

TEACHING OF SCIENCE AT THE SECONDARY SCHOOL LEVEL IN MEGHALAYA: AN ANALYSIS OF THE TEACHING STRATEGIES ADOPTED BY SCIENCE TEACHERS IN THE TEACHING OF SCIENCE

Ms.BahunlangTron¹

Abstract:

The Secondary Education (1952-53) observed that secondary education is a complete unit in itself and not merely a preparatory stage; that at the end of this period, a student should be in a position, if he wishes, to enter on the responsibility of life and take up any useful vocation. Secondary education is helpful in making individuals to become useful members of a modern complex society. In the present age, science education is essential as it is of immense value to individuals' life in society. The Education Commission (1964 – 66) remarks that modernising of society will result only through development of scientific temper, awakening of curiosity, creation of attitudes and values through essential skills and that in the process of development and transformation the role of science is of utmost importance. Taking note of the importance of science teaching, the Kothari Commission Report (1964-66) states “If Science is poorly taught and badly learnt, it is little more than burdening the mind with dead information and it could degenerate even into a new superstition”. On this note the present study was conducted to find out the different teaching methods and strategies being adopted by science teachers and to examine the problems associated with teachers' inability to adopt effective science teaching strategies. Descriptive survey method was used and the questionnaire was the main tool for data collection. The study found that science teachers do not adopt diverse teaching strategies due lack of awareness and other allied problems such as lack of training and resources,

Key terms:Activity oriented strategies, individualised instruction methods,secondary school education, science, teaching strategies.

¹ Research Scholar,Department of Education,North Eastern Hill University,Shillong, Meghalaya,Pin-793022 India

INTRODUCTION:

Secondary education occupies an important position in the whole scheme of education because it lays the foundation of all higher education and is considered to be the terminal stage for individuals who, after achieving well directed additional training, have to fill the middle level working position – technical, vocational and professional. Considering the Secondary School curriculum, it may be stated that the subject science holds a unique place because it can play a vital role in the development of human potentials. The Education Commission (1964-66) was of the opinion that science education must become an integral part of the school education². Progress in science, is the key to progress in all walks of life. But the present educational system at the secondary school level, in India and particularly in the state of Meghalaya does not seem to meet the requirement of a growing economy and is lagging other nations in the race of scientific progress.

BACKGROUND OF MEGHALAYA:

Meghalaya "the abode of clouds" became a full-fledged State on January 21, 1972 and is comprised of eleven districts. It is bounded on the north by Goalpara, Kamrup, Nagoan and KarbiAnglong districts of Assam State, and on the east by the Districts of Cachar and North Cachar Hills, also of the State of Assam. On the south and west is Bangladesh. Meghalaya lies between 20.1 'N and 26.5 latitude and 85.49 'E and 92.52 "E longitude. According to the 2011 Census, Meghalaya has a population of 29, 66,889 of which 14, 91,832 are males and 14, 75,057 are females. The population density per square kilometre is 132.

Science Education in Meghalaya: The records in the state archives reveal that there was no place for science in the school curriculum until the University of Calcutta, introduced Elementary Science Knowledge "as an optional subject of study at the matriculation level in 1938 and the first examination was held in 1942-43. It was only after Independence, that efforts were made to expand formal education and to popularise science education. The Secondary Education Commission's (1952-53) recommendations also gave momentum for the expansion of education and introduction of science at various levels. In Meghalaya, the first attempt to introduce science education was through the recommendation of the first Education Commission which was appointed by the Government in April 1972 then reconstituted in June 1975. The Commission recommended that Science and Mathematics will be made compulsory subjects for both boys and girls from Standard I to X and was implemented only in 1983. However, it was in 1975-76, that science as a subject of study was formally introduced in the primary and middle stages, when the Government of Meghalaya implemented UNICEF-assisted science education programme. Initially, the programme was implemented on a pilot basis in 30 primary and middle schools and it was proposed that the programme be introduced on a wider scale in a phased manner in a period of 3 to 5 years³.

Science education was to a certain extent an area of priority in the state and therefore there has always been provision and allocation of funds in the different plan periods to improve and strengthen science education. Right from the period 1979-80 the Government emphasised on improvement of laboratories, incentive to teachers, provision of equipment, etc. for improving the quality of science education. To further strengthen science education in

²Aggarwal, J. C., & Gupta, S. (2008). *Secondary Education and Management*. Shikarpur, Delhi: Shipra Publications.

