

Executive Summary

1. Introduction

Science education plays an important role in developing the human resources of any country. Hence, policy-makers and educationalists across the world have been devoting attention to the status of science education. In India, the teaching-learning of science and mathematics occupies a special place in school education. The status of science education in schools of the North Eastern (NE) Region has been a matter of considerable interest to the stakeholders. Accordingly, the 17th Executive Committee Meeting of the Techno-Economic Development Fund (TEDF) had discussed and approved a study on '**Regional Plan and Status of Science Education in Schools in North Eastern Region**'.

The above study has been conducted in 2016-17 by the Advisory & Consultancy (A&C) Division of North Eastern Development Finance Corporation Ltd. (NEDFi) with the support of Indian Institute of Technology Guwahati. In addition, the results of the present study have been benchmarked against a similar exercise conducted in April 2017, covering ten schools located in Maharashtra. The Regional Plan has been developed in this report based upon the findings of both these studies.

Science Education in India

In the year 1976, the subject of 'education including technical education' was placed in the Concurrent List of the Constitution of India. Now, both the Government of India and State Governments have powers over this subject, with the former having an overriding authority. At present, science education in India is guided by the National Curriculum Framework (NCF) of 2005. This framework intends to give shape to the national system of education as envisioned in the National Policy on Education, 1986.

Science Education in North Eastern Region

Despite many developmental challenges, the North Eastern states have reported notable achievements in the field of education and literacy. Here, the educational system at the school level is organized on the all-India pattern. There are eight years of elementary education, including five years of lower primary education and three years in the upper primary classes. This is followed by four years of secondary education, of which two years - Classes IX and X - comprises the high school or secondary phase. After Class X, science education is an option for the student to exercise.

The Education Departments of North Eastern states follow the guidelines of National Curriculum Framework (NCF) of 2005 in framing the syllabus of different subjects, including science and mathematics. Most states have a State Board (Board of Secondary Education) to regulate education at the secondary level. In Arunachal Pradesh and Sikkim, no such board exists and secondary education is governed by the Central Board of Secondary Education.

Objectives & Terms of Reference of the Present Study

The objective of the present study is to formulate a Regional Plan for the improvement of the teaching-learning of science and mathematics at the school level in the states of North Eastern India, based on an assessment of its present status.

The following are the Terms of Reference of the present study as approved by the Executive Committee of TEDF.

1. Assessing the present status of Science Education at the School Level (Upper Primary & High School levels covering Class VI-X) in the eight states of the North Eastern Region;
2. Framing the Vision and Goals for the Regional Plan in Consultation with Stakeholders (Students, Teachers, School Administration, Guardians, State Governments, NEC etc.);
3. Finalizing Strategies for the Regional Plan with implementable Action Sub-plan to achieve the above Goals;
4. Determining the Implementation Sub-Plan in terms of work components, resources, responsibilities, time frames etc.; and
5. Evolving a system for mechanism of Monitoring & Evaluation Sub-Plan in the above connection.

The present study was carried out to cover the above Terms of Reference.

About this Report

This report covers the work carried out under the present assignment as per the above mentioned Terms of Reference. The report has been organized into different sections based on the terms of the assignment. These sections have been supplemented by material annexed to the report as Appendices.

2. Conduct of the Study

Approach & Broad Methodology

The current study has two aspects, viz.: (a) ascertaining the present status of science education in the North Eastern states of India; and (b) preparation of a Regional Plan for its improvement in these states with Implementation Sub-plan and Monitoring & Evaluation (M&E) Sub-plan.

The broad methodology adopted for carrying out first aspect involved a study of secondary data and the collection of primary data from the stakeholders (Governments and sampled schools), which was followed by an analysis to the data to determine the present status of science education in schools of the region. The Vision and Goals were derived with inputs from the stakeholders, which enabled drawing up of the Implementation Sub-Plan and M&E Sub-Plan as parts of the present Regional Plan.

Data Collection

At the outset, pertinent documents were obtained from the Internet and other sources on the different facets of the subject.

