qualities. It should be worthwhile to
analytical study the whole process of production followed by the Textbook
Board, identify the problems faced and work out alternative strategies which
would help improve the quality of textbooks.

In fact, the findings of the present study regarding the textbooks are some
what global in nature. This is because; the study had in focus the whole
curriculum and its implementation. Therefore, as the next step, a study or
studies may be taken up with the purpose of subjecting each of the textbooks
into a detailed content analysis.

A general observation made in the study is regarding the discrepancy
between the recommendations of National Education Commission, prescribed
curriculum and syllabus of secondary science education by Central Board of
Secondary Education and present prescribed curriculum and syllabus of
secondary physical science education by Tripura Board of Secondary Education.

Several observations have been made regarding the Academic performance in Physical Science subject at Madhyamik (Secondary) Examination for last five years. From this study it has found that there were considerable and meaningful gap between academic performances of physical science subject in different categories of secondary level students. Therefore, as the next step, a study or studies may be taken up to find reason detailed.

It has been pointed out that some of very important part and specifications of physics and chemistry made in the secondary physical science curriculum have remained unimplemented. Some of these are organization of work experience activities, provision of lab facilities, proper periodical examinations and their evaluation, allotments of marks in different categories, supply of audio-visual aids, continuous evaluation and reporting of students’ progress and so on. These failures at the implementation stage only represent the symptoms and not the causes. It would therefore, be necessary to undertake studies for diagnosing the actual causes and planning out remedial measures to overcome the problems.

Yet another problem identified relates to the teachers’ inability to carry out certain activities in an efficient and effective manner. Many teachers were found to be unaware of and unequipped with preparation and use of improvised teaching aids and utilization of community resources. This actually points to the need for proper in-service programmes of teacher education and different training in proper periodical ways.