Journal of Scientific Temper
Vol 10 (4), Oct-Dec 2022, pp. 230-241
DOI:10.56042/jst.v10i3.68350

ARTICLE

Science education and promotion: Understanding the reach of media among rural school students

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ABSTRACT

As our country is one of the fastest-growing major economies in the world, it is imperative that every citizen, particularly the youth, must contribute to nation-building for further acceleration in economic growth and prosperity. India has the immense potential to reap rich demographic dividends if the youths are adequately empowered and engaged by implementing appropriate, effective and timely policies. A nation witnesses incredible economic growth when there is scope for the continuous flourishing of science, technology and innovation. This unequivocally calls for enrichment in science education among school goers. In an effort to identify and tap the bright and creative young minds in India, there are government-funded several programmes for science education and promotion. An example of one such remarkable programme is 'Rashtriya Avishkar Abhiyan' launched recently by the Ministry of Education, Government of India. The pertinent question arises here whether there is equality in getting access to government initiatives by the youths across the length and breadth of the nation. The present article attempts to understand this particular scenario by pursuing a field study among high school students studying in schools situated in remote areas of the Sonitpur district in Assam. The article also highlighted the media interventions to be undertaken to make the initiatives for science education and promotion more accessible and attractive.

Keywords: Science Education, Innovation, Education, Media

Introduction

"Innovation is the key to realising the dream of New India". This recent clarion call made by our Honorable Prime Minister has

far-reaching consequences for the development of our country (Press Information Bureau, Govt. of India, 15 November 2021). Innovation is apparently the catalyzing force for the economic prosperity of a nation. In fact, the development of a nation could be profoundly measured by the progress in the fields of science, technology and innovation. In terms of innovation, India is performing better consecutively in the last five years, yet India is placed at number 40 in the Global Innovation Index in 2022 (GII 2022). Considering the magnificent vast demography in India, such a rank is a matter of serious introspection for our policymakers, educationist, civil society and government at large.

It is worth reminding ourselves time and again that despite the glorious path shown by Sir C.V. Raman, who was awarded the Nobel Prize in Physics in 1930 for his remarkable discovery of the Raman Effect (Nobel Prize 1930), our country is yet again to accomplish such recognition in science. Therefore, a critical question arises at this juncture — 'Is there a dearth of enough talent pool in India?'. The overall global influence of Indian talents may probably lead to a negative answer. For example, technocrats such as Sundar Pichai and Satya Nadella, who are the Chief Executive Officers of the world-renowned companies Google and Microsoft, respectively, are household names for many, globally, in contemporary times. Gupta in his research article mentions the policies and measures to dramatically improve the innovation scenario of the country for the betterment of the quality of our daily life and the economy of India (Gupta, 2016).

Science education acts as a propeller in unleashing the innovative talents and immense power of creative minds. It aids in inculcating the spirit of problem-solving and an attitude of critical thinking. It hones universal skills that allow us to search for novel ideas, take intelligent decisions and look for out-of-the-box science and technology solutions for complex problems. Underpinning the dire importance of science education in an evolving society and culture, the Government of India is taking various measures in understanding and reforming the scenario of science education in post-independent India. Indian Parliamentary and Scientific Committee (1961) evaluated the

progress and problem of science education in schools in India. The National Education Commission (popularly known as Kothari Commission, 1964) also provided recommendations for improving the quality of science education in India. The "Curriculum for the Ten-Years School: A Framework" developed by the National Council of Educational Research and Training (1975) highlighted the importance of science and mathematics for enhanced productivity and a rational outlook. The National Policy on Education (1986) also emphasised the need to strengthen science education programmes for enabling better problem-solving and decision-making skills. Similarly, the recent National Education Policy (2020) vouched for multidisciplinary and holistic approaches to imparting science education across all levels.

Mahatma Gandhi defined equality by mentioning that "My idea of society is that while we are born equal, meaning that we have a right to equal opportunity, all have not the same capacity"(Village Swaraj, 1962). If providing science education is on one side of the coin, the opportunity to get access to this education is on the other side. Therefore, Gandhi's philosophy of equality also holds true while it comes to equal access to science education. Generally, the dwellers of metro cities and urban areas are more privileged in obtaining information related to education, healthcare, sports, etc. in comparison to rural areas. Therefore, it is pertinent to understand the reach of the government's numerous initiatives on science education and promotion in rural areas. Thereby, it also sheds light on the importance and impact of media intervention on science education and promotion.