The purpose of primary data collection for the present study was to obtain information assessing the present status of Science Education at the School Level (Upper Primary & High School levels covering Class VI-X) in the eight states of the North Eastern Region. Such data was collected through consultations with State Governments and from field surveys covering a large number of schools across all states of the region. The data has been compiled and analyzed to obtain the findings of the present study.

As a part of the present study, officials of the Education Departments were contacted in all states of the NE Region. Meetings were convened with officers from the Directorates, RMSA, SSA and DERT / SCERT. These discussions were carried out on a semi-structured basis in order to obtain the necessary inputs from the State Governments regarding the present study.

A large number of schools had been covered across the region as per the Sampling Plan given below. In these schools, interfaces were held with the School Principal / Headmaster and Teachers of Science and Mathematics as per pre-determined discussion points. In addition, a School Information Schedule was filled up to gauge the infrastructure of the school (building, laboratories, and other infrastructure) of pertinence to the study. Such field work was carried out during the period from September 2016 to mid-November 2016.

Most importantly, students of the following two classes were administered with the Study Schedule (for gauging their aspirations) and Assessment Test (to understand their level of understanding of science and mathematics):

- Class VII – representing Upper Primary Stage (which covers Classes VI, VII and VIII), and
- Class IX – for the Secondary stage (which covers Classes IX and X)

The above tests were based on Multiple Choice Question (MCQ) type of questions, with these being based on the lessons of the class being assessed. The tests had 25 questions each - with 15 being from Science and the remaining 10 from Mathematics.

All eight states were covered for primary data collection. The exercise was carried out in 119 schools located in 47 districts across the region. In all, 5,620 students were administered with the Assessment Tests, of which 2,645 were from Class VII and the remaining 2,975 from Class IX.

Data Entry & Analysis

The data collected from the above sampled schools was entered into worksheets from December 2016 to mid-January 2017. Thereafter, data analysis was carried out in two phases. Initially, the results of the Assessment Tests were analyzed by mid-February 2017. Later on, the analysis of data collected from schools and teachers of science and mathematics was completed. The outcomes of the above analyses have enabled an appraisal of the current position of science education in the North Eastern Region, which has been a crucial input from the preparation of the Plan.

Benchmarking Study

As an additional part of the present assignment, it was felt necessary to conduct the above exercise in order to *benchmark* the performance of the covered North East schools. This was done by considering the performance of sampled students in some schools from Maharashtra which is considered as one of the better performing state in India with regard to science and mathematics at the school level. Accordingly; ten schools located in Maharashtra were contacted in the first part of April 2017. In all, 542 students of Class VII and Class IX of these schools were administered with the same Assessment Test used for the study in the NE Region. It may be noted that these test papers had been translated into Marathi for use during the Benchmarking Study. The conduct of the Benchmarking Study in Maharashtra was supported by Homi Bhabha Centre of Science Education (HBCSE), Mumbai.

In addition, it was decided to carry out an *additional study* of the status of teaching -learning of science and mathematics in three leading schools and three lagging schools of the NE Region, with these schools being identified out of the 119 schools covered by the data collection exercise across the region. The study of these schools was taken up in May 2017 (from 2nd May to 23rd May 2017). From the above study of leading and lagging schools in the region, qualitative factors playing an important role in students' performance in science and mathematics could be identified and cross-linked with other analysis which emerged from the primary data collected earlier during the study

3. Present Status of Science Education in Schools in NER

Key Findings of the Students' Performances

The overall findings regarding students' performances in the Assessment Tests are given below. Such tests included a sampling of 20-30 students in a class, with the study covering Class VII and Class IX in 119 schools across 47 districts from all eight states of the Region.

- The performance of students in mathematics and science in the NE Region is a cause for concern.
- There are individual high scorers, but the average performance is low.
- The students' performance has been found to be better in Science than in Mathematics.
- In Tripura, Manipur, Arunachal Pradesh and Assam; the average scores are higher than the regional average.
- In Nagaland, Meghalaya and Mizoram; the average scores are lower than the regional average.
- In Sikkim, Class VII scores are higher than the regional average while Class IX scores are lower.

The above findings have been disaggregated into the Class-wise performances, which have been detailed at Section-3. The main finding was that the following distinct clusters of states exist in descending order of the performance of their sampled students from Class VII in the Assessment Test.

