Journal of Scientific Temper
Vol 9(1&2), Jan-June 2021, pp. 8-20

ARTICLE

Film-centric promotion of scientific temper: A study of screening grassroots technological innovation short science films at schools across India

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ABSTRACT

Film-centric promotion of scientific temper has been attempted the world over to influence audience perception of themes allied to science and technology which often reflect shades of social as well a cultural concern. This paper attempts to see how students in 77 under-resourced schools in 15 states of India have comprehended the science content through screenings of short science films themed on grassroots technological innovators who have had no formal technical education and yet have been able to innovate products that answered a sorely and regularly felt local need. All the short science films screened offered an amazingly simple technical solution to a real-life challenge. In a large number of instances, the challenges faced by the grassroots innovators in their daily lives were also the problems encountered by the school children who formed the audience of these films. The fact of audience identification with the films emanating from a striking similarity with the socio-economic background of the grassroots technological innovators drove a large part of this study. The analysis establishes how gender distribution of audience among nine to eighteen years of age have received the short science films and what competing ratios did the responses indicate about the degree of engagement during post-screening interactions in both rural as well as urban locations.

KEYWORDS: Documentary, Science films, Rural India, Grassroots Innovators, Grassroots Technology, Science fiction.

Introduction

Science on television and celluloid in the context of science communication has increasingly been used to inculcate scientific

temper across societies[1]. The sensate perception of films has traditionally guided its art and craft to impact how culture, gender, society, and economic background influence a target group's appreciation and understanding of issues of societal relevance[2,3,4]. The population of students has also been similarly influenced. Students in contemporary times are regularly being exposed to ever-evolving newer varieties of social media platforms that offer a huge range of visual content[5,6]. When looked at from the point of view of films dealing with themes of science, It becomes imperative for a science film to critically examine and convey appropriate, valid, and verified messages based on scientific facts and principles which are visually treated in a manner that promotes active cognitive reception by the target audience[7,8,9].

Contextualized for the Indian educational system, the skewed balance in favour of knowledge acquisition from textbooks has affected exposure of students that they could have gained from engaging with practical sessions and experimentations at educational institutions that were to aid and enrich the learning outcomes[10]. A study carried out by the Unified District Information System on Education (UDISE) and the National University for Educational Administration and Planning (NUEPA), in 2014, established the fact that more than three-quarters of schools in India lack fully equipped science laboratories for the students. For class 9 to 10, over 58% of schools did not have a decent science laboratory[11]. It is precisely here that science films can be actively considered as a rescuer[12]. Science films have the potential to visually and aurally deliver content that may aid and enrich the theoretical knowledge gained in the classrooms[6,13].

In this study, the screening of short films based on grassroots technological innovations that solved a real-life challenge routinely faced by the villagers of India, conducted by a non-governmental organization operating out of New Delhi for promotion of technological innovation and scientific temper called ‘Search for Truth And Return To Science’ (START) has been analyzed. The study is based on the audience data of their socio-economic background, gender as well as age, which were obtained right after the screening of films at seventy-seven schools located in fifteen states of India.

The film screening conducting organization START consists of scholars, academicians, media professionals, science communicators, scientists, technocrats, medical doctors, grassroots technological innovators, engineers, entrepreneurs, and social workers, firmed up by a series of responsibilities to improve appreciation of science among people at large employing the art, craft, and technology of modern media.

Over the last eight years, 'Search for Truth And Return To Science' (START) has focused on public engagement programmes through screening of short science films produced in the Hindi language on grassroots technological innovations at educational centres across India, especially at under-resourced schools. It brings together local expertise to discuss scientific concepts presented in the screened films, with children who attend these science film screenings.

These films attempted to aid and enrich the learning of scientific concepts themed on physics, chemistry, and certain aspects of utility technology which were reflected intrinsically in the works of grassroots technological innovators. The films were screened in various parts of India starting 2012 and were independently produced by Television Programme Company (TPC), a production house managed by the founder and president of START who had also scripted and directed all the films screened at the schools. The films shown at various locations were shot and edited by Poonam Chaurasia, the co-founder of START. The database of innovators was provided by the National Innovation Foundation, an autonomous organization of the Department of Science and Technology, Government of India.