Objectives

The primary objectives of the study are as follows:

(i) To find out the awareness of various government initiatives for science education and promotion among rural school children

(ii) To know the media platforms used by the school children for accessing information on science-based schemes.

Methodology

As part of the field study, the researchers surveyed a total of 510 numbers of 10^{th} standard school children (277 Females and

233 Males) studying in rural areas of Sonitpur district in the state of Assam. For conducting the field survey, a well-designed open and close-ended questionnaire was distributed among the students in the classroom followed by a Focus Group Discussion (FGD) for understanding the grass-root issues in the dissemination and popularisation of science initiatives. The justification for selecting only the 10^{th} standard students is that the given population of learners is poised to embark on pursuing higher studies either in science or other streams. In addition, most of the schemes promoted by the government are categorically targeted at this group.

The following general questions were covered in the survey:

1. Are you aware of the following institutions/initiatives?

   (a) Indian Institute of Technology (IIT), (b) Indian Institute of Science Education and Research (IISER), (c) VigyanPrasar, (d) India Science TV Channel, (e) INSPIRE Award, (f) INSPIRE Award-MANAK, (g) Smart India Hackathon, (h) YUVIKA - Young Scientist Programme by ISRO, (i) CSIR Innovation Award for School Children, (j) Make in India, (k) Skill India

2. Have you ever visited any Science Centres/Museums?
3. Do you read the '*Science Reporter*' magazine?
4. Write down the name of two famous Indian scientists.
5. Are you familiar with the 'Dos and Don'ts' of COVID-19?

The following questions related to media were covered:

1. Do you have access to media?
2. Which of the following media forms would you prefer to access information on science education?

   (a) newspaper, (b) magazine, (c) poster, (d) radio, (e) TV,

   (f) Facebook, (g) YouTube, (h) cinema, (i) documentary,

   (j) Internet, (k) street play

3. Is language a barrier for you to understand the scientific concepts available on TV, Radio, newspapers, Internet, etc.?

Queries of Focus Group Discussion:

1. Which media forms did help you the most to know the etiquette ofCOVID-19?

2. If you are familiar with the topics covered in general Q. No.1, what kind of media did help you to make you awareof the institutions/initiatives?
3. According to you, which media formis convenient forgetting easy access to science education/information in rural areas?
4. Importance of regional media in disseminating the opportunities for science education.
5. Out of all Indian scientists, why do you consider Dr A.P.J. Abdul Kalam popular among the youth?

Results and Discussion

The survey was conducted to find out the awareness level of 10^{th}-standard school students on the topics related to science education in India. The questionnaire consisted of general awareness of science education, innovation and government initiatives on science education and promotion. To address the reach of media among young learners, in terms of science education, queries and concerns were raised through FGD. The survey results and interpretations are summarised below.

Indian Institute of Technology, popularly known as IIT, is a well-known premier and elite academic institution in the field of engineering and advanced research in India. There is no denying that the IIT graduates brought laurels to the country. It is the most sought-after institution for pursuing engineering by any student. Therefore, it is no surprise that students are aware of IITs. Our survey indicates that 82% of students know about IITs. Therefore, we enquired about their means of getting awareness on IITs. It was found that the large-scale advertisements often published in print media such as newspapers, magazines, periodicals, etc. and billboards of coaching institutes, primarily involved in training the aspirants to qualify IIT entrance examination, easily noticeable in every nook and corner are the prime reasons for their awareness. In contrast, there is negligible awareness of the Indian Institute of Science Education and Research (IISER). IISERs are relatively new but emerging institutions for pursuing the basic science and advanced research in India. Only 4% of students indicate awareness of IISERs.

It is needless to mention that COVID-19 battered our life since its outbreak. The students were asked about the ‘Dos and

Don'ts' during the COVID-19 pandemic. It is quite interesting to note that all the students are well-versed in the etiquette of COVID-19. The prime reason for their awareness of COVID-19 is that they have seen posters and hoardings of it in schools, hospitals and public spaces. The compulsory broadcast of mobile phone caller tune with COVID-19 information and vaccination also helped them to make aware of the pandemic. A recent study conducted by a group of scientists based in the US and UK also confirms the importance of mobile phone caller tunes in combating the COVID-19 pandemic (Appiah *et al.*, 2022). Television advertisements also helped in the awareness and promotion of safe hygiene and social distancing during the pandemic.

