

## TEACHING LEARNING OF SCIENCE THROUGH LOCAL CULTURE: ETHNOSCIENCE

EISHA

Research Fellow, Department of Education, Centre for Advanced Studies in Education (CASE), Faculty of Education and Psychology, The Maharaja Sayajirao University of Baroda, Vadodara, Gujarat, India

### ABSTRACT

Vast heritage, diverse culture, enormous wisdom, traditions, ethos are the identity of India. Indian ancient books collection and its culture always remain a way forward from the scientist of today and work as an information Centre for most of the scientific discoveries and studies. These knowledge generation cultures and traditions were proudly passed on and preserved by several generations for upcoming generations and in this process education plays important role. Through education, these local and traditional values were integrated in the classroom to make teaching learning more effective and interesting. Ethnoscience is one of the concepts through which these local values and traditional knowledge integrated with scientific concepts were introduced in classroom to make teaching learning more efficient. According to Joseph (2010), Ethnoscience learning is based on the acknowledgment of culture as a fundamental part of education and as a communicative expression to the development of science. Though ethnoscience is a complex concept it surely help to make daily teaching learning more effective and resourceful and helpful in the development of science and technology subject in the classrooms. The researcher tried to focus upon the significance of science and technology subject at school level in India. The paper emphasized the implications of ethnoscience based teaching learning process. The paper also suggested some key aspects which may consider effective for the ethnoscience based teaching learning process.

**KEYWORDS:** Importance of Science, Ethnoscience & Teaching Learning Process

### INTRODUCTION

Vast culture, rich heritage, valuable wisdom, colorful traditions, strong ethos and so on, these are the attributes and descriptive words when we have thought of Indian ethnicity and its immense civilizational values. Indian ancient Knowledge community has immeasurably contributed in all the fields and especially in science and technology. Indian ancient books collection and its culture always remain a way forward from the scientist of today and work as an information Centre for most of the scientific discoveries and studies. Science and technology is not new to Indian folk, it has its footprints since ages. It is only the Indian science education system who produced science and technology intellectuals such as Charaka and Susruta, Aryabhata, Bhaskaracharya, Chanakya, Patanjali and Panini and many more. Most of the concepts of modern science are already explained in our ancient knowledge bulk, such as concept of Darwinism, which is much more similar to the Samkhya philosophy of Kapila, many such concepts were explained in our traditional literature. Even most of the Indian traditions have scientific base as well. These knowledge generation cultures and traditions were proudly passed on and preserved by several generations for upcoming generations and in this process education plays an important role and if we consider science, it has an innovative and ground-breaking impact.

Ethnoscience is one of the concepts through which these local values and traditional knowledge integrated with scientific concepts were introduced in classroom to make teaching learning more efficient. According to Ahimsa and Pura

(2007), the set of knowledge owned by a nation using certain method and procedure as the part of their tradition and proven with empirical study is called as ethnoscience. No doubt, ethnoscience is a complex concept but it surely helps to make daily teaching learning more effective and resourceful and helpful in the development of science and technology subject in the classrooms. Though, it is a new term as an individual identity but as an anthropological term, it has been in use since 1960. Scott Atran in 1991, explained ethnoscience as an aspect which helps to understand common people developing knowledge and beliefs differently and expression of culture in scientific perspective. Ethnoscience is nothing but the expression of science in the form of culture and tradition and vis versa. It is an approach which cast light on the expressions, beliefs and traditions of local community relating with scientific aspects. Simply, ethnoscience could be defined as a science with ethnicity integrated in it or it may be explained as a cultural concept elucidated with scientific relativity. Ethnoscience is a knowledge that is indigenous to a particular language and culture. It approximates or reflects the natives' own thinking about how their physical world is to be classified (Abony et al. 2014).