Methodology

Collection of Data

Data that has been analyzed in this study include the number of film screenings, locations where the films have been screened, age of the audience, gender of the audience, and socio-economic background of the audience.

The number of film screenings, locations, socio-economic background, and the age of the audience was fetched from the information available from the reports on individual screening as well as the filled-up feedback forms received from the school students after every screening.

Analysis of the Data

The data has been classified primarily based on age, gender, and socio-economic background. The responses have been analyzed based on gender and socio-economic background.

Results

Over eight years, START has held a screening at 77 different locations across India.

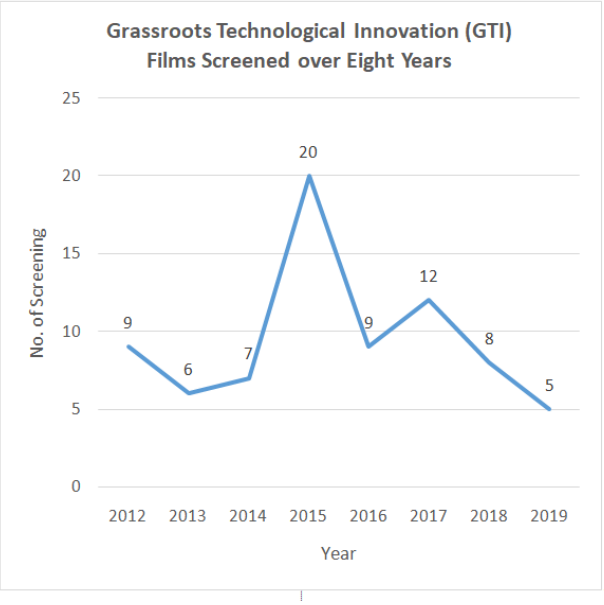

Figure 1: GTI Films screened over eight years

Figure 1 depicts the number of short science film screenings beginning from the year 2012 up to 2019. The year 2015 tops the

list, followed by 2017. The least number of screenings were conducted in the year 2019.

Over the past eight years, Search for Truth And Return To Science (START) had screened short science films in fifteen states of India, covering Andhra Pradesh, Bihar, National Capital Region of Delhi, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Nagaland, Odisha, Rajasthan, Tamil Nadu, Uttarakhand, Uttar Pradesh, and West Bengal.

Figure 2 depicts the states where film screenings have been held.

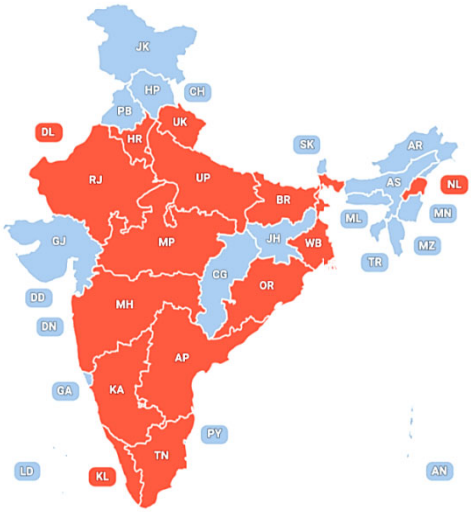

Figure 2: Short Science Film Screenings themed on Grassroots Technological Innovations held by 'Search for Truth And Return To Science (START) across India

As indicated earlier, the films that were screened were in the Hindi language. Apart from Delhi, Madhya Pradesh, Uttarakhand, and Uttar Pradesh, none of the states spoke Hindi as their native language, while Hindi enjoyed prevalence in Bihar, Haryana, Maharashtra, and Rajasthan. On the other hand, in some parts of West Bengal and Odisha, though Hindi as a language is spoken in the cities, 90% of people speak a mix of the native languages – Bengali and Odia. In Karnataka, Kerala,

and Tamil Nadu, the first languages are the native languages – Kannada, Malayalam, and Tamil respectively. Their second language is Indian English. The people in these areas rarely speak Hindi. While Indian English is the official language of Nagaland and it is a medium for education in the state, Nagamese is widely spoken, particularly in the urban and tribal areas.