Science Centre (or Science Museum) is an attraction site under the National Council of Science Museums under the Ministry of Culture, Govt of India. The primary objective of these centres is to popularise science among common masses of all age groups. There is an established science centre in Guwahati. For the study, it was found that 92% of students never visited these types of centres either due to a lack of awareness or support. It is important to note here that there is a plan for the establishment of additional Science Museums across the country by the Government of India for the promotion of science (Press Information Bureau, Govt of India, 29 September 2021). A survey study shows that regular visit to science museum by students (class 9 and 10) significantly influences the retention ability in science subjects (Panda, 2018). On the other hand, another study shows that the various scientific programmes organised by Regional Science Centre, Guwahati, received not due participation from students due to a lack of information and it was also found that there is insufficient media coverage of these programmes (Bharali *et al.*, 2012).

Vigyan Prasar, under the ambit of the Department of Science and Technology, Government of India, is a dedicated organisation for communicating and promoting scientific information and knowledge among the citizens in India since its inception in 1989. It undertakes scientific activities in various forms across the country throughout the year. One of the greatest outreach activities sincerely pursued by Vigyan Prasar is

publishing books and periodicals on science education. One of the popular monthly science magazines published by Vigyan Prasar is '*Dream 2047*'. Therefore, the researchers examined the awareness and perception of students on Vigyan Prasar and it was found that only 34% of students know about Vigyan Prasar.

Another monthly Indian science magazine of immense repute is '*Science Reporter*' published by the National Institute of Science Communication and Policy Research (NIScPR), CSIR. The dissemination of COVID-19 pandemic-related information in *Science Reporter* is exemplary (Dharampalan *et al.*, 2022). Our survey indicates that students are mostly unaware of the existence of these two important magazines. But they show a keen interest in reading these types of scientific magazines when informed about the possibility of downloading them free of cost from the websites of Vigyan Prasar and NIScPR. While discussing with the students, it also came to light that the English language is a barrier for them to understand the scientific articles published in science magazines. Therefore, students who are getting educated in vernacular mediums prefer articles and magazines written in their native language.

Keeping pace with the evolving digital world, another latest but remarkable add-on from Vigyan Prasar is the 'India Science TV Channel'. It is an easily accessible Over-The-Top (OTT) platform on devices such as laptops, desktops, smartphones, smart TV, etc. This channel exclusively broadcasts diverse scientific topics intending to disseminate the latest information on science and technology and, simultaneously, educate the citizens about it at their own pace. However, the survey indicates that 89% of students do not know about it.

An important innovative and pioneering initiative sponsored by the Department of Science and Technology (DST), Government of India is to motivate and attract students at an early stage for pursuing basic and natural sciences at college and university under 'Innovation in Science Pursuit for Inspired Research (INSPIRE)' programme. Qualified students receive incentives in the form of monthly scholarships. It is interesting to note here that a fairly good number of students (53%) know about it. Two primary reasons for it are that they have seen advertisements for INSPIRE award and know some seniors who

received the INSPIRE award. On the contrary, almost all of them are unaware of the 'INSPIRE Award-MANAK (Million Minds Augmenting National Aspirations and Knowledge)'. It is a scheme to reward school students studying in classes 6 to 10 (age group of 10-15 years) who can offer original scientific ideas and innovations for tackling societal needs. Similarly, the Council of Scientific & Industrial Research (CSIR) also introduced 'The CSIR Innovation Award' targeting school children who are studying up to 12^{th} standard (below 18 years of age). This annual national award recognises the original scientific and technological ideas proposed by the students which in turn instils the spirit of innovation and out-of-the-box thinking among school children. Unfortunately, these students are ignorant of such noteworthy awards.

Indian Space Research Organization (ISRO) organisesa special two-week residential young scientist programme popularly known as 'YUVIKA' for school children with a noble and far-reaching intention of educating younger students about the science of space technology and space applications. The programme aimed at targeting students mostly studying in rural areas across the country. But again, these students failed to know about the programme.

A nation wise initiative to inculcate a culture of product innovation by the Ministry of Education, Government of India, is known as the 'Smart India Hackathon'. It provides a platform for students (classes 6-12) to give solutions to some of the pressing problems we often encounter in our daily lives. Our survey indicates that 19% of students are aware of such initiatives through print and digital media.