- 1 Tripura & Manipur
- 2 Manipur, Sikkim & Arunachal Pradesh
- 3 Sikkim, Arunachal Pradesh & Assam
- 4 Mizoram, Nagaland & Meghalaya (cluster is below the regional average)

In Class IX, the states have been found to be in distinct classes, based on the performance of the sampled students as follows:

- 1 Tripura
- 2 Arunachal Pradesh, Assam & Manipur
- 3 Manipur & Sikkim
- 4 Meghalaya, Nagaland & Mizoram (cluster is below the regional average)

Relative Performances of Rural & Urban Schools

The findings of the sampled students in the rural and urban schools of the states have been discussed as follows.

- Be it in Class VII or IX, the performance of the students from urban and rural schools are on similar lines, with students from urban schools having usually done better.
- However, in Mathematics in Class IX, scores of urban and rural students are equally low.
- Hence, the difference in performance is more due to differences in the Science scores, especially in Class IX.
- In Manipur and Mizoram, students in the urban and rural areas are almost at par unlike the other states.

Relative Performances of Male & Female Students

After carrying out a gender based segregation of test performances, the following trends had been discerned.

- In most of the NE states, the performance of the female students of Class VII are at par with their male counterparts.
- In Class IX, the above picture changes; scores of female students are at par with the male students in 3 states, while in 4 other states, the males perform better than their female peers.
- In Meghalaya, female students from Class IX have done better their male counterparts.
- In Mathematics, the scores of male and female students of Class VII are equally low in almost all the states.
- In Class IX, male students perform less badly in three states in the above subject.

Findings of the Benchmarking Study in Maharashtra

Based on a comparison of the average test scores of the sampled students of Maharashtra and of the different states of the NE Region, it is seen as follows.

- The performance of the covered schools in Maharashtra is distinctly better than that of the covered NER schools.
- In Class VII, the average scores are 42% higher in Maharashtra as compared to the average for the NE Region.
- In Class IX, the scores are 40% higher for the Maharashtra schools when compared with the NER schools.

The above difference is greater for Mathematics than for Science in both the classes. It is seen that the difference in the Mathematics score is over 61% for Class VII and nearly 59% for Class IX. Differences in science scores are relatively lesser.

The underlying factors which might have *probably* contributed to the above gap in student performance include: (a) disparities between the sampled schools in the student-teacher ratio, (b) difference in the educational levels of the parents, and (c) dissimilarities in the teaching-learning methodologies used (such as use of laboratory experiments and activity based learning in science) and home work assignments in mathematics.

In addition, text books were available at the beginning of the session in all the sampled schools of Maharashtra, but only in less than two thirds (65%) of the sampled schools in the North Eastern states.

Additional Findings from Primary Data Collection

During primary data collection at school level, information was sought and received from a range of stakeholders like schools, students and teachers of science and mathematics. This included data on the following aspects which are of importance to the present study.

School Information	About the Schools Covered Working Hours in the Year
Students' Feedback	Family Background – Parents' Education Family Background – Parents' Occupation Future Study Plans of Sampled Students Students' Interest in Science at Higher Levels Teaching-Learning Methodology: Class VII & Class IX
Teachers' Feedback	Teachers' Feedback on Teaching of Science Teachers' Feedback on Teaching of Mathematics

The above points have been briefly discussed in Section-3, based on the primary data collected in sampled schools. The following important facts were uncovered in the above connection and they have been highlighted. **'In nearly three-fifths (58%) of the sampled schools, a majority of the students informed that they found the science syllabus to be long. Only in half of the covered schools, a majority of the students reported that activity based learning is used in teaching of science. Practical classes are held in less than half (49%) of the schools, while students of just over a quarter (27%) of the schools get a chance to personally handle laboratory equipments'.**

Qualitative Analysis of Factors involved in Students' Performance

From the above study of leading and lagging schools in the region, the following factors were seen to play an important role in students' performance:

- Family background of the students
- Aspirations and interest of the students
- Basic Foundation in the lower classes
- Availability of qualified math and science teachers
- Methodology used for teaching science and mathematics
- No. of actual working days available in the academic year
- Existence of the right academic atmosphere in the school
- Medium of Instruction

These factors have been discussed in Section-3 of this Report, and may be referred to therein for the details.