It is critical, therefore, to take note of the language variation to communicate effectively. Though START faced the challenge of language proving a barrier in getting the desired communication across to the audiences in the states which did not speak Hindi, the on-spot assistance offered by the local coordinators saved the screening sessions at schools. The reality was underlined at a rather long duration film show held at Nagaland. START also realized at this venue that the self-explanatory nature of visuals combined sometimes with animation compensated for the absence of a locally suitable language.

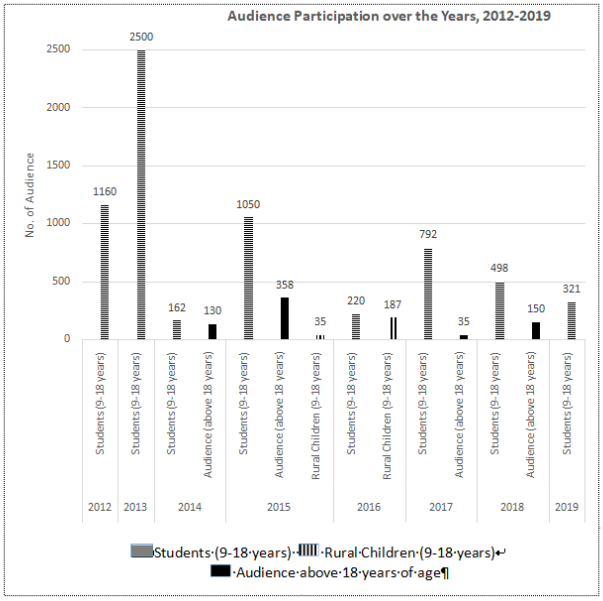

Figure 3: Age of audience that participated in the science film screenings over eight years

As Figure 3 suggests, the highest number of audience participation in the screenings was in the year 2013, although the highest number of screenings were held in 2015. This is largely because in 2012 the screenings were held during the National Children's Science Congress where students from schools all over India assembled to display their science project works. The fact of the analysis proved to be a pointer for planning to target a higher number of the audience while deciding locations for future short science film screenings. It was also felt, on the other hand, to restrict the audience to a manageable number for the screening to be interactive. The screenings in the consecutive years have taken note of the analyzed facts.

During 2015 and 2016, START focused on screening films at under-resourced schools and educational centres. Most of the attending students came from low resource settings who were severely limited by financial constraints and had not received any formal education. Their families being daily wage earners further complicated matters. About 6703 students of urban schools across India participated in the screenings. A total of about 222 children from the low resource settings participated in the START screenings. About 673 audiences were above the age of 18. These audiences also included mothers with hardly any formal education, trainees with a rural background and without any formal education, as well as teachers who were curious about exploring the potential of teaching-learning through films. The number of the participating audience involved totalled about 6925.

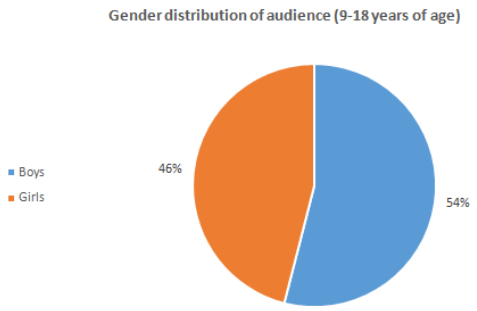

Figure 4: Gender distribution of the audience

START focused on co-educational schools, institutions, or educational centres for screening short science films on grassroots technological innovations. Out of the 77 screenings, 74 screenings targeted audience below 18 years. 71 out of the 74 were co-educational schools, institutions, or educational centres, 2 were all-girls schools while only 1 was an all-boys school. On average, about 46% of the audience (below 18 years) were girls and 54% were boys (Figure 4). As the reports suggested, except for the three schools, boys outnumbered girl-audiences registering a high number of female attendees. Considering India lists 4th in the top 10 countries with the biggest difference in gender in mean years of schooling, the finding is a positive pointer.

Figures 5 and 6 depict that 61% of all the boys interacted during the film screenings. The interaction included asking questions, answering a question, and proposing a problem statement. The study indicated that only 34% of the girls interacted post-screening while they were observed to be quite keen watchers during the shows.

