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RESEARCH ARTICLE

Telling Stories in Science — For Better Communication

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ABSTRACT

In the present research paper, the researcher has attempted to find out whether the Post Graduate science teachers of higher secondary schools are aware of using the storytelling method for communicating both curricular topics and new scientific research findings to the students. A sample of 50 Kendriya Vidyalaya PG science teachers of different states had been selected through purposive sampling. The significant finding of the study is that storytelling for science communication at higher secondary level is not popular amongst the PG teachers. Science storytelling sessions are very limited due to various reasons. Storytelling either through audio or visuals or both has the potential to be useful in both urban and rural areas to make science popular among the students and public alike. The gap between the scientists and common people can be bridged with more efficient communication like storytelling.

KEYWORDS: Storytelling, Science Communication

'Well, if storytelling is important, then your narrative ability or your ability to put into words or use what someone else has put into words effectively, is important too.'

— Howard Gardner, American Psychologist

Introduction

Science has its presence in every aspect of human life. Scientists venture out into different areas to know about it, understand it and try to find out the ways of useful application of the specific knowledge of that specific area for the greater benefit of the society and environment. Many of us do not understand the computer machine language, which are combined patterns of binary digits or bits. Nonetheless, we are familiar working with computers.

Likewise, the language of scientific research is complicated to understand for an ordinary person. However, when that person learns about the interesting story behind the results of a particular scientific research and realizes how that is useful in our lives, the person appreciates the hard work. At that time, a bond of trust and confidence is built between the scientific community and the common people.

Science is the systematic knowledge of things around and within us. The knowledge of science creates new ideas that brighten up the world around us. New ideas and concepts are tested, retested, extended, modified and combined into an impressive explanation. For example, one can take the case of garden peas. Scientists made observations of the pea plants over many years which was combined and explained by science to the whole world as the wider understanding of Genetics.

The process of science helps to construct and integrate ideas and scientific knowledge into useful findings. From designing bridges and pacemakers to forecasting weather and events, to reducing pollution, scientific knowledge allows us to solve practical problems, develop new technologies and bring out appropriate decisions. One can understand how the discovery of the structure of DNA has led to a wide range of useful practical applications. Some of its important application areas are DNA fingerprinting, genetically modified crops, genetic engineering of animals, experiments for genetic diseases, manufacturing of pharmaceuticals, diagnosis of certain medical conditions, testing to see whether a person is a carrier of a particular disease but does not have the disease, etc.

Each day the work of the researchers and scientists touches our daily lives from the food we eat, the medicine we take, the water we use to the air we breathe and to the energy we consume. Still, the quest to excel and succeed in every situation is continuing every day, every moment in the scientific research laboratories.

Scientific researches have the potential to change the world for the better, but many times there is a lack of effective communication between the scientists, researchers and the ordinary people. People need to be communicated about the advances and new developments in various fields of science. It is

also necessary to instill a scientific aptitude and create interest amongst the young generation towards the different areas of scientific research.

Governments are spending huge amounts of public money for the scientific research works. It is a big challenge for the researchers as well as communication personnel working for different media to popularize the science concepts, the process, and scientific research findings among people in general. For making the task easier, one can try different methods and adopt different settings. Storytelling is one such approach that makes science communication more interesting, lively and efficient, because everyone loves a good story.

Storytelling

'Let me tell you a story' — this single sentence creates sudden excitement, curiosity, and interest amongst the readers, audience or the viewers whatever is the situation. It helps in drawing immediate attention of people. In a gathering, it transforms the general mood of the people from serious and tense to relaxed and familiar, which helps in making communication easy.

A story is a series of events on a specific topic or subject connected by a person to an audience. Stories conserve our own culture, tradition, and history, passing it on in a simple form which is easy to remember for the next generation. Beyond just the reflections about what might happen next, we use stories to answer the amazing unanswerable questions. What is life? What happens when one dies? What does it mean to be a human being? Stories bring discipline, order, and meaning to the chaos and turmoil of life. Stories connect people to each another. Sharing the person's subjective experiences through stories enables others to connect and empathize with one another.