4. Vision & Goals of the Regional Plan

Vision Statement

The following Vision Statement had emerged during the Regional Workshop on 'Regional Plan and Status of Science Education in Schools in NER', which was organized in connection with the conduct of the current assignment. **'The best way of developing the North Eastern Region is through human resource development, which can be achieved by offering quality education, especially in the science and technology sector.'**

Goals of the Regional Plan

The following Goals for the Regional Plan have been derived from the above mentioned Vision Statement.

Goal-1: Improved **student performance** in the Upper Primary classes (Class VI-VIII) and High School (Class IX & X) in science and mathematics in all states of the region.

Goal-2: Improved **utilization and maintenance of the existing facilities** for quality science and mathematics education (like laboratories, computers and libraries) with the **creation of facilities** being driven by identification of existing and foreseeable educational needs.

Goal-3: Raising **public awareness on the** importance of quality science and mathematics education for the overall socio-economic development of the North Eastern Region and support for public measures for its improvement.

Priorities

Based on the present assessment, some of the priorities in the states of the region may include the following:

- (a) Priority to schools located in **rural areas**, especially for science;
- (b) Priority for needs of **female students** (girls), especially in the High School classes and in Mathematics; and
- (c) Priority to schools located in **sub-state geographies** with lower performances in science and mathematics at the school level.

On a regional basis, the needs of schools located in states like Meghalaya, Mizoram and Nagaland may be accorded priority as these states form a cluster with below average performance in the Assessment Tests in both Class VII and Class IX. Schools in Sikkim have special needs in Mathematics, which may be accorded priority in any Regional Plan. Students may be helped to carry out and practice innovative experiments in science and mathematics to enlarge their imaginative strength and liking for science and mathematics. **The non-teaching workload of teachers needs to be reduced as much as possible.**

To do well in Mathematics & Science, it is very important that a student should be capable of comprehending a lesson, a fact, a situation or a statement very quickly. Therefore, it is necessary to examine whether some kind of test can be conducted regularly in primary, upper primary and middle schools to test the power of comprehension among the students.

It is very essential that by the time a student passes Class-III, he or she should be able to memorize completely the four tables of summation, subtraction, multiplication and division.

This is very essential at a later stage when Mathematics becomes tougher with introduction of geometry, algebra, coordinate geometry and solid geometry, etc. Therefore, it should be ensured in every school that in Class-III, all students are able to completely memorize and use four aforesaid mathematical tables.

The earlier system of not detaining a student till Class VIII may not have put any pressure on some students to take learning of Mathematics and Science seriously, as there is no fear of failing in examination. The recent decision of the government to do away with the no-detention policy for the students from the next academic session is a welcome move.

5. Strategies & Activities under the Strategies

Suggested Strategies

The following strategies have been conceptualized as the overall methods to be adopted, in order to reach the Goals identified under the present Plan.

Goal-1: *Improved **student performance** in the Upper Primary classes (Class VI-VIII) and High School (Class IX & X) in science and mathematics in all states of the region.*

Strategies suggested for reaching the above Goal

1. Implementation of learner-centric and activity-based learning approaches for offering quality education in science and mathematics in schools
2. Strengthening the evaluation of the students' performances in science and mathematics
3. Addressing the issues existing for science and mathematics teachers in schools of the NE states (including through the use of Information and Communication Technology to address the issue of teachers shortages)

Goal-2: *Improved **utilization and maintenance of the existing facilities** for quality science and mathematics education (like laboratories, computers and libraries) with the **creation of facilities** being driven by identification of existing and foreseeable educational needs.*

Strategies suggested for reaching the above Goal

1. Improving the use and maintenance of existing facilities for quality science and mathematics education in schools
2. Augmenting the existing facilities after evaluating the unmet needs of students for quality science and mathematics education
3. Linking-up with the Health Department for checking the health of school students

Goal-3: *Raising **public awareness on the importance of quality science and mathematics education for the overall socio-economic development of the North Eastern Region and support for public measures for its improvement.***

Strategies suggested for reaching the above Goal

1. Implementing IEC measures for the creation of public awareness regarding the importance of quality education in science and mathematics for the overall socio-economic development of the region

Activities under the Strategies

In order to achieve the implementation of the above-mentioned strategies in the schools of the region, different activities are needed to be taken up for each strategy. A list of such activities has been suggested at the next page in Table-ES.1.

