

Promoting Science Communication among Scheduled Tribe Students through Museum

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ABSTRACT

Governments try to improve the educational status of socially excluded sections like Dalits, tribals and women through various strategies and tools. It is already proven that students learn better and retain more when they participate actively in the learning process. Students find science difficult as the language of instruction is very much different from their own language. They generally fail to adapt to new circumstances as well as the new language. The science curriculum is far from their dreams, aspirations and life pursuits.

This study is a descriptive survey based on the data collected by the author from Scheduled Tribe (ST) students and staff of a Museum in Bhubaneswar. It was found that student visitors to the museum experienced a change in the way they thought about science, and thus developed a bonding relationship with science. As visiting a museum had a measurable impact on students of this study, it is concluded that regular visits to the museum may further fuel their interest to study science. Though the study was limited in its scope, it provided evidence that positive science outreach experiences can have a strong impact on students' ability to learn and understand science.

Keywords: Science communication, Scheduled Tribe (ST) students, Museum

Introduction

There is an intellectual curiosity hidden in every human. His or her inquisitive mind always searches for the answer to the whys and hows. Often we fail to understand the scientists' ideas

and theories due to a gap in communication. The common masses find it difficult to grasp the language of science though they are very much acquainted with the uses of scientific products. For instance, people find it difficult to understand terms like stem cell, El Nino, pacemaker, DNA fingerprinting or GM crops, but they come across the consequences of these every now and then. Thus, here the role of science communication starts which aims at filling the gap between scientists, their work and the common people.

For school students who are just exposed to new and different terms, theories and concepts, science is often not a very attractive subject. This becomes more difficult for the scheduled tribe students. The study materials, curricular instructions and the environment, all are new to them, especially for those who reside in an urban hostel for studies. Under such circumstances, museums, especially science museums play an important role. Museum visit in an informal way is an effective approach to create interest in science and promote science learning among students.

Museums

When we talk about the museum, people perceive it as a place of collection of objects of historical, cultural or artistic importance. They forget about objects of scientific importance. The displayed items are not only for observation, one can study them, enquire about them from the staff, sometimes the museums have hands-on practices especially for students.

The visitors come to know about the process of preservation of dead matter, working principle of body systems and machine, consequences of natural and man-made hazards, discoveries and inventions made so far, new technologies, medical practices and so on. They can also take part in different museum programmes. Thus, the museums provide the required educational experiences.

A museum can be a state or private museum. *Britannica Encyclopaedia* broadly divides museums into five basic types, such as, general or multidisciplinary, natural history and natural science, science and technology, history and art. Besides these, nowadays we often come across the term virtual museum which

has digital records and can be visited or accessed through the electronic media.

1. **General or Multidisciplinary Museum:** Such museums were established to promote knowledge mostly during the 18th and 19th century. Here the collections are from more than one subject.
2. **Natural History and Natural Science Museum:** These museums have physical, social and natural collections to promote the science behind the exhibits. They depict concern for environmental climatic changes and protection.
3. **Science and Technology Museum:** They exhibit developments and applications of scientific ideas and new technology. Sometimes they also enlighten the visitors thorough demonstration of working models.
4. **History Museum:** These are like general museums that collect exhibits from different fields and exhibit them in chronological order. Archaeological museums fall in this category.
5. **Art Museum:** Traditionally these museums have collections like paintings, sculptures and decorative things which have some aesthetic value in the eyes of the visitors. Due to the high cost of modern art, and artistic objects, establishing such a museum is expensive.

Literature Review

The present study is an attempt to find out the need for a museum to promote science communication specifically for the scheduled tribe students. The reviewed studies are related to the role of the museum in promoting scientific literacy. In 1990, according to Wellington, the non-formal way of learning science is a museum; it creates an appropriate environment for discovery learning and promotes student's scientific behaviour and thinking¹. He suggested that cognitive, psychomotor, and effective learning are all important aspects of the total educational experience and that formal education in science overemphasises the cognitive component of learning to the detriment of the psychomotor and the effective learning.

Ayres, R., & Melear, C.T. in 1998, tried to determine whether the use of an interactive multimedia exhibit is more effective than a traditional hands-on exhibit in teaching physical science in a museum setting². The sample consisted of Elementary school students (N=104) who were exposed to a multiple-choice quiz before entering the museum and again after interacting with the exhibits. They found that there is an increase in science learning when students interact with a multimedia exhibit when compared to the hands-on exhibit. With no significant difference, both multimedia exhibits and hands-on exhibit were very efficient in attracting and engaging students and statistical tests indicate no gender differences in learning.

L. Rennie and G. Williams in 2002 from Curtin University of Technology explored the perceptions, ideas, and understanding of the science of the staff and adult visitors to an interactive science centre³. They found the visitors to the science centre had a positive experience, a change in the way they think about science, and a small change in their relationship with science.