Storytelling has an incredible power of communication. Since ancient times, stories have been shared in every culture. Stories have passed on from one generation to the next generation. It has had a major role in the growth of human beings. Stories and narratives have a way of making people understand many concepts. Stories add fuel to one's imagination and creativity and good stories motivate the learners to know more by exploring wider fields.

Storytelling and Science Communication

A combination of storytelling and science can be utilized for effective mass communication to understand and popularize science. Stories are essential not only to learn but also to be speculative, to raise questions and then find solutions.

There exists a communication gap between the section of society who have an academic background in science subjects, who can understand the scientific terms used in the scientific reports and journals and the section of society that has a non-science background and does not understand the jargon of scientific terms in the science articles and papers.

An ordinary person hesitates to spend money for buying science magazines and journals, as the person doubts that the articles may not be up to that person's reach. But we understand that science has benefited mankind in many ways. Science has brought remarkable changes in our daily lives. It's hard to imagine a life without the scientific discoveries and inventions.

So, the responsibility of bridging the gap between the scientific researchers and ordinary people must be taken up seriously by science communicators. Storytelling makes the communication process more interesting. However, to maintain trust, storytellers have a responsibility to be true to the scientific data and information while communicating.

Types of Storytelling — Verbal, Print, and Digital

Verbal Storytelling: An earlier form of storytelling was oral or verbal, with the inclusion of gestures and body expressions. It was prevalent much before the practice of writing started. Bed-time stories are well known and very popular amongst children. Grandparents are the eternal storytellers of the household. They narrate events from memory or experience. That can be called the basic form of verbal storytelling. It can be combined with song and dance. This type of storytelling is usually used while communicating to a very young generation.

But, can it be used effectively with adults too? This type of communication is most flexible. The narrator can modify and adjust the story depending on the situation, location, and the audience. Sometimes the storyteller uses visuals to have a better

impact. It can be in prose, poetry or drama form. Professional storytellers were very popular in different cultures.

In medieval British culture, Bards were professional storytellers, verse-makers and music composers employed by the royals mainly to praise their ancestors and their rule. In India, there was the tradition of *Dastangoi* in the 13th century. *Dastango* were the storytellers who used to recreate the story or the *Dastan* verbally. Recently, TED talks have gained much popularity worldwide. One can say that TED speakers are excellent storytellers. Any person can improve the oral storytelling skills by observation and practice. Originality also counts for such talent.

Written Storytelling: Written forms of storytelling developed gradually with the passage of time. It can be seen starting with elementary cave drawings and painting by people who lived in caves. Those drawings were their way of entertainment, education, preservation of culture and imparting moral values. The written form of storytelling is popular with common people as it is conveniently available and can be used as per one's own time management schedule.

Digital Storytelling: Digital storytelling involves the use of various digital tools for the narration of the story. The range of digital narratives can be web-based stories, interactive stories, hypertexts, narrative computer games, etc. Films and documentaries narrating an event or issue can also be included in the category of digital storytelling. Digital stories can be used as an effective medium in the classroom for integrating subject matter with knowledge and skills from across the academic curriculum. Digital storytelling is being preferred these days due to its capability to combine still images, moving objects, sound, animation, text, subtitles, etc. Digital storytelling can be used for sharing scientific data and evidence to the public as well as researchers.

Review of Related Literature

The related studies reviewed focus on various aspects of successful communication and storytelling in the field of science communication. Few findings worth mention are listed here.

