

Comment

SCIENCE FESTIVALS

The Caribbean's best science festival: NIHERST's Sci-TechKnoFest

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ABSTRACT: For the past thirty years, The National Institute of Higher Education, Research, Science and Technology (NIHERST), Trinidad and Tobago, has been a pioneering force in science popularization both locally and regionally. The biennial NIHERST Sci-TechKnoFest is the Caribbean's premier science festival, having hosted seven large-scale events catering to tens of thousands of patrons each. This article provides an overview of the role of NIHERST at the national development level, an in-depth look at the content of Sci-TechKnoFest 2013, its impacts on visitors and the way forward for the festival.

KEYWORDS: Science festivals, NIHERST, Sci-TechKnoFest

Overview

The National Institute of Higher Education, Research, Science and Technology (NIHERST), Trinidad and Tobago, since its establishment in 1984, has been resourceful in the pursuit of its mandate to promote the development of science and technology; enhance the creative, innovative and entrepreneurial capacities of the public; and support the government's goal of developing a diversified, knowledge-based economy. NIHERST continues to play a critical role in the development of Trinidad and Tobago as its work includes: conducting the necessary research and intelligence gathering to inform science policy and guide the funding of research and development (R&D); the promotion of innovation and commercialization of technology in key developmental sectors; the building and maintenance of global collaborative partnerships; and fostering a culture of science, innovation and entrepreneurship amongst the citizenry.

One of the organization's strategic goals is to position itself as a world class Science, Technology and Innovation Institute and as such, the institute consolidated its efforts in science popularization in the 1990s, through the establishment of a National Science Centre. Starting off with a travelling exhibition named YAPOLLO (an Amerindian word meaning "to discover") in 1990, the National Science Centre evolved to over fifty thousand square feet of dynamic, experiential learning space. In 1997, in order to engage

new audiences and provide a greater variety of experiences to visitors to the science center, NIHERST raised the curtains on its first grand science and technology festival, Sci-TechKnoFest, with the theme of “Science & Technology in Our Daily Lives”. The inaugural festival saw a visitorship of approximately thirty thousand (30,000) people.¹ As the first exhibition of its kind in the country, it was deemed a success in achieving its mission of increasing public understanding and appreciation of science and technology and its impact on our everyday interactions, and the response was a great encouragement for the institute to continue to host the festival on a biennial basis.

Subsequent festivals and themes were:

- Sci-TechKnoFest 2002: Celebrating Our Connectivity
- Sci-TechKnoFest 2004: Energy Odyssey
- Sci-TechKnoFest 2006: Our Place, Our Space
- Sci-TechKnoFest 2008: Health and Wellness: Take a Journey Within You
- Sci-TechKnoFest 2011: iCreate, iInnovate, iSustain.

Sci-TechKnoFest 2013

The seventh installation of Sci-TechKnoFest, held from October 1st to 20th, 2013 with the theme, “Celebrating Human Ingenuity”, enlivened the world of science and innovation to its 55,000 visitors (Figure 1). It focused on the story of our collective experience as human beings with the innate creative capacity to invent and innovate, which has defined and advanced civilizations throughout history and is today the key driver of the global economy.

The festival continued in its established tradition of bringing alive cutting-edge science, innovation and technological concepts in genuinely engaging ways that would appeal to lay citizens of all ages. From its inception, Sci-TechKnoFest has employed a multi-pronged approach to the execution of the festival through the use of in-house exhibits from the National Science Centre, external exhibitors from the public and private sector, a science theatre, and specially-themed exhibit areas catering to specific age groups (early childhood, elementary, middle and high school levels) (Figure 2).

The large-scale “101 Inventions That Changed the World”² was the featured “center-piece”, providing a high tech, multisensory and hands-on experience to all. Both children and adults were transported through time as they saw, through immersive theatre, live artefacts and interactive touch screen devices, the 101 inventions that played a significant role in human and social development.