³Jala, J. (1986). *An Investigation into the Development of Secondary Education in Meghalaya since independence*. Shillong: Department of Education, North Eastern Hill University.

schools, the department of Science in the SCERT (now DERT) was set up. The department provided coaching classes in science and maths for tribal students and also provide in-service training in science and maths for primary and middle school teachers in the state. The department is also involved in developing model questions and textual materials in science and maths under the guidance of experts from NCERT. The State Council of Science, Technology and Environment (SCSTE) was constituted by the Government of Meghalaya and registered under the Societies Registration Acts, 1983 to ensure effective utilisation of Science and Technology for all round development of the state. The society is responsible for popularisation of science programme, sponsored students' project programme, etc.⁴

Methods of Science teaching: Though teaching is an art and there are some born teachers, a majority of teachers who have no inherent flair for teaching and are not able to arouse interest in students to learn the subject can do so by practicing and adopting the various methods of teaching devised from time to time⁵.

Though the teaching methods are varied ranging from the lecture method to computer assisted instruction, yet it all depends on the teachers' awareness of the different methods, the expertise, the available time and the resources available.

OBJECTIVES OF THE STUDY:

1. To find out the awareness of science teachers regarding the various methods and strategies of science teaching
2. To find out the commonly used methods of science teaching.
3. To study the problems associated with the adoption of individualised and activity oriented strategies in the teaching of science at the secondary school level.
4. To offer suggestions in order to encourage teachers adopt effective teaching strategies for teaching science.

DELIMITATION OF THE STUDY: The present study was delimited only to the Government, Deficit and Adhoc Secondary schools affiliated to the State Board of School Education i.e. Meghalaya Board of School Education (MBOSE) of East Khasi Hills and Jaintia Hills of Meghalaya.

METHODOLOGY:

- i. POPULATION:** The population of the present study comprises of 7 Government Secondary Schools, 61 Deficit secondary schools and 170 adhoc secondary schools.
- ii. SAMPLE:** The sample for the present study comprise of 136 science teachers who were randomly drawn from 4 Government Secondary Schools, 35 Deficit secondary schools and 57 adhoc secondary schools

⁴State Council of Science, Technology and Environment. (1983). Retrieved November 25, 2015, from megplanning.gov.in: <http://megplanning.gov.in/sscst.html>

⁵Sharma, R. C., & Shukla, C. S. (2002). *Modern Science Teaching*. New Delhi: Dhanpat Rai Publishing Company.

- iii. **TOOL USED:**For gathering data the investigator made use of a self-prepared questionnaire designed for obtaining information from the science teachers.
- iv. **DATA COLLECTION:**The data was collected by administering the tool mentioned above to the teachers' sample. The collected data was then tabulated and analysis was done on the basis of the percentage of responses.

FINDINGS OF THE STUDY:After a detailed analysis, the findings of the study may be reported as follows:

1. With regards to the teachers' awareness of the different teaching methods, the study reveals that there are still science teachers close to about 42% who are not aware of the different methods and strategies of science teaching.
2. The study also reveals that the lecture method, demonstration method, the lecture cum demonstration method and the project method are the teaching methods that all teachers are aware of.
3. The study further reveals that the problem solving method has started to find room in the list of teaching methods as 39% respondents are aware of this particular teaching method. However, the other methods such as the programme learning method, the heuristic method, the constructivist method and discovery methods are not well known to science teachers as only 8%, 25%, 19% and 10% are aware of the respective teaching methods.
4. With regards to the teaching method that teachers often adopt, it is found that reading from the book and explain is the common method adopted by almost 65% respondents followed by the lecture demonstration method as responded by 47% respondents.
5. It is also found that 94% teachers make use of activity methods in order to teach the subject science. Though the teachers adopt various activity methods, yet the most commonly used activity method is the question-answer method as affirmed by 95% respondents. As per the analysis, project work is another activity method as stated by 79% respondents. The other methods such as discussion, brainstorming, experimentation and problem solving are not commonly used by teachers as evident from the responses provided by 22%, 17%, 21 and 26% respondents respectively.
6. It is encouraging to report that 87% science teachers are also giving importance to individualized instruction while teaching the science subject. Of the various individualized instructional methods, it is found that majority of the teachers are adopting the assignment method and the problem solving method as evident from the responses provided by 99% and 78% respondents respectively.
7. Through the study it is found that the other methods such as tutorials, programme instruction, guided independent study method, discovery method and the heuristic method are least being adopted by science teachers in order to provide individualized instruction.
8. Though a variety of group teaching methods are available, the study reveals that majority of the teachers are using the group discussion method and the group project method as evident from the responses provided by 72% and 58% respondents respectively. Further, other methods such as cooperative learning, collaborative learning or classroom seminars are least being adopted by science teachers in order to promote group learning among students.

