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Challenges & Prospects of Science Education at Secondary Level in the Light of N.E.P 2020

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ABSTRACT-

Development of a nation depends on the progress of Science and Technology. The progress of Science and Technology also depends on the scientific interest of young pupils especially at secondary stage. If they can get interest at this stage more incorporation in science education in the higher education level will be possible. So secondary level science education is a great challenge to encourage the young pupils. In N.E.P 2020 there are so many ways to grow the scientific interest of young pupils. N.E.P 2020 Strongly recommends the innovation and research attitude in science that should be promoted by the teachers among the students.

INTRODUCTION-

In our country the education system is theoretically good and fine. But the practical scenario is different for secondary level schools. There are so many schools where Higher Secondary units are not attached. In the teaching of vital subjects e.g- Physics, Chemistry, Biology-All the subjects are taught in a traditional way. In the classroom situation of science education, the pictures are the same as our childhood. Practical work or activity-based science education is very important for secondary stage students. But most of the teaching learning process would not follow this activity-based teaching. In secondary stage science syllabus, the most important compulsory subjects are Physics, Chemistry, Mathematics and Biology. In almost all schools traditional lecture method is followed for teaching these important subjects. Some



schools basically in urban areas follow activity-based learning but they are few in number. It's our challenge to teach science education at secondary stage by doing practical work. N.E.P- 2020 can show the pathway of innovative teaching of science education.

BACKGROUND OF THE STUDY-

Being a chemistry teacher, I have been teaching science at secondary level in West Bengal for more than ten years. I have noticed that many lessons in science are taught theoretically. But Science is always experiment-based. The main intent of this paper is to investigate the role of practical work in conceptualizing the subject. There are so many lessons which can be understood more effectively by practical work. But science is taught in traditional lecture methods at secondary level. There is no scheduled lab. class in 9-10 (secondary level) like 11-12 (higher secondary level). By this investigation, it can be compared between theoretical and practical education in learning science. It can be analyzed the better teaching strategy for science education. We all know that secondary level science is the basic science. If our students can conceptualize science joyfully at this level then more incorporation in science education at higher education would be possible. These quality science students will play a great role in the long run in promoting science and technology for the nation's development.

IMPORTANCE OF SCIENCE EDUCATION AT SECONDARY LEVEL-

Secondary stage is the basic stage of Higher Education. If a student can learn science joyfully at secondary stage, he or she will get interest for science education in future. There are so many fields of science education in higher education in our country's education system. Physics, Chemistry, Biological Science, Medical Science, Space Science and different branches of engineering are the different areas of science education. At secondary stage science education is compulsory for all students in class 9 and 10. At this stage if a student can get proper guide for the interest of science education he or she can participate in the progress of science education for our nation's development. Best doctors, best engineers, the best architects and best scientists are very important for our nation. Only innovative learning at secondary stage can promote a student in the field of science education.



REVIEWS OF RELATED LITERATURE-

The review of related literature is an important part for conducting research. By this study we can get related topic details of any research paper. It is a survey of scholarly sources such as different books, journals and thesis papers. It can bring clarity and focus on particular research. It can improve research methodology. It can broaden our knowledge base in connection with our research area. I have reviewed the following research papers before conducting my research work. Different chapters of N.E.P2020 and the following literatures are reviewed during this paper writing.

Study-1: Chapter 4 (PART 1: School Education)-N.E.P 2020: In this chapter, it is given stress on the holistic development of learners. Curriculum content should be reduced to make space for critical thinking. The lessons should be Holistic, enquiry-based, discovery-based and analysis-based. Here role of practical work of science education is encouraged.

Study-2: Chapter 23(Part 3: Other key areas of focus)-N.E.P-2020: In this chapter use of technology and integration is mentioned. India is a global leader in Information and Communication Technology. So the relation between technology and education at all stages of learning should be emphasized. For science education the role of virtual laboratory may be used for this purpose.

Study-3: Jain, Neha (2021)-in the research paper- ‘Impact of ICT on Understanding of Science Among Students at Secondary Level’ studied on the understanding of science education by ICT. This study can be further improved by practical work. Practical work and ICT are parallel to conceptualize science education. So, for understanding science education, the role of practical work can be studied in the present research work.

Study-4: Swati Kumari (2021) found in the research paper- ‘Effectiveness of social inquiry model SIM in promoting global citizenship education GCE with science teaching at secondary level’-the effectiveness of social inquiry model. This type of model play an important role to understand the concept of science. This research paper is very helpful for further study to realize the role of practical work in conceptualizing science education at secondary level.