¹This compares with an overall population within Trinidad and Tobago at the time of 1.1 million people.

²This was a new travelling exhibition developed by Grande Exhibitions (an Australia-based firm), and its showing in Trinidad and Tobago was the second venue on its world tour, immediately following its inaugural staging in the United States.

Exhibits

While bringing the excitement of international exhibits to the festival, NIHERST also had an impressive offering of the exhibits housed at the National Science Centre (Figure 3) as well as interactive displays by partnering external agencies. Thematic exhibit areas flanked the main exhibition floor and offered the public a closer look at concepts in the following fields:

Eureka: Brain Development (Figure 4), Health and Wellness, Road Safety, Music (Figures 5 and 6), Nanotechnology, Mathemakits, Renewable and Non-Renewable Energy, and Natural Disasters.

Science vs. Spy: the science behind motion detection, lasers, and researcher-developed tools that utilize the concept of bio mimicry (artificially mimicking behavior found in nature).

Robomania (Figure 7): the varying functionality of robotics was showcased. Visitors got to explore the concept of the application of robotic units to make everyday life easier, such as robotic vacuum cleaners, and the use of tactical robots in situations that may be dangerous for humans to navigate (Figure 8). The application of robotics in the manufacturing industry was also showcased, as well as how these types of robots are programmed.

Sustainable Dance Club: visitors, both young and old, generated enough energy to power their very own dance club. In this system, when the plates on the floor were moved, kinetic energy was transformed into electrical energy, to power lights at varying degrees, impacting on the brightness and intensity of the illustrations on the walls. When enough energy was produced, a disco ball on the ceiling of the dance club was activated.

101 Inventions That Changed the World: this exhibit consisted of three sub areas:

- The Immersive Gallery (Figure 9) — A large walk-through theatre, in which the 101 inventions that changed the world were highlighted through the use of projected photography, video, animation, music, sound and written words.
- Real Artefacts (Figure 10) — Sixty genuine, historical exhibits were displayed and their creation and use was explained using touch screen displays.
- Inventors' Den (Figure 11) — Educational activities were conducted such as map making, microscope viewings, papermaking and hands-on activities on electricity, lasers, string telephones and much more (Figure 12).

TechKno Theatre (Figure 13): this is where science met entertainment and lived happily ever after. Top international and local artistes brought fun and laughter to learning with public lectures, science shows and performances for all ages (Figure 14). The theatre was packed during peak hours (over 600 visitors).

Virtual World: this exhibit area explained and applied the technologies used in two-way mirrors, multi-touch screens, transparent projection film and the Xbox Kinect. Visitors left intrigued by the variety of new technologies available.

Planetarium: designed to depict an actual view of the sky, this area contained an inflatable dome equipped with a digital projector. Visitors were given a guided tour of the October night sky and navigated the vast field of stars through introduction to various easily identified constellations.

Other festival areas included: a Creative Design Laboratory, flight simulators, and an Immersive Story Telling area exclusively for the early childhood and elementary age groups.

Partner Exhibitors

Over the years, NIHERST has successfully forged partnerships with public and private sector entities. The role of popularizing science and getting students interested in the pursuit of science as a career must be done through mechanisms that show the application and relevance of science in the real world. Over the years, our festival partners have modified their offerings, many choosing to incorporate computer simulation and multi-touch technology thus engaging participants in more meaningful ways with their content. Partner exhibitors showcase careers that require students to study STEM (science, technology, engineering and mathematics) fields at the high school and tertiary education levels. Over thirty public, private and civil society entities supported Sci-TechKnoFest 2013.