Ethnoscience based teaching learning involves learning of science linked with students' daily life, culture and traditions. Joseph (2010) explained ethnoscience learning as a learning based on the acknowledgment of culture as the fundamental part of education and as a communicative expression to the development of science. Ethnoscience learning focuses on student centered teaching learning shifting from teacher centered teaching learning process and helpful in creating more expressive, contextual and circumstantial based learning environment. It becomes more interesting for students to learn scientific concepts relating to their environment, ecology and to their culture. As stated by Sudarmin (2014), the importance of science reconstruction from local culture has not been conceived textually and formally. In the same line, various other researches such as, Cristian Damayanti (2017), Kevin and Sudarmin (2015), Wahyuni (2015), Khoerunnisa et al. (2016), Arfianawati et al. (2016), Dewi et al. (2017), and Pamungkas et al. (2017), put emphasis on science teaching learning process through science models integrated with ethnoscience. The results from these studies showed that ethnoscience based science learning models improve the learning outcomes and critical thinking skills of students. Science learning based on ethnoscience can improve student learning outcomes.

## **REFLECTIONS ON EXISTING SCIENCE EDUCATION IN INDIA**

Science and technology is an important tool in the hands of any developing country to place themselves among developed states of the world. India is moving towards the status of developed countries and science and technology is playing vital role in the progress of the country. Since Independence, each and every educational reports as well as commissions emphasized on the development of science education. Our constitution which is the law of the land also signifies the importance of science education, as fundamental duties enshrined in Article 51 A(h) of the constitution states that it is the duty of the every citizen of the country to inculcate, propagate and further disseminate scientific temper in society. National Education Policy Draft (2019) also emphasized on the importance of science and stated that, "Evidence-based reasoning and the scientific method will be incorporated throughout the school curriculum – in science as well as in traditionally "non-science" subjects – in order to encourage rational, analytical, logical, and quantitative thinking in all aspects of the curriculum".

In the subsequent time, India has also achieved tremendous progress in science and technology, but still low ranking with respect to science and technology subject at school students, in various national and international reports such as PISA explained the critical situation of the subject in Indian classrooms. One of the most important reasons for this situation is boring and sedentary teaching learning process in most of the schools. National Curriculum Framework for

School Education (2000) and National Curriculum Framework for School Education (2005) suggested the development of curiosity and creativity in students, which is lacking in science classrooms. National Education Policy Draft (2016) mentions that “Failure rate among students in Board Examinations is traditionally high. It is well documented that much of the higher failure and dropout rates can be attributed to poor performance in two subjects — Mathematics and Science”.

The main objective of learning science is to enhance critical thinking, reasoning, analyzing and scientific literacy among students at secondary level. At this stage, students are more eager to reason out each and every concept and just a little support from teacher will help them to analyze and innovate new knowledge. It is important to analyze the fact that science is just not learn and do practical in the classroom rather it is about learning scientific culture, practices and grasping concepts through innovating new knowledge.

### **IMPORTANCE OF ETHNOSCIENCE BASED TEACHING LEARNING PROCESS**

The purpose of education is not only to produce earning members of the house rather education is for learning; learning the legacies of our culture, tradition, values and integrating them in future generations and contributing every bit in the development of the community, society and country as a whole. Ethnoscience includes transcribing indigenous knowledge for sustainable development and hybridization of scientific knowledge. Ethnoscience based teaching learning process involves development of scientific concepts among students through their indigenous and local knowledge. Many researchers such as Atmojo research (2012), Damayanti, Rusilowati, and Linuwih (2017), Dewi, Suryadarma, Wilujeng, and Wahyuningsih (2017), Pamungkas, Subali, and Linuwih (2017) conducted research on ethnoscience based teaching learning process and found that there was an increase in student learning outcomes in science learning with an ethnoscience approach and students were more interested, enthusiastic, and happy with this approach. With this approach, students learn and develop scientific skills in more likely the way as they find the subject as a part of their existing local culture and wisdom. Ethnoscience based teaching learning unfolds the scientific concepts and relates them with local knowledge and culture which becomes easy for students to understand and figure out the whole scientific phenomenon. It is an interdisciplinary approach which relates ethnicity and science with each other creating more inter-dependency and inter-relativity. The learning through Ethnoscience is not only conceptual and applied but meaningful as well. It aid students to understand the concepts as well as make them aware that why the concept is being taught to them. Abonyi in 1999 stated that, although ethnoscientific concepts do not walk hand in hand with Western conceptual methods, they share common links, which have been utilized creditably in conventional science classrooms to achieve better acquisition of science concepts and sustainable hybridization. The development of local wisdom-based science learning design can develop positive character and learning achievement in elementary schools (Subali, Sopyan, and Ellianawati, 2015).