STUDY-5: Narayan, B. B. (2019), studied in his research paper, “Teaching science to standard ix cbse students through value integrated experiential learning” value integrated experiential learning as a new teaching learning practices of science education. From this research paper the researcher examined that values can be introduced into the educational field especially in science education. This kind of education is very important for our society's development. We know experiential learning is very attractive and effective. It is learner -centric and flexible approach rather than teacher centric one. But now-a-days values are deteriorating from the student which is a problem for society. So value integration in science is very essential for present day science education. This type of learning will positively affect the achievements of students in science and it is very fruitful for learning science education.

Study-6: Mitra, M. (2018), In the research paper “School students' perceptions of mathematics and its relation to their achievement in mathematics”, studied the perceptions regarding mathematics of Secondary and higher secondary students. Here the investigator examined the perception of mathematics of Secondary and Higher Secondary students with respect to their a) Experience in mathematics b) image in mathematics c) manifestation of the relation with mathematics. The perception of Secondary and Higher Secondary students in mathematics is compared gender wise, class group wise and stream wise. This research investigates the significant relation between perception of mathematics and achievement in mathematics. Researcher interprets that perceptions do not affect on mathematics achievements, but it is influenced by other exigencies. Girls’ student required attention and enriched experiences. Society creates gender differences. It is also an interpretation of the researcher. The study can be applied to Physical Science at the secondary level.

Study-7: Bahunlang, T. (2018), found in his research paper- “A study of Science education in the Secondary schools of Meghalaya” The context of Curriculum, evaluation, status of secondary teachers etc in the state of Meghalaya 8 | P a g e at secondary level science education. The researcher examined the infrastructure available at secondary stage in Meghalaya state for science education. Researcher also searched for the teaching strategies and problems faced by science teachers. In this research paper it is shown a clear picture about evaluation process for science education at secondary stage and studied its further



development for Meghalaya state. The researcher here examined very carefully about the Science textbooks used for secondary stage. Ultimately the investigator Shown a perfect direction towards students achievement in science education on the basis of sex, locality and management etc.

Study-8: Mondal, M. M. (2018), conducted in his research work “Development of Secondary Education in West Bengal Since Independence” to study the development of Secondary Education in West Bengal since independence with particular reference to resources, administration, academic organization and financial management. From this research, It is found the analysis of objectives, curriculum and examination system of Secondary Education in WB. In this research, It is found the problems of Secondary Education in WB and suggestive measures for future development of Secondary Education. From this research some remedies for secondary education-1. The school administration should be efficient 2. Secondary Education should have some definite aim related to practical life And the school should Try to to avail to these aims in a perfect way. But. there is no discussion about science education at secondary level in this research paper. How to improve in conceptualizing science education at secondary level is the further study of this research paper.

Study-9: Sudha Sharma (2017)-studied in her research paper “A Comparative Study of Problem Solving and Creativity at Secondary Level Students” about the skill development of secondary students. This study can be applied to secondary level science students.

Study-10: Aafreena (2017)-in the research paper. “Study of the academic achievement of secondary level science students in relation to self regulation and their attitude towards science” studied about the academic achievement of secondary students. This area of research has captured a scene of a solution to the myriad problem faced at work in the field of education. The investigator utilized this section to put forward some of the practical educational recommendations to equip teachers and parents with a variety of classroom and home management strategies to strengthen children's“ selfregulatory skills and their attitude towards science with a goal to attain academic competence. This type of paper is very helpful for the present paper.



Study-11: Kavitha S (2015) studied in research paper ‘Scientific Attitude Of Students Towards Scientific Creativity In Relation With Students Academic Achievement At Secondary Level In Salem’ students’ scientific creativity at secondary level. The study has shown that the secondary school students have good scientific attitude. It also implies that the students excel high in their verbal and non-verbal scientific creativity. Relationship was found between scientific attitude, scientific creativity and achievement in science of secondary school students. The present study also revealed that gender, locality, type of school, medium of instruction, parent’s education, parents occupation and parents income has 242 significant bearing of achievement in science and scientific attitude, scientific creativity of secondary school students. Thus, it can be concluded that a positive attitude towards scientific creativity would enhance the achievement in science. Keeping in mind the importance of learning science, it becomes very important for schools and families in particular and society at large to foster good attitude toward learning skills among students and provide good socio-economic conditions for their effective learning and performance in science.

Study-12: Osborne, Jonathan (2015) found in the research paper-‘Practical Work in Science: Misunderstood and Badly Used?’-the way of fruitful use of practical work to understand science education. This article argues that the role of practical work in science is overemphasised and misunderstood. Science is distinguished by the fact that it is a set of ideas about the material world and not by empirical enquiry. The latter is only one of six styles of reasoning that have been used to develop scientific ideas. The lack of clarity around the role of practical work in science means that it is often poorly used in the teaching and learning of science. And, until its role is clarified, attempts to assess it are of little value. This investigation is very useful for this paper.