- A study on 'Using narratives and storytelling to communicate science with non-expert audiences' was conducted by Michael

F. Dahlstrom (2014) of Greenlee School of Journalism and Communication, Iowa State University. The researcher reported that narratives represent a potentially useful format of communication for the communication of science to non-expert audiences. Narratives are easier to process and generate more attention and engagement than traditional logical-scientific communication. Narratives already represent the format with which most non-experts receive their information about science and narratives are intrinsically persuasive, which presents both benefits and challenges for science communication. The final section explores how narratives may intersect with ongoing and future discussions within science communication.

- A study on 'Speaker-listener neural coupling underlies successful communication' by Greg J. Stephens and team (2010) from Princeton University, New Jersey has findings which indicate that during successful communication, speakers' and listeners' brains exhibit joint, temporally coupled, response patterns. For the study, they recorded the brain activity of a speaker telling an unrehearsed real-life story and the brain activity of a listener listening to a recording of the story. Such neural coupling substantially diminishes in the absence of communication, such as when listening to an unintelligible foreign language. The researchers have further reported that on average the listener's brain activity mirrors the speaker's brain activity with temporal delays. Such delays are in agreement with the flow of information across communicators and imply a causal relationship by which the speaker's production-based processes induce and shape the neural responses in the listener's brain. The researchers connected the extent of neural coupling to a quantitative measure of story comprehension and find that the greater the anticipatory speaker-listener coupling, the greater the understanding.
- A study on 'Prescriptive scientific narratives for communicating usable science' was carried out by Julie S. Downs (2014) of Department of Social and Decision Sciences, Carnegie Mellon University, Pittsburgh. The study concluded that use of narrative helps to convey scientific findings in a coherent manner that can help the audience better understand and remember complex processes that are otherwise difficult to explain. Prescriptive

scientific narratives can explain science to people who can then use their improved understanding to make better decisions for themselves. By using narrative to convey scientific information, communication can help its audience to reconsider long-held beliefs that may be inaccurate, and develop an understanding that will serve as a framework for new information. Interactive narrative science communication provides significant additional benefits. In particular, it allows for structured self-tailoring, delivering the most relevant information to the audience efficiently, while boosting feelings of engagement and agency. The case study presented in this paper demonstrates how a prescriptive scientific narrative reduced adolescents' risky sexual behaviour. This approach has promise for other domains requiring communication of complex scientific processes that underlie risky human behaviours.

- In an article, 'Finding the plot in science storytelling in hopes of enhancing science communication,' authors Susana Martinez-Condea and Stephen L. Macknika of State University of New York have opined that it is this integrated approach that one may consider a potential partnership between the science of science communication and the art of storytelling. Reaching a general audience while communicating scientific content is perhaps as much an art as a science, and successful art engenders emotion. Identifying and developing such emotional connections in public might be a powerful path to a gripping plot.
- Alan Ada, an actor and the visiting professor at the Alan Alda Center for Communicating Science, at Stony Brook University in New York in his interview to Australian National Centre for the Public Awareness of Science has given some interesting statements. In his words, 'It was wonderful. I counted once, I think, I interviewed about 700 scientists. And I realised that what we were doing was a different way of interviewing about science. It was just a pure conversation like the conversation we're having now. It was freewheeling. I didn't have a list of questions. I just wanted to understand them and there was something that was so personal, that it brought out the personality of the scientists and they were real people, they weren't lecturing. When the show was over, I thought, wouldn't it be wonderful if scientists could do that naturally without

somebody next to them like me, drawing it out of them? How could we get them into that conversational tone? Whenever I would be at a university where they taught science, I would try to talk the president of the university into the idea of teaching communication while they taught science, because if you can graduate experienced scientists, capable scientists who are also capable communicators, then the public has a chance to learn something from them.' This interview has given insight into how proper expression can make the scientists more approachable and can break the communication barriers for the ordinary people.