Rationale for the Activities Suggested

The suggested activities have been drawn on the basis of the following factors:

- (a) Findings from the Field Survey undertaken to obtain primary data from schools, teachers of science and mathematics and students, which covered 119 schools in 47 districts across all states of the NE Region, and the findings of which have been reported under Section-3 of this Report;
- (b) Suggestion received from various stakeholders during the Regional Workshop and at other times during the conduct of this assignment; and
- (c) As derived from secondary sources in support of the suggested activities.

The rationale for the different activities has been furnished in Section-5 and may be referred to therein.

6. Implementation Sub-Plan

This section translates the broad strategic approach outlined earlier (and consisting of the Vision Statement, Goals and Strategies of the Regional Plan) into a detailed work plan specifying the outputs and outcomes of the different activities (work components) planned against the different project goals.

Table-ES.1: Suggested Strategies and Activities [Regional Plan for improving the Status of Science Education in Schools in the NE Region]

Goal	Suggested Strategy	Proposed Activity
Improved student performance in the Upper Primary classes (Class VI-VIII) and High School (Class IX & X) in science and mathematics in all states of the region.	Implementation of learner-centric and activity-based learning approaches for offering quality education in science and mathematics in schools	<ol style="list-style-type: none"> 1. Implementation of activity based teaching-learning of science in schools focused on the development of concepts and real-life applications through experiments 2. Implementation of visual approaches, IT applications and other innovative methods to strengthen the teaching-learning of mathematics in schools 3. Evaluation of existing textbooks and other learner materials on parameters like availability, simplicity of language, attractiveness of layout and content etc. and making improvement wherever needed 4. Monitoring the teaching-learning activities in schools and the maintenance of academic calendar by school authority 5. Conduct of extra-curricular activities like exhibitions, competitions, exposure visits, student exchanges etc. to reinforce teaching-learning of science and mathematics 6. Exploring the greater use of instruction in mother tongue or local languages for teaching-learning of science and mathematics in schools
	Strengthening the evaluation of the students' performances in science and mathematics	<ol style="list-style-type: none"> 1. Conduct of periodic evaluation of the students' learning of science and mathematics through examinations and tests 2. Provision of regular feedback on the findings of the above evaluation measures to the students and their parents or guardians 3. Advocating for expeditious amendment to the pertinent provisions of Right to Education (RTE) Act to enable the detention of poorly performing students in all classes
	Addressing the issues existing for science and mathematics teachers in schools of the NE states	<ol style="list-style-type: none"> 1. Ensuring the availability of science and mathematics teachers in all schools by filling up vacancies and ensuring rational deployment of such teachers 2. Regular evaluation of the training needs of school teachers of science and mathematics 3. Creation of regional facility for the training of school teachers of science and mathematics along with emphasis upon Science/Maths content in the teachers' training programs 4. Tie-up by State Governments with IIT-Guwahati / HBCSE / Other reputed Institutions in Science and Mathematics for training of school teachers concerned 5. Use of Information & Communication Technology for Science Education in NER