Study-13: Nagalakshmi, R. (2011), found in the research paper- ‘Effectiveness of constructivist approach on students' achievement in science related attitude science process skills and perception of Nature of science at secondary level’, the constructivist approach can develop the lessons of science education. Students’ achievement in science education is studied by the effectiveness of constructivist approach. The students' perception of nature of science is also studied by a constructivist approach. Students' opinions about science are also



studied by constructivist approach. This research paper examines the relation among science process, skill Science related attitude, opinion towards science achievement in science and perception of nature of science. Constructivist approach was observed effective for both boys and girls in perception of science education in this study. Ultimately this study showed a direction from teacher centered to learner centered education that is constructivist approach is more effective than the conventional method for science education. This type of study can be applied for secondary level science education.

Study-14: Ian Abrahams (2009)-found in his research work-Does Practical Work Really Motivate? A study of the affective value of practical work in secondary school science"-the affective value of practical work in secondary school science. The present paper reports on a study that examined whether practical work can be said to have affective outcomes, and if so in what sense. The term 'affective' is used here to refer to the emotions, or feelings, engendered amongst pupils towards school science in general, or one of the sciences in particular. The study is based on 25 multi-site case studies that employed a condensed fieldwork strategy. Data were collected, using tape-recorded interviews and observational field notes, in a sample of practical lessons undertaken in English comprehensive (non-selective) schools during Key Stages 3 and 4 (ages 11-14 years and 15-16 years, respectively). The findings suggest that whilst practical work generates short-term engagement, it is relatively ineffective in generating motivation to study science post compulsion or longer-term personal interest in the subject, although it is often claimed to do so. This suggests that those involved with science education need to develop a more realistic understanding of the limitations of practical work in the affective domain.

This study can be further investigated through the present paper.

Study-15: JANI S. (2008)-in the research paper "Effectiveness of Continuous Evaluation in Science Subject at Secondary Level" studied understanding of science education at secondary students. Continuous Evaluation is very necessary tool for the achievement of secondary students. If we include practical work in the continuous evaluation, the science education would be fruitful.



SECONDARY LEVEL SCIENCE EDUCATION ACCORDING TO N.E.P- 2020:

The previous academic structure in school education is modified in N.E.P- 2020. According to N.E.P- 2020 a new pedagogical and curricular restructuring of (5 + 3 + 3 + 4) design is introduced. This new academic structure covers ages 3 to 18.

i) Foundation stage - 5 yrs

PreSchool => 3 yrs (Ages 3 to 6)

class I and 2 => 2 yrs (Ages 6-8)

ii) Preparatory Stage-3 yrs

Class 3 to 5 => 3 yrs (Ages - 8-11)

iii) Middle Stage-3 yrs

class 6 to 8 => 3 yrs

iv) Secondary Stage-4 yrs

class 9 to 12-4 yrs

There are 8 chapters in N.E.P-2020 where school education is described. In the 4th chapter curriculum and pedagogy of school education are stated. According to N.E.P- 2020 learning should be holistic, integrated, enjoyable and engaging.

MAJOR ISSUES OR CHALLENGES FOR TEACHING-LEARNING PROCESS OF SCIENCE EDUCATION:

There are so many problems for learners to conceptualize science education. The Problems are as following-

- 1) lack of science teachers
- 2) lack of qualified and trained teachers
- 3) lack of time for teachers to prepare experiment work preparation
- 4) instrument problems
- 5) some more classroom and laboratory problems
- 6) lack of in first structure and huge number of students



- 7) some more psychological problems
- 8) insufficient in-service training of science teachers for a new program
- 9) the broken link with other lessons
- 10) demographic changes

There are so many problems as above to learn science for the secondary students.

PROSPECTS OF SCIENCE EDUCATION BY N.E.P- 2020:

N.E.P-2020 strongly recommends innovation and research attitude for the students because it develops the scientific temper of the students. Teachers should take an important role to ensure science experience. They should be sensible to promote classroom for doing experiments by improvised teaching aids. They should use science laboratory for Physics, Chemistry, Biology etc subjects. Because by practical work science concepts can be easily understood.

CONCLUSION:

To conceptualize the science concept at secondary level is very important as it is the seed-time for science education. According to N.E.P- 2020 the structure of secondary level is class 9 to class 12. This is also the adolescent period of pupils. So, this secondary stage is very crucial for career building for the students. There are so many problems but with the help of teachers our young pupils must overcome these challenges. In the recommendation of N.E.P-2020, there are so many prospects and solutions to assimilate the concept of science education.



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