Audience

The impact of the experiential learning opportunities afforded by events such as science festivals can sometimes be difficult to measure. Despite this challenging task, NIHERST's Statistical Unit conducts a feedback survey during each festival, not only to gauge the visitor's level of satisfaction with the event, but also to capture the knowledge gained by the visitor from having attended. Using structured, pre-coded questionnaires, during the 2013 festival, data were gathered from a visitor sample size of 4,044 persons, representing roughly 7% of the overall attendees [1]. The data show that segments of both the scientific and non-scientific public attended the festival, from the early childhood level to senior citizens. Students represented 73% of respondents, with school-aged children from 10–14 years old accounting for 48% of the total visitorship. The survey instrument captured a wide range of data, including information pertaining to the marketing strategies employed. Visitors reported that they were informed of the festival through three main communication channels: 62% through their schools, 25% via television and 18% by word of mouth.

Through our past festival surveys, NIHERST has consistently found that both the festivals and the National Science Centre appeal to a wide range of persons including students, teachers, legislators, senior officials and retirees. The data collected in the 2013 festival

survey also indicates that visitors come back, as 34% of the survey respondents were in fact repeat visitors through the years. Approximately two-fifths (41%) of the survey respondents indicated that they had visited the NIHERST/NGC National Science Centre (NSC) in the past. Eighty-eight percent (88%) of them found this particular exhibition to have surpassed the others in terms of the size of venue, interest level and engagement factor of the exhibits.

Short and Long Term Impacts

In the broader context of science popularization at the national level, a survey on the public perception of science (n=2504) highlighted that 43% of respondents expressed a high level of interest in science [2]. It was also noted that 24% visited the science center, those who were informed about S&T were more inclined to visit the Centre than those who were not, and 95% were satisfied with their visit to the Centre.

When conceptualizing the 2013 instalment of Sci-TechKnoFest, several key objectives were expressed. While the learning experience is contextualized through the lens of the learner, there are specific goals that the organization wanted to achieve.

Through attendance at our science festival, NIHERST intended to:

- Expose the population to the multifaceted direction of science and technology
- Showcase the application of human ingenuity individually and collectively to devising solutions
- Inspire scientific and innovative thinking
- Promote greater awareness and understanding of science and technology
- Generate willingness for action for new possibilities

Returning to the 2013 visitor survey data, approximately 97% of those surveyed had an enjoyable learning experience, listing the following areas as being most educational:

- Eureka
- Science vs. Spy
- Robomania (Figure 15)

Ninety percent (90%) of respondents indicated that the festival increased their knowledge about science and technology overall. The interactive exhibits offered the public a rendering of scientific concepts that were easily digestible to all palettes: 98% of visitors reported that the STEM content was understandable.

Over three-quarters (78%) of the visitors indicated that the festival ignited the flames of their own creativity, as they felt encouraged to be more creative and innovative in their daily lives. While every person's experience of the festival was different, it definitely left an indelible impression on the minds of the attendees as they indicated that after visiting they:

- Had interest in conducting experiments and practicing what was taught

- Were encouraged to pursue a career in science, technology and engineering
- Wanted to research more and learn more about science and technology topics

NIHERST has been fortunate to have had first-hand experience with the long term impacts of science festivals and other informal science learning initiatives on students' interest in science. Although the longitudinal impacts of the science festival have not been explicitly researched to date, there is evidence of particular areas of benefit from other NIHERST programs. After participating in our summer camps, science clubs, youth fora and internship programs, students have gone on not only to pursue but to excel in careers in the fields of science and technology. One such program is the Caribbean Youth Science Forum, a one week residential science immersion program for sixth form students from the Caribbean region. The forum employs 50 hosts and chaperones who have all been former participants. As they continue to work with us year after year, we have seen them progress through their studies in various scientific fields and begin their careers both locally and abroad. Students have stated that some of segments of the forum with the most impact were:

- **Socializing with Scientists:** an interactive session where students get to interact with local and foreign scientists in a small group setting. Students are able to ask questions and engage in meaningful conversation that lecture-style sessions cannot afford. These sessions expose students to career paths and specializations that they may not have known before.
- **Field Trips:** the public and private sectors open their doors to our participants and provide to them a real world look into a wide range of industries. Students get to conceptualize themselves as future scientists in these environments.