9. With regards to demonstrations of experiments, the study reveals that demonstrations are not always being given in the science laboratory as 57% respondents stated that demonstrations are carried out in the classroom and according to 40% respondents the same are being carried out sometimes in the laboratory or classroom.
10. Further, the study reveals that only 44% science teachers usually update themselves in relation to modern methods and techniques of science teaching and only 21% science teachers may be considered well equipped to use the modern methods and techniques of science teaching.
11. It is also found that schools do not provide teaching aids to teachers for teaching the subject science as reported by 65% respondents. It is further revealed that that 88% teachers encounter problems in the process of preparation of teaching aids and 70% science teachers are facing problem to incorporate technology in science teaching.
12. Of the various problems identified, it is found that the common problem faced by science teachers in preparing teaching aids is the limited time factor and the non-provision of resources by the school as affirmed by 62% and 35% teacher respondents.
13. With regards to the problems associated with ineffective use of teaching strategies, the study reveals that the lack of training, inadequate time and lack of resources however, have been considered by a larger percentage of the sample of science teachers i.e. 84%, 89% and 94% respectively as the common problems associated with ineffective use of teaching strategies.

DISCUSSION:

1. The findings suggested that all science teachers are not aware of the different methods of science teaching. The teaching methods common to all teachers include the lecture method, demonstration method, the lecture cum demonstration method and the project method. Teaching methods such as the problem solving method, programme learning method, the heuristic method, the constructivist method and discovery methods are not well known to science teachers. Science teachers usually transact the curriculum by reading from the book and explain.
2. The study showed that though the teachers adopt various activity methods, yet the most commonly used activity method is the question-answer method. The other methods such as discussion, brainstorming, experimentation and problem solving are not commonly used by teachers.
3. Science teachers also adopt individualized instructional methods of teaching the subject science. However, the type of individualized method being used is rather limited as teachers quite often adopt only the assignment method and the problem solving method. The other methods such as tutorials, programme instruction, guided independent study, discovery method and the heuristic method are least being adopted by science teachers.
4. The findings also suggested that teachers are not aware of the constructivist methods teaching. As far as group teaching method is concerned, it is found that science teachers do not adopt group teaching strategies such as cooperative learning, or collaborative learning.
5. The finding of the study is also suggestive of the very fact that laboratory teaching is not given importance in the teaching of science at the secondary school level. As such demonstrations of experiments are not always given in the laboratory. Instead, they are sometimes being given in the classroom which clearly indicated the lack of exposure for laboratory experience on the part of the students.
6. It is discouraging to report that science teachers usually do not update themselves in relation to modern methods and techniques of science teaching and a dismal number

of science teachers are well equipped to use the modern methods and techniques of science teaching.

7. With regards to the aids of science teaching, the study revealed that schools do not provide teaching aids to teachers for teaching the subject science and teachers encounter problems such as limited time factor and the non-provision of resources by the school in the process of preparation of teaching aids.
8. Finally, the study revealed that lack of training, inadequate time and lack of resources are the common problems associated with ineffective use of teaching strategies.

SUGGESTIONS:

In the light of the above findings, the investigator put forth the following suggestions:

1. Regular training on effective science teaching may be organized on a regular basis so as to enable science teachers to become aware of the different modern methods and strategies of teaching.
2. Schools should make effort to depute teachers for attending various subject specific trainings so that teachers' effectiveness may be enhanced and bring about professional development of teachers.
3. The effective use of the different activity oriented and individualized oriented instruction depends very much upon the number of students in the class. Hence teacher-student ratio should be maintain in a way that it enables teachers provide individualized instruction and also that students are given opportunity for individual work in the classroom as well as in the laboratory.
4. With the trend moving towards self-learning of students, teachers are to be encouraged to do away with the traditional method of reading from the textbook and explaining and embrace newer strategies such as the constructivist teaching-learning strategies so as to bring about effective science teaching and learning.
5. The adoption of the new strategies will depend much upon the resources available within the school; hence the government as well as the school managing committees should make effort to make all the required resources available right from furniture, a well-equipped laboratory to teaching aids including ICT.

CONCLUSION:

The present study clearly indicated that science teachers are facing problem as the teaching-learning process is inundated with ever-changing teaching methods and strategies and teachers are not equipped to adjust to the changing trend. Science teachers are working within constrained time limit of completing the lengthy syllabus hence do not have time to engage themselves in the preparation of teaching aids. Further, while a number of science teachers are trained, yet it may be wrong to assume that they are familiar with the variety of teaching methods and strategies. In conclusion, it may be mentioned that the lack of training is one factor which bar science teachers from exploring into the newer pedagogical strategies and prefer to focus on traditional classroom teaching methodology and aids which quite often result in ineffective teaching.

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