Significance of the Study

The statement of the present study is 'Telling Stories in Science — For Better Communication'. Storytelling is a globally accepted tool to elicit connection and positive response from the target audience. It depends on how skillfully one exercises this tool to be a successful communicator. It has also been understood that focusing on the storytelling approach in science communication, the obstacles between the researchers and the non-experts in the field can be removed to a large extent. Reaching out to ordinary people is necessary to have faith and confidence in the scientific researcher community. Researches are done for the good of society and the benefit of everyone. When people appreciate and applaud the good work done in the science laboratories, the researchers get encouraged and motivated to work more for better results in their work.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) in its document, 'UNESCO Science — For Peace and Sustainable Development' (2013) have stated six relevant chapters: (1) Science to Empower Society, (2) Science to Manage Freshwater, (3) Science and Services for the Oceans and Coast, (4) Science to Manage the Earth, Eco-Systems and Bio-Diversity, (5) Science to Build Safe, Inclusive and Prosperous Community, (6) The Wider Horizon: Science, Society and a Sustainable Future. The realisation of these global objectives needs popular science communication.

Moreover, to reach out and get connected with the mass, storytelling has much potential for success. Hence, the study was undertaken to find out the scope for making science

communication interesting for a non-expert audience. Delivering scientific findings in a well-organized narrative with a high degree of connectivity can help make complex processes appear as more accessible, interesting, and memorable.

Objectives of the Study

The following were the objectives of the study:

1. To analyse the views of the science postgraduate teachers towards the storytelling approach for general science communication.
2. To analyse the views of the science postgraduate teachers towards the storytelling approach in classroom pedagogy in science subjects.

Delimitation of the Study

1. The study was delimited to postgraduate teachers in only science subjects, i.e., in physics, chemistry, and biology.
2. The study was conducted only on the teachers serving at the Kendriya Vidyalayas of Odisha and Kerala.
3. The study focused only on storytelling approach in science communication.

Methodology of the Research Work

The present study was descriptive with qualitative and quantitative methods employed in data collection and analysis.

Population and Sample of the Study

The general population for this research paper consisted of all the postgraduate teachers of the science subjects — physics, chemistry and biology teaching in secondary and higher secondary classes of Kendriya Vidyalayas functioning in two states.

Sample: For selecting a sample, 50 postgraduate science teachers were identified and selected through Non-Probability Sampling technique (purposive sampling). It was conducted during an in-service training programme of the organisation. The selection of the teachers was made intentionally considering the criterion of being postgraduate science teachers teaching in

secondary and higher secondary classes. Data have been collected from 50 regular postgraduate science teachers for further analysis and interpretation.

Research Questions

The present study focused on the following research questions:

1. What is the opinion of the teacher towards storytelling in science?
2. What is the view of the teacher towards science communication in different media — print and digital?
3. What are the various Information and Communication Technology resources for students that cater towards increasing their interest in science?
4. What are the challenges and problems a teacher finds in storytelling approach in science?

Accordingly, a questionnaire was prepared by the researcher for getting the personal view/opinion of the teachers in the sample for this study. The individual questions were open-ended and had opportunities for the respondents to give their opinion elaborately as per their personal choices.

Analysis and Findings of the Study

The analysis and interpretation of collected data were done as follows:

- In response to the first question, all the sample teachers in their opinions differed on the appreciation of the storytelling approach for understanding difficult concepts in science for people of all ages. Most of them agreed about its applicability for primary level. Nearly 10% of the responses were positive for storytelling approach for higher level science concepts and scientific research findings. Though, most of them (95%) have stated that they have not tried storytelling much in their dealings in the present academic set-up with secondary and higher secondary level learners but agreed that it has a good potential for popularizing science. From the responses, it can be seen that storytelling does not have a good reputation among science teachers. Scientific concepts are considered as isolated areas and not meant for the public audience.