Goal	Suggested Strategy	Proposed Activity
Improved utilization and maintenance of the existing facilities for quality science and mathematics education (like laboratories, computers and libraries) with creation of facilities driven by identification of existing and foreseeable educational needs	Improving the use and upkeep of existing facilities for quality science and mathematics education in schools Augmenting the existing facilities after evaluating the unmet needs of students for quality science and mathematics education	<ol style="list-style-type: none"> 1. Measuring the existing utilization and upkeep of existing facilities like laboratories, computers and internet for quality education in science and mathematics 2. Implementing a school based plan for improving their use and upkeep 3. Assessing the impact of the above school-wise plans and encouraging the performers <ol style="list-style-type: none"> 1. Evaluating the unmet needs of school students for facilities (laboratories, computers and internet) for quality education in science and mathematics 2. Implementing a school based plan for augmenting such facilities, incl. library books 3. Assessing the impact of augmenting school facilities for quality education in science and mathematics
Raising public awareness on the importance of quality science and mathematics education for the overall socio-economic development of the North Eastern Region and support for public measures for its improvement	Linking-up with the Health Department for checking the health of school students Implementing IEC measures for the creation of public awareness regarding the importance of quality education in science and mathematics for the overall socio-economic development of the region	<ol style="list-style-type: none"> 1. Linking up with nearby health facilities of the State Health Department for regular check-up of students' health (to detect issues like poor sight, iron deficiency etc.) <ol style="list-style-type: none"> 1. Implementing IEC measures for the creation of public awareness on the importance of quality education in science and mathematics through media campaign in TV, FM Radio, Print media, Outdoor media etc. 2. Organizing local meetings of parents, teachers and other stakeholders for creation of public awareness on the importance of quality education in science and mathematics and receiving public suggestions for the necessary measures in future

Note:

Based on the present assessment, some of the priorities in the states of the region may include the following:

- Priority to schools located in **rural areas**, especially for science;
- Priority for needs of **female students** (girls), especially in the High School classes and in Mathematics; and
- Priority to schools located in **sub-state geographies** with lower performances in science and mathematics at the school level.

On a regional basis, the needs of schools located in states like Meghalaya, Mizoram and Nagaland may be accorded priority as these states form a cluster with below average performance in the Assessment Tests in both Class VII and Class IX. Schools in Sikkim have special needs in Mathematics, which may be accorded priority in any Regional Plan.

Students may be helped to carry out and practice innovative experiments in science and mathematics to enlarge their imaginative strength and liking for science and mathematics. **The non-teaching workload of teachers needs to be reduced as much as possible.** Contract persons may be deployed for undertaking these non-teaching works.

As there are many stakeholders, the Implementation Sub-Plan also identifies the Agency that can act as the Implementing Agency for executing an activity or a set of activities. Further, the time frame for such activities has been given, as well as a broad estimate the resource requirements and probable sources of funding.

Outputs and Outcomes of the Activities & their Indicators

Table-6.1 (at Section-6) gives the outputs and outcomes for each of the activities identified under different strategies for the Goals of the Plan. These activities may be visualized as being the components of the different strategies for reaching each Goal of the Regional Plan. The above table may be referred to for the details about outputs and outcomes and the indicators identified for the same.

In the above regard, it may be noted the above-mentioned terms have been understood as given below.

- **Outcomes** refer to the likely or achieved short-term and medium-term effects of an intervention's outputs.
- **Outputs** are the products, capital goods and services that result from a development intervention; these may also include changes resulting from the intervention which are relevant to the achievement of outcomes
- **Performance Indicators** are quantitative or qualitative factors or variables that provide the simple and reliable means to measure achievement, to reflect the changes connected to an intervention, or to help assess the performance of a development actor.

Note on Coverage

Owing to existing constraints of funding and the need to focus on fewer schools initially, the Regional Plan may be implemented in 600 schools in the region in Phase-I (145 schools in Assam and 65 schools in each of the other seven states).

The Regional Plan may be extended in future in a phase-wise manner depending upon the achievement of planned outcomes. Such a phase-wise approach will give an opportunity to make corrections in the design of the plan at each phase, based on the monitoring and evaluation findings.

Implementing Agencies for the Activities

The Implementation Sub-Plan has also identified the Agency which can act as the Implementing Agency for executing an activity or a set of activities. Table-6.2 gives the Implementing Agency for the activities. It is seen from the above table that almost all the activities will be implemented by the Education Departments of the State Governments, with the cooperation of the schools planned to be covered in Phase-I.

Time Frame for the Implementation of the Plan

The proposed Regional Plan may be implemented over a time period of **five years**. The date of approval of the Regional Plan may be taken as the 'Zero Date' (i.e. the start date of the implementation process).

The above time frame of five years is suggested in view of the number of strategies and activities suggested, apart from the importance of the subject and its multi-dimensional nature encompassing several aspects. In addition, some of the outcomes may take a longer time frame to materialize. Depending upon the evaluation of the impact of the Plan, an extension may be considered.