Conclusion

The efforts made by the government agencies such as DST, CSIR, ISRO, etc. in promoting science education and popularisation are applauded and noteworthy. The existence of a fairly large number of innovative schemes and initiatives to attract young minds is an ultimate testimony of it, which certainly reverberates the idea of 'Catch them young'. However, it appears that there is yet a section of the population that is unable to take leverage of these opportunities and it is a grey area. One of the primary reasons is the

acute lack of information. Such a situation is not so surprising considering the great diversity and large demography in our country. Therefore, there is a need to mitigate this scenario. This is where media intervention is of paramount importance to bridge the gap. Our survey and interview analysis also hint at it. For example, when the students were asked to mention the name of a great Indian scientist, almost all of them stated the name of Dr A.P.J. Abdul Kalam. Whereas it was merely difficult for them to mention the second name.

As per the survey, the second most popular Indian scientist(Indian-origin American astronaut) is Kalpana Chawla. Only 33% of students could recognise her as a scientist or astronomer. While discussing with them, it got revealed that the majority of them are aware of Dr A.P.J. Abdul Kalam because they have seen his photograph either in schools or public places. Similarly, they know about Kalpana Chawla since her photograph is displayed in some of the commercially available school notebooks. This signifies the importance of print media such as posters and photographs in the effective dissemination of information which otherwise may be quite difficult. A similar example could also be drawn from the recent COVID-19 pandemic. The aggressive display of posters depicting the perils of COVID-19 in public places unprecedently helped to raise awareness of the pandemic among the common masses. There is also a report that posters can effectively improve healthy eating habits among school children (Panda, 2020).

Vigyan Prasar has been taking strides to reinvent itself to reach the masses as much as possible. For example, an Assamese language science periodical named ‘Sandhan’ is being launched recently to reach out to Assamese students. Our survey also indicated that students prefer science articles written in their native language. But they were completely ignorant of such an initiative. Vigyan Prasar has also launched a unique news service ‘India Science Wire’ to disseminate the latest science and technology news from India. It is found in our study that a majority of the students are digitally literate and have access to social media platforms such as Facebook and YouTube.

Taking into account the growing digital media literacy among the youth, one can understand the usage and popularity of the

'Digital India' campaign launched in 2015 and the huge demand for digital media dependency during COVID-19. As per the students' feedback, they would prefer to know about any latest information related to science education and promotion on social media platforms. The participants have expressed that the internet is a convenient medium for them to search for information and news related to science education. But as the internet is a wide pool of resources, knowledge and content, the participants reflected on the difficulty in tracing the relevant and specific topics on science education due to lack of proper guidance. One way to enhance awareness is by displaying important information on the school webpage. But it would be merely a daunting task to maintain a dynamic webpage for each government school. In this context, the easiest and most cost-effective approach would be to have a social media page for each school where all the relevant information can be posted and students of that particular school can easily access the information.

The sponsoring agencies can encourage all the state and central universities to set up a nodal centre voluntarily under Scientific Social Responsibility (SSR). The members of the centre could be students and faculty members who availed opportunities under various government schemes and they may organise outreach activities in local and remote areas for the widespread promotion of initiatives undertaken by the government. The Science and Engineering Research Board (SERB), DST, has already devised its Scientific Social Responsibility policy to connect researchers with society. It is worthwhile to note here that out reach activities in the form of mobile science exhibitions undertaken by Pushpa Gujral Science City in association with the National Council of Science & Technology Communication (NCSTC), Department of Science & Technology, Government of India, and the Punjab Technical University significantly boosted the science popularisation level among the school students (Grover *et al.*, 2021).

It is important to observe that the 'Make in India' initiative of the Government of India is immensely popular among students. It is because of the widespread advertisements of 'Make in India'in newspapers, TV commercials and, most importantly,

consumer products. Although it is not directly related to science education, the students could relate the Make in India initiative with product design, development and innovation exclusively in India. Information on opportunities for science education is esoteric and, hence, it requires special efforts for popularisation through effective mass media.

India can harness the immense potential of the young innovative minds that is latent in the country if, in addition to providing infrastructure, adequate emphasis is also given to all possible media avenues in reaching out to the masses of the far-flung areas so that 'No one leaves behind in realising the aspirations of New India'.

Acknowledgement

The authors are thankful to the Heads of the Schools for granting permission to conduct the survey and interviews. The authors also acknowledge the respondents who actively participated in the survey. Special thanks to Mr Rituparna Baishya and Miss Devalina Sarmah from the Department of Physics, Tezpur University, for their valuable support.

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