In 2005, J. Falk and M. Storksdieck in their study “Learning Science from Museums” concluded that visitors to science museums do in fact learn science⁴. Though the sample was from a diverse range of visitors of all ages, incomes, occupations and levels of education, results suggested that science museums are particularly useful for facilitating science learning even amongst the least knowledgeable persons.

In their paper, J. Panda & B. Mohanty in 2010 said science museums provide a unique learning environment as the exhibits based on in-depth scientific principles but designed to serve the broadest general public⁵. Offering learning opportunities that are difficult to replicate in a traditional school setting, museums can successfully host science-related activities. They concluded that museums act as a bridge between the formal science education system and the community at large.

In his study, N. Dohn in 2010, described museums as informal learning environments with a special focus on students’ interest and learning motivation⁶. Though it is not possible to separate out informal/non-formal learning from formal learning, informal learning environments have served as a unifying

concept for learning environments outside the conventional educational system.

In 2011, N. Dogan, S. Cavus, and S. Gungoren studied the impacts of school trips on learning science subjects⁷. They conducted trips to Science and Technology Museums for pre-service teachers for research purposes. The participants were given some concepts and questions relating to Science and Technology in order to search in the museum. After the field trip, they were asked to write and present an explanatory essay including their learning about the questions and concepts.

At the end of this study, the participants' efficiency was evaluated. According to the results, nearly all of the participants stated that they found it quite enjoyable and didactic. In addition to this, the majority of the participants also stated that with the help of essay writing which is performed after the trip, they learned how to summarise the knowledge they got during the trip, how to put their thoughts in order and associate the key thoughts which are defined in each subject, that is they learned how to organise the knowledge and how to arrange them.

In the study "Science museum for science communication: A case study", B. Bharali and R. Chakrabarty in 2012, analysed the effectiveness of the science museum in the North-east region especially in Assam with reference to science communication and also to explore the possibilities of enhancement of museum for better communication⁸. They conducted a survey for three years in the Regional Science Centre, Guwahati, in relation to communication of science and technology in urban and rural areas for students and the common masses. However, this study did not throw any light on the impact of museum visits on science learning.

A study on "Role of museum in teaching science" by N. Goyal and others (2017) of Barkatullah University, Bhopal⁹ reported that science museums are the perfect setting to counter socio-cultural and linguistic challenges. They help the learners facilitate observations and construct their knowledge. Teaching-learning of science should go beyond presenting the facts and principles and result of investigations.

Significance of the Study

UNESCO (United Nations Educational, Scientific and Cultural Organisation) Science for Peace and Sustainable Development mentioned in its foreword that “Without science, there can be little progress towards sustainable development”. In promoting science to achieve sustainable development UNESCO tried to address the challenges that can be achieved only through proper science communication. A country’s potential to achieve the sustainable social and economic growth, and to attain Millennium Development Goals depends on its accessibility to modern science and technology and its application.

Food security, good health, and employment, all depend on either science or technology. To allow the public easy access to science and scientific knowledge science communication is necessary. In this regard, UNESCO supports science centres and science museums to provide informal science education and to facilitate interaction between science and society. On 10 November 2016, the World Science Day for Peace and Development was dedicated to “Celebrating Science Centres and Science Museums”. From that day the International Science Centre and Science Museum Day (ISCSMD) is being organised by countries every year. As recognised by educationists and UNESCO now it is well established that the museums are playing an important role in science communication.

Objectives of the Study

The following are the objectives of the study:

- To analyse the views of scheduled tribe students towards the science museum as an informal way of learning science.
- To analyse the interests of scheduled tribe students towards science subjects.

Methodology

In the present study, the investigator aimed at finding the views of scheduled tribe students towards visiting a science museum. The details of various steps followed in the investigation are discussed below with qualitative and quantitative methods employed in data collection and analysis.

Delimitation of the Study

- The study is delimited to scheduled tribe students of secondary schools residing in hostels.
- The study is conducted only on the scheduled tribe students in two schools in Khordha district.
- The study is delimited to visiting the science museum in the context of promoting science communication.

Population and Sample of the Study

The general population for this research paper consisted of all the scheduled tribe students of secondary schools in India.

Sample: For selecting a sample, 91 scheduled tribe students were identified and selected through a Non Probability Sampling technique (purposive sampling). The sample was selected from two scheduled tribe hostels in Bhubaneswar. The selection of the students was made from class IX and X. Data have been collected through a semi-structured interview for further analysis and interpretation.

Table 1: Sample of the study

Boys	Girls	Total
42	49	91

Design of the Study: In the present study, one interview schedule was developed viz., interview schedule for students in order to find out the views and interests of students towards the museum.