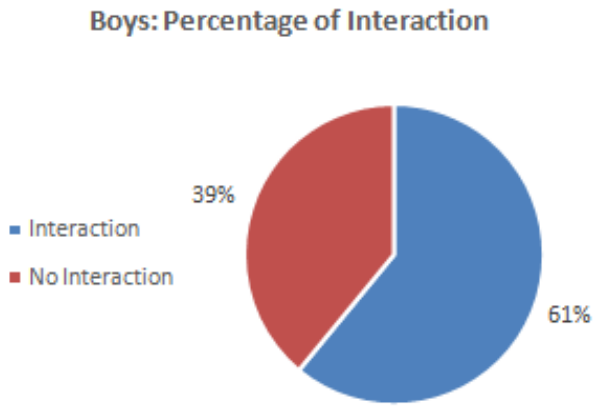

Figure 5: Interaction by boys with the films

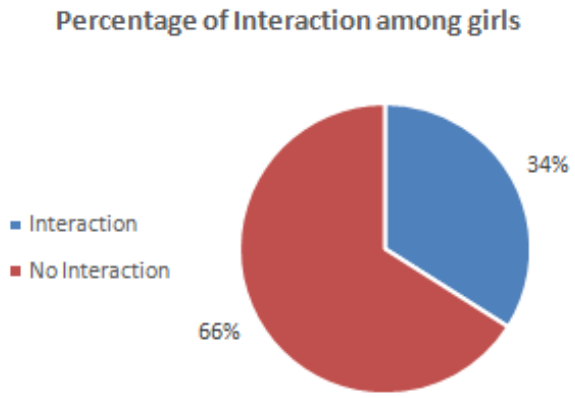

Figure 6: Interaction by girls with the films

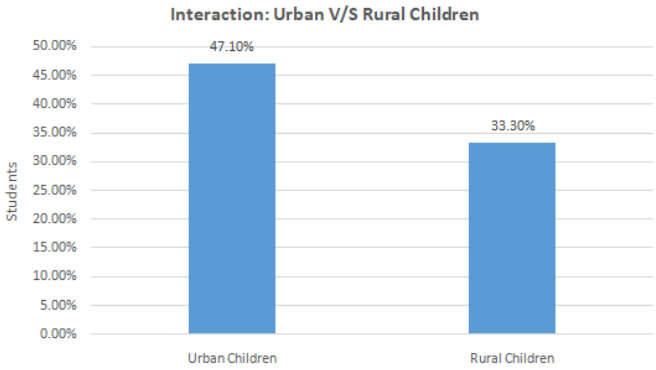

Figure 7: Interaction by urban and rural students with the film screenings

On average, around 47.10% of the students of urban schools were seen to have interacted post-screenings, whereas around 33.30% of the children from the rural educational centres participated in the interactive sessions (Figure 7). Most of the students of urban schools could understand the principles behind the technologies created by the grassroots innovators through the visual presentation in the films. They were also able to answer the questions asked in the interactive sessions based on what had been taught in their schools. Children from rural educational

centres were equally good at responding, though the interaction rate among them was low.

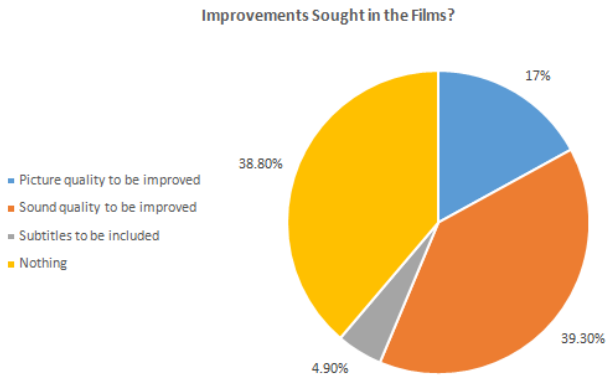

Figure 8: Students' suggestions for improvements in films

As Figure 8 suggests, most of the students (39.3%) wished the sound quality was better. These concerns were not because the audio quality of the films screened was originally bad, but largely because the sound reproduction through the speakers used at the schools was not as good. Hardly any school had even a reasonably good audio system which came in the way of good sound reception. START normally employs a portable battery-operated mini speaker while screening at most of the easily accessible locations. Only those locations where the projection equipment could not be carried experienced weak audio reach. In situations where the students were more than 30, the students seated at the back often couldn't catch-up with the audio.