Financial Requirements & Sources for Funding the Plan

Financial Requirements

The total requirement of funding for implementing the components of the proposed Regional Plan is estimated to be about **Rs 3864.00 lakh (Rupees Thirty Eight Crore and Sixty Four Lakh only)**. Table-6.3 at Section-3 furnishes the pertinent details in the above regard.

Owing to existing constraints of funding and the need to focus on select schools, the Regional Plan may be implemented in 600 schools in the region in Phase-I (145 schools in Assam and 65 schools in each of the other states). The above funding has been estimated based on the above coverage of schools in the initial period.

Probable Sources for Funding the Plan

The probable sources of funds for the Plan include the following:

- North Eastern Council (NEC);
- Ministry of Human Resources Development, Government of India;
- Ministry of Development of NE Region, Government of India;
- State Governments of the North Eastern states; and
- Corporate Sector through CSR funds.

The quantum of contributions from each source can be worked out during the finalization of this plan.

7. Monitoring & Evaluation (M&E) Sub-Plan

Regarding the implementation of the proposed Regional Plan for improving the status of Science Education in schools in the NE Region; an organized system of monitoring the program outputs is expected to provide such a mechanism to ensure that the interventions (activities under various strategies) result in the intended outcomes.

Monitoring of the Plan

In the present instance, performance indicators have been given for the various outputs and outcomes, which are planned to be achieved consequent to the performance of the planned activities for improving the status of Science Education in schools in the NE Region. These are available at Table-6.1 of the previous section.

Monitoring may be done by the North Eastern Council (NEC) and the State Governments (Education Departments). Such monitoring can be based on targeted improvements in each performance indicator [compared to baseline conditions] for the different outputs and outcomes, during the pendency of the Plan.

For the monitoring the progress of the proposed Regional Plan; the performance indicators as proposed at Table-6.1 will have to be reviewed by the NEC and the State Governments and mutually agreed upon, including by the Implementation Agency for execution of various

activities under the Plan. This exercise may be carried out by NEC before the start of the Plan.

Reporting System

The Reporting system should be based on compilation of Quarterly Progress Reports (QPR) and Annual Reports (AR) by the funded Implementing Agencies involved in the execution of activities under the Plan.

The QPRs will be sent to the North Eastern Council (NEC) Secretariat, where they will be scrutinized by the NEC officials nominated for this purpose. Any deviations from the targeted achievement for performance indicators may be discussed by the NEC officials and the Implementing Agency for solutions. In addition, the Annual Reports will be discussed by the NEC Secretariat in formal meetings to review project progress. Based on these reports, summarized reports will be prepared and placed before the Council (NEC) for its review and comments.

Evaluation of the Plan

The Regional Plan (for improving the status of Science Education in schools in the NE Region) is proposed to be implemented in the NE states over a time period of five years from the date of its approval (Phase-I). At the end of the above period, an independent evaluation may be carried out on the Plan.

The evaluation to be taken at the end of the Regional Plan will study the entire Plan implementation. It will analyze the factors for its successes and failures; assess the sustainability of its impacts and results; and draw conclusions that will be used for better planning of similar interventions in the future under separate phases.

The findings of the above evaluation will be placed before the North Eastern Council (NEC) for its review and decision for future phases of the Regional Plan.

8. Conclusion

In the region, the intellectual raw material is available as the young boys and girls are quite talented, analytical and comparable to others from elsewhere in the nation. What needs to be done is to put in place a system of productive science education in the schools - ensuring joyful teaching-learning of the subjects through activity based and innovative methods, so that the young boys and girls of the region grow up in a positive environment and deliver the goods for the overall socio-economic development of the states.

The Regional Plan has been developed for improving the status of science education in schools in the NE states. It includes goals and strategies developed through stakeholder consultations to attain the Vision that **'The best way of developing the North Eastern Region is through human resource development, which can be achieved by offering quality education, especially in the science and technology sector.'**

It is hoped that the strategies and proposed activities will find favour with the policy-makers and educationalists, so that the above plan is implemented to attain the above vision for the NE Region and thereby benefit India as a whole.