Research questions: The following research questions were developed in the present study:

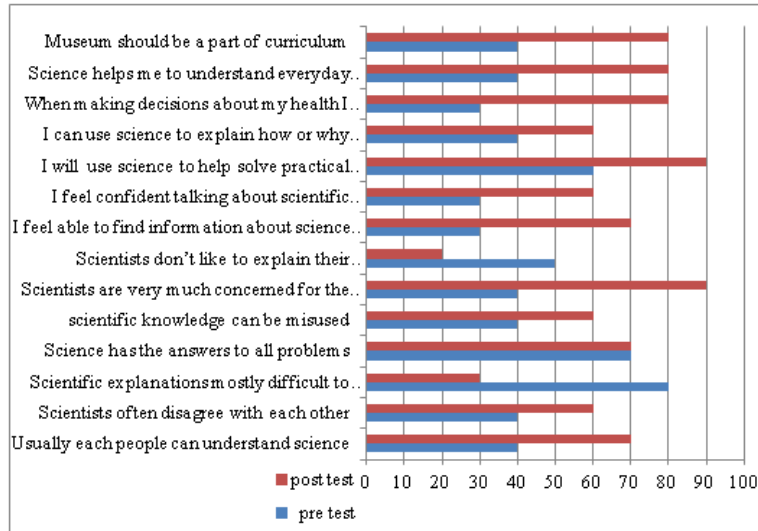
- What is the view of the scheduled tribe students towards science communication through the museum visit?
- What are the various available resources for scheduled tribe students residing in the hostel that would increase their interest in science?

Tools: Accordingly, a Semi-structured Interview schedule was prepared by the researcher for getting the personal view of the students in the sample for this study. Questions were close-ended so that the respondents could give their responses simply with a “yes” or “no”. The interview was done on the basis of pre- and post-visit to the museum.

Results and Discussion

There were 14 interview questions. All these were asked of the students before their visit to the museum and also again asked after their visit to the museum. Their responses were collected, analysed and interpreted as follows:

- Before the students visit the museum, in response to the questions like whether people can understand science, scientists often disagree with each other, scientific knowledge can be misused, scientists are very much concerned for the community, they use science to explain how or why things happen and science helps them to understand every day — 40% of the respondents gave affirmative response.
- In response to questions like their ability to find information about science topics that create interest, feeling confident when talking about scientific topics with friends and when making decisions scientifically about health — nearly 30% of them said yes which went up to 80%. The affirmative response in pre-visit saw a decrease in two questions like scientific explanations mostly difficult to understand and scientists don't like to explain their research clearly to ordinary people.
- When 60% of the students ensured that they would use science to help solve practical problems around the house, it increased to 80% after their visit to the museum.
- The most interesting was that about 80% of the students felt that the museum should be a part of the curriculum after their visit.



The results of the study could be analysed through the above figure

Impact of the visit on students' idea about science was measured from their responses towards the interview questions. Almost three-fourth (73 out of 91) students enjoyed their visit and felt the necessity of a museum visit to promote interest in studying science. The survey results traced a growing perception among the students towards science after the visit.

Students believed that scientific knowledge would not be misused and scientists always think about the impact of their research on the society. The changes in responses from pre-visit interview to post-visit interview were encouraging.

Conclusion

In summary, it is found that the visited museum focussed on the concepts of science through exhibits. Thus a visit to the museum had a measurable impact on the students. The study was worked out only for one visit and more subsequent visits would have a more positive impact on students which may be more apparent from their curricular achievements. The visiting students had a positive experience as most of them responded that there was a change in the way they think about science. This change was a small step towards how they experienced science.

The students might become more interested and more aware of science if their visits were repeated.

The tribal population of the country, as per 2011 census, is 10.43 crore, constituting 8.6% of the total population. 89.97% of them live in rural areas and 10.03% in urban areas. Education is important for the overall development of an individual with emphasis on improvement in socio-economic conditions. According to Statistical Profile of Scheduled Tribes in India 2013, the literacy rate among tribal people aged 7 years and above is 58.96 against that of the total population of 72.99¹⁰. To close this gap and to bring the tribal people into the mainstream, the Government is trying to attract more scheduled tribe students by providing free hostel facilities with other living requirements. This improved the percentage enrolment of scheduled tribe students in 2010-11 since 95-96, at different levels. At the same time dropout rates are still very high, i.e. 70.9 % (from Classes I to X in 2010-11).

Those who continue to study in secondary level are afraid of science as a subject. It is a low scoring subject for them as they are mostly unable to conceptualise the concepts. Interest is a factor for them to study science. Therefore, to make science popular among the scheduled tribe students and build confidence about science subjects museum visits could be an appropriate approach.

Acknowledgement

The researcher thanks the students of ST Hostel, Govt. Boys' High School, Unit-1, Bhubaneswar, and students of ST Girls' Hostel, Govt. High School, IRC Village, Bhubaneswar, for their cooperation during the study. She also thanks all staffs of her own institute for support and suggestions.

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