The Way Forward

The major challenge in executing Sci-TechKnoFest continues to be that of limited funding from both the government and private sectors. Each festival becomes more costly as the pressure is on to be bigger and better than the last. Additionally, as our visitorship continues to grow, we have simply outgrown many of our past venues. Visitors demand longer and annual festivals which, with current resources, cannot be accommodated.

While the future of science festivals seems secured by the natural curiosity of the human mind, the competing needs of the developing world cast science popularization in the light of a luxury expense. In order to continue the benevolence of public funding, governments, educational institutions, legislators and civil society organizations must buy in to the narrative that shapes engagement in STEM fields as a critical pathway for driving the national development agenda.

The institute also hopes to showcase the practical applications of science, research and development to finding solutions to national development problems, boosting public confidence in science locally as well as highlighting the nation's progress in the creation of new knowledge and technologies.

As people have become more interconnected, they are searching for experiences that not only allow them to learn but also to share these experiences in a group setting. NIHERST has taken this into consideration as it has begun construction of a 52 acre outdoor/indoor science city. This science city or discovery park will allow individuals to interact with traditional and non-traditional science exhibits. It will provide opportunities for visitors to learn at their own pace, with a guide, or engage in a whole group activity. The science city is also envisioned as the permanent base at which the biennial Sci-TechKnoFest will take place. To NIHERST, science is not a statistical concept, but it is a dynamic organism, one which the public is entitled to the opportunity of experiencing.

Pictures



Figure 1. Celebrating local culture: performers illustrate the creative capacity of our people through song and dance at the opening ceremony of Sci-TechKnoFest 2013.



Figure 2. NIHERST Senior Innovation Technician, James Khan prepares students to engage in a game of soccer using the Kondo Humanoid robot.



Figure 3. NIHERST Innovation Technician Marvin Holloway captivates students as he explains drone technology.



Figure 4. Focus! Students challenge one another to a game of Mind Flex Duel in the NIHERST, Brain Rush exhibit area.



Figure 5. Local innovation: a visitor tests her musical skills on the Percussive Harmonic Instrument (PHI) Pan, an innovation of the University of the West Indies (UWI) Steel Pan Research Laboratory. The PHI Pan blends MIDI technology with the conventional design of the steel pan to create a unique electronic instrument.



Figure 6. Looks of wonder prevail as a visitor creates music with the NIHERST music exhibits' Chaldni Plates.



Figure 7. Dr. The Honourable Rupert Griffith, Minister of Science and Technology controls the Kondo Humanoid robot as he is encouraged by the Chairman of the NIHERST Board of Governors, Prof. Prakash Persad.



Figure 8. Freedom to explore: one of the festival's young visitors controlling the Vexplorer modular robotic system.



Figure 9. A NIHERST Visitor Guide explains some of the most important inventions known to mankind in the 101 Exhibit Gallery.



Figure 10. Family Fun: a father shows his son how to use the 3D touch screen display in the Real Artefacts exhibit area.



Figure 11. Lego isn't only for children, a group of adults race to complete the design challenge in the Inventor's Den.



Figure 12. A group of primary school students explore their creative side as they participate in a design challenge using Lego blocks in the Inventor's Den area.



Figure 13. U.K. based science showman, David Price, has fun with a crowd volunteer as he performs his popular water experiments.



Figure 14. Puppet Theatre! These puppet scientists explain concepts to younger students in a fun, and captivating way.



Figure 15. High School students interact with an exhibit that demonstrates the physics concept of momentum conservation.

References

- [1] National Institute of Higher Education, Research, Science & Technology (NIHERST) (2013), *Sci-TechKnoFest 2013 Evaluation Report*, St. Augustine, Trinidad & Tobago.
- [2] National Institute of Higher Education, Research, Science & Technology (NIHERST) (2012), *Survey on the Public Perception of Science*, Port of Spain, Trinidad & Tobago.

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