In Indian context, ethnoscience based teaching learning process seems to be quite beneficial for the students at secondary level to develop and understand science concepts more effectively even without much advanced laboratories. Our traditions and cultural aspects have scientific bases which if linked in a proper way with various concepts of science may yield desired results and enhance the learning of science and also develops curiosity and interest in the students. To make teaching learning more meaningful and effective, teacher has to always link the concept with daily life situations and assimilate with new and related knowledge.

### **KEY ASPECTS OR SUGGESTIONS FOR INTEGRATING ETHNICITY IN SCIENCE**

Ethnoscience based teaching learning process is more focused approach for the sustainable innovation in the field of science and technology. In order to integrate culture, traditions, and our ancient wisdom in the modern concepts of science, students find strong hold on the concepts, appropriate steps should be taken into consideration. These are:

- School science curriculum should be designed in a way such that, it involves such concepts which have cultural and traditional approach as well.
- Concepts should be systemized according to the local as well as western approach.
- Proper modules for teachers should be developed at all levels. These modules should include brief descriptions of the scientific concepts (included in the school books) and also different approaches for explaining each and every concept linking with local culture and traditions.
- Laboratories should also be equipped with those equipments which are necessary for such kind of practical.
- Developing indigenous technologies and encouraging such innovations. Make in India is one such programme which is initiated by govt. of India.
- Exploring Indigenous and local knowledge in understanding science concepts and encouraging students with their own innovations in knowledge and creativity.
- Recognizing talent based on ethnoscience teaching learning process.

## CONCLUSIONS

Science has its importance in every sphere of life and it has earned its importance because it is the way through which man could answer each and every question of past, present and future. We have learnt science through our environment and environment through science. They both are interlinked with each other. So, it becomes easy to understand the concepts of science if and when they are linked with and explained through local conducts. Ethnoscience plays its role in understanding the science and explaining each phenomenon of science in much more operative and meaningful way. It helps students to understand the real life science concepts and develops curiosity in them because through this, students realize the concept in their daily life.

## REFERENCES

1. Abony, Njoku & Adibe (2014), Innovations in Science and Technology Education: A Case of Ethnoscience Based Science Classrooms. *International Journal of Scientific and Engineering Research*, Vol. 5 Issue1, Jan. 2014
2. Adhi, Sudarmin & Linu Wih (2018). The Influence of Ethnoscience-Based Learning Video to Improve Students' Understanding of Green Chemistry in Integrated Science Subject. *Journal of Innovative Science Education*.
3. Prasida, P. Amidst science and literature: a critical quest.
4. Ahimsa & Pura, H. S. 2007. Etnosains dan Etnometodologi: Sebuah Perbandingan. *Masyarakat Indonesia Th. XII(2):103-133*.
5. Arfianawati, S., Sudarmin, & Sumarni, W. (2016). Model Pembelajaran Kimia Berbasis Etnosains Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa. *Jurnal Pengajaran MIPA*, 21(1), 4651. Retrieved from <http://journal.fpmipa.upi.edu/index.php/jpmipa/article/view/669>