Besides, 17% of all the students were not too happy with the picture quality. This was again because of the absence of good picture projection systems available at the schools. Though START employs a portable-mini battery operated picture projector for the screenings, the throw of projected light and audio called for intervention and improvement. Since the picture quality depends a lot on the quality of projectors, this particular aspect of screening needs attention by organizations who support the social responsibility of communicating science.

Though 38.80% of students had nothing to complain about, 4.90% of the students wanted the films to contain subtitles. These students belonged to the non-Hindi speaking states.

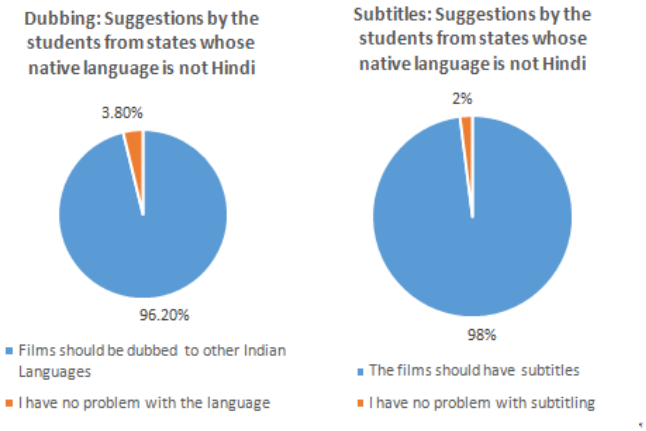

Figure 9 and 10: Suggestions by students of non-Hindi speaking states

About 96.2% of students out of a total of 349 students from Indian states who do not speak Hindi and rarely understand the language wanted the films to be dubbed in their native languages or English (Figure 9). About 98% of those students wanted subtitles as well (Figure 10). Though the coordinators had successfully conducted the screenings in their native languages and the visuals were self-explanatory, students wanted to experience the film visuals in the way the audio of the film had presented them.

Conclusion

For the film-centric promotion of science and scientific temper to be a tool of any reckoning, it is critical for the science filmmakers as well as science education managers to fully realize the potential that moving images harbour in reducing the knowledge-gap in the comprehension of complex concepts in science that routinely exists among learners in secondary and senior secondary standards in a large number of schools across India. Short science film screenings, therefore, could serve as an

appetizer for creating a bigger hunger to read from the book of nature, each page of which unfolds myriad stories for the audience to identify with.

The students of non-Hindi speaking states wanted the films to be in their native languages and have subtitles to aid better appreciation and understanding. Though it provides an opportunity for science film-makers, budgetary constraints often mar the effort.

In conclusion, the results showed a positive attitude of students (both genders, and students from both urban and rural backgrounds) about attempting to communicate science and inculcate scientific temper through short science film screenings on grassroots technological innovators. These films were based on the real-life challenges faced by the grassroots technological innovators who have not had the opportunity to even complete their education at school and yet have gone on to offer techno-creative solutions that may well be the envy of formally trained engineers.

To produce a science film that keeps the audience hooked for even ten minutes has often proved to be too hard to achieve unless there is enough visual and aural variety that the selected science theme can offer. In the instance of these films on grassroots technological innovators, the potential in the moving images was inherent in the nature of their grassroots technology theme.

Amongst others, two factors that contributed in imparting a rich tapestry of visuals were the fact of their technological innovations being achieved without using any sophisticated fabrication and testing facilities. They were done within their homes, on their farms, in their kitchens, and even by the roadside. Such scene settings for designing sequences for a science film offered a very wide range of visual variety that normally is not obtained at laboratories and even from authentically planned locations and sets.

Further studies can be undertaken to analyze the impact of other short science films on students in the Indian context, especially for its treatment of the content on one hand and the aesthetics of filmmaking on the other. A combination of the art and craft which appeals through balanced handling of objective

research combined with the elements of artful storytelling, scripted narration, and a visual and audio design that lends itself well to the science theme being treated in the films for ultimately achieving the raised curiosity among the audience may form the core of the future studies.

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