- It was found that nearly 70% of the sample teachers opined that storytelling could be done more efficiently with the digital media. In their view, digital presentations can be interactive and thus more appealing. With the visuals, one can create the desired atmosphere according to the situation and convey the information more lucidly. The rest of the teachers were in favour of the print media. They mentioned in their views that stories in print are readily available to all the learners anytime and are less dependent on power consumption. Print media has its advantages too. As per the responses of the teachers, with the provision of the computer lab and electronic display boards in the school, the Information and Communication Technology facilities are adequate for accessing resources for science communication. Documentaries on specific issues can also provide scientific information and facilitate science communication for the young learners.
- Regarding challenges in the way of storytelling for science communication majority of the teachers (90%) were of the view that: (1) They were ignorant about the use of narratives in higher science. They also opined that they have neither experience nor exposure of storytelling and need exposure on integrating the storytelling approach with higher level science topics and audience from a non-science background. (2) How to evaluate different sources of scientific information was raised by five, i.e., one-tenth of the sample. The challenge of (3) how to examine the factors necessary to consider when getting started as a science storyteller were pressing concerns of nearly half of the teachers. (4) The balancing of complex scientific analysis with a simple way of expression was another issue in storytelling. (5) Reflecting one's knowledge and personal experiences in the form of stories, anecdotes, and narratives in the process was another area of concern to be tackled in the storytelling approach as stated by the respondents. All of them also opined that (6) regular feedback should be taken from the scientists, researchers, expert storytellers, to realize the gap between planning and actual implementation of storytelling for effective science communication.

With the storytelling approach the communicator can present a wide range of information in a different way from a different

angle in each story to face the challenges. The skill of storytelling needs to be developed. Teachers have a greater role to play as they act as the connection between the upcoming young generation and the community. Promoting scientific knowledge and understanding among the students motivates them to be inquisitive and creative and helps them to decide their future action in the field of academics, for the greater benefit of the mankind.

When the stories in science move from data collection, to the communication of science to non-expert audiences, then stories and narratives become not only more appropriate but more important. Research suggests that narratives are easier to comprehend and audiences find them more engaging than traditional scientific communication. 'Prescriptive narratives' are desirable use of the narratives for communicating the scientific understanding, information and advice to the people who are at risk and who have the maximum use for the information.

Science communicators need to balance the influence of narratives to persuade otherwise resistant audiences about issues related to disease, health and environment.

Conclusion

There is no point in discovering new research findings in science unless one does not make efforts to communicate to the world outside the walls of the laboratories and outside the conference rooms. Also, it is desired of the research team to explain if the expenses incurred for the visits and experiments during the research period have been paid for by public funds. It is the joint responsibility of the scientists and science communicators to share the results with the public in a simple way, easy to understand.

People who communicate science are not always practising scientists, but individuals with interest and some knowledge about science or some science background. The biggest problem is that scientific language is not easily understood, and the misunderstanding of information can lead to inaccurate and risky explanation in the mass media.

With the storytelling approach, the communicators can present a wide range of information from a different angle in each

story. The skill of storytelling needs to be developed. Teachers have a greater role to play as they act as the connection between the upcoming young generation and the community. Promoting scientific knowledge and understanding among the students motivates them to be inquisitive and creative and helps them to decide their future action in the field of academics, for the greater benefit of the humanity.

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India has a population of 1.21 billion as per the 2011 Census data. Out of this, more than 800 million people live in rural and hilly areas, whereas the rest of the population lives in cities. There is a gap in the field of communication of science in India which splits wide open across education, occupation and geographical lines. Storytelling is one appropriate method to fill this gap and serve as the primary source of information regarding science, technology, health, and environmental issues.

Planners, policy makers, scientists, media houses must work together and make an effort at science communication for the ordinary citizens. Feedback from different sections of the society needs to be regularly monitored. Stories should be used to communicate science appropriately because of their power to convince and build confidence amongst the ordinary people. Teachers, students, parents, writers, journalists, different media persons have to be apprised of this fascinating tool of storytelling to make science communication better. As the competition for attracting attention in the midst of the increased volume of potential messages rises, the art of storytelling can guide the non-expert audience with necessary information about the developments in the field of science.

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