6. Atran, Scott (1991). "Social Science Information / Sur Les Sciences Sociales". *Ethnoscience Today*.
7. Atmojo, S. E. (2012). Profil keterampilan proses sains dan apresiasi siswa terhadap profesi pengrajin tempe dalam pembelajaran ipa berpendekatan etnosains. *Jurnal Pendidikan IPA Indonesia*, 1(2), 115-122. Retrieved from <https://journal.unnes.ac.id/nju/index.php/jpii/article/view/2128>
8. Naz, S., & Dixit, K. To study the scientific concept structure of science students studying in MP Board and CBSE schools of Bhopal by using concept Attainment technique.
9. Damayanti, C., Rusilowati, A., & Linuwih, S. (2017). Pengembangan Model Pembelajaran IPA Terintegrasi Etnosains untuk Meningkatkan Hasil Belajar dan Kemampuan Berpikir Kreatif. *Journal of Innovative Science Education*, 6(1), 116-128. Retrieved from <https://journal.unnes.ac.id/sju/index.php/jise/article/view/17071>
10. Dewi, I. P. M., Suryadarma, I. G. P., Wilujeng, I., & Wahyuningsih, S. (2017). The effect of science learning integrated with local potential of wood carving and pottery towards the junior high school students' critical thinking skills. *Jurnal Pendidikan IPA Indonesia*, 6(1), 103-109. Retrieved from <https://journal.unnes.ac.id/nju/index.php/jpii/article/view/9598>
11. Eisha, (2019). Ethnic aspect of Science concept understanding: Ethnoscience. National Seminar on Science Education. NERIE, Umiam. 2019.
12. Joseph, M. R. (2010). *Ethnoscience and Problems of Method in the Social Scientific Study of Religion*. Oxfordjournals.
13. Khoerunnisa, R. F., Murbangun, N., & Sudarmin. (2016). Pengembangan Modul IPA Berbasis Etnosains untuk Menumbuhkan Minat Kewirausahaan. *Journal of Innovative Science Education*, 5(1), 45-53. Retrieved from <https://journal.unnes.ac.id/sju/index.php/jise/article/view/13241>
14. National Policy on Education. (1986). In Sharma, R C (2006). *Modern Science Teaching*. New Delhi: Dhanpat rai publishing comp.
15. NCERT. (2000). *National Curriculum Framework for School Education*. New Delhi: NCERT
16. NCERT. (2005). *National Curriculum Framework for School Education*. New Delhi: NCERT
17. National Council of Educational Research & Training. (2006). *National Curriculum Framework 2005 Position Paper National Focus Group on Teaching of Science*. New Delhi: NCERT.
18. National Education Policy Draft (2016). Ministry of Human Resource and Development. Government of India
19. National Education Policy Draft (2019). Ministry of Human Resource and Development. Government of India
20. Pamungkas, A., Subali, B., & Linuwih, S. (2017). Implementasi Model Pembelajaran IPA Berbasis Kearifan Lokal untuk Meningkatkan Kreativitas dan Hasil Belajar Siswa. *Jurnal Inovasi Pendidikan IPA*, 3(2), 118-127. Retrieved from <https://journal.uny.ac.id/index.php/jipi/article/view/14562>
21. Subali, B., Sopyan, A., & Ellianawati. (2015). Developing local wisdom based science learning design to establish positive character in elementary school. *Jurnal Pendidikan Fisika Indonesia*, 11(1), 1-7. Retrieved from <https://journal.unnes.ac.id/nju/index.php/JPFI/article/view/3998>

22. Wahyuni, S. (2015). Developing Science Learning Instrument Based on Local Wisdom To Improve Student's Critical Thinking Skills. *Jurnal Pendidikan Fisika Indonesia*, 11(2), 156161. Retrieved from <https://journal.unnes.ac.id/nju/index.php/JPMI/article/view/4228>
23. Widiyatmoko, A., Sudarmin., & Khusniati, M. (2015). Reconstruct ethnoscience based-science in karimunjawa islands as a mode to build nature care student character. *International Conference on Mathematics, Science, and Education 2015*