Plenary session 5: PCST challenges and tools directed to young people

SCIENCE POPULARISATION AMONGST CHILDREN IN EARTHQUAKE AFFECTED AREAS OF KUTCH THROUGH LOW-COST SCIENCE

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Introduction

January 26, 2000 is a date which will remain etched in the minds of the people of Gujarat for years to come. For, this was the day when a devastating earthquake ripped through parts of Gujarat and created havoc. The earthquake measuring 6.8 on the “Richter’s Scale” resulted in around 10,000 casualties and left thousands of others injured and disabled for life. Moreover, there was a terrific toll on wealth and property too. All major cities of Gujarat like Ahmedabad, Bhuj, Surat, Rajkot, Surendranagar, Jamnagar, Banaskantha, etc were affected.

The people were traumatized and stalked with fear due to their lack of knowledge about the scientific basis of an earthquake. For them, this was God’s way of punishing them for some unknown sacrilege that they might have committed. It was difficult to educate the illiterate folk of Gujarat in the midst of belief in superstition and black magic.

The effect of such disasters on children was the strongest since they were not able to understand and interpret the happenings around them easily and also developed a lot of irrational fears in the absence of proper guidance.

At this point, ‘Manthan’ our NGO stepped in and pledged to help these victims by providing them proper scientific knowledge of what earthquakes really are and how one can tackle the aftershocks. The widespread myths and queries about this natural calamity were handled in an easy play-way method in order to make it comfortable for the unlettered folk and especially the children to understand and accept the knowledge.

The experience that Manthan had gained by working in Latur, a village in Maharashtra which had been hit by an earthquake in September, 1993 resulting in 9783 deaths was useful in getting an insight into the fear psychosis that an earthquake creates in the minds of people.

Aim

The aim of the project undertaken by Manthan was ‘Popularization of Science’ amongst children in earthquake affected areas of Kutch through low cost science communication aids.

Secondly the project also aimed at removing the myths associated with earthquakes in the quake-hit areas of Kutch.

In nature, there are only consequences

Methodology

Manthan's methodology mainly focused on communicating science to the children by means of very simply but highly effective low-cost tools.

Thus to serve this purpose, the following steps were taken:

"Understanding Earthquakes" activity kits for children

First of its kind in the whole country, these innovative kits consisted of around 25 scientific toys and activity material to understand what are earthquakes, why they take place, and what to do to minimize the damage when an earthquake strikes.

The unique feature of the kits was that the toys made were very simple to use and did not involve complicated technology, and yet they managed to convey important facts about earthquakes and their aftermath.

Moreover, since the toys were attractively made and colorful, the children found it easier to study apply the knowledge they had so learnt.

For example, to teach children a subject like safe structures that can resist earthquakes, colorful cardboard pieces were provided in the kit and instructions given as to join them in different ways to come up with weak and strong structures, roofs, walls etc.

Another interesting toy was a horizontal spring called 'slinky' which could be vibrated in different directions to illustrate the types of seismic ways and educate the children about the extent of damage done by them.

Along with these, the kit also included an indigenous design to make a home-made model of a seismograph with the use of a funnel and, a bent iron rod and a card paper board and explain its working and the model of the globe on a ball to understand tectonic plates.

Secondly, activity books like flip books of fault lines on the earth's crust, maps to color and display the seismic zones of India and booklets elaborating on earthquake related terms and 'frequently asked questions' were prepared too.

Also, a mini book of Dos and Don'ts during and after an earthquake, multicolored sheets giving information on seismological observatories, magnitude and impact of earthquakes of different scales and on the lithosphere were included in the kit.

Around 500 such kits were distributed in Kutch and other nearby earthquake hit areas and more are now being prepared to provide information in the other earthquake sensitive regions of India where though the calamity has not taken place yet, but it is just waiting to strike.

Thus topics like building sciences and seismology were understood by children to some extent by a very child-friendly medium.

An important thing to be mentioned here is that in this endeavour, Manthan was supported by the Department of Science and Technology, Government of India and Vigyan Prasar.

Workshops

Manthan also conducted workshops in 32 villages to explain various facts, concepts and precautions related to earthquakes using lectures and paraphernalia like charts, graphical displays, models etc.

Children were made to draw and paint so that they had a decent outlet to express their trauma and the phobias that they associated with earthquakes.

These workshops also facilitated the distribution and usage of the "Understanding Earthquake" kits.

During the workshops, games on safety, camps and informal events were also conducted to communicate messages regarding earthquakes

We also developed low cost disaster mitigation material and distributed it to schools and village groups.

Exhibitions

A very exclusive project undertaken by Manthan was in the form of exhibitions put up on camel-carts. These low cost mobile exhibitions were making use of the animal found commonly in the desert and something which would easily attract and sustain the interest of both children and adults.

On such camel-carts, posters giving information on pre and post earthquake precautions, awareness charts on the distribution system of relief material etc were displayed and the counselors of Manthan were instructed to give vital information on earthquake related issues.

In this manner, we managed to effectively combine local knowledge with modern technology to come up with the unique idea of exhibiting things on a camel-cart.

A thing to be noted here is that apart from working in the education sector, Manthan also conducted useful trainings on the health care services provided during the earthquake

Results

The short term result of this venture was that children managed to overcome some of their fears about earthquakes and they gained a lot of information and insight which would help them in the long run.

The pictorial representation of their thoughts and fears resulted in a kind of catharsis of pent-up emotions.

The project helped people to shed their fears regarding earthquakes as with the technical know-how on the subject, their many myths were shattered.

Their ignorance had made them victims of superstition, but with this new found knowledge, they were better equipped to handle stress.

A network of NGOs doing work in earthquake prone areas emerged and is still developing.

It would be useful to point out those NGOs like ‘Kutch Mahila Vikas Mandal’, ‘Prayas’ and ‘Ganthar’ that they adopted this approach in popularizing earthquake related material amongst the quake-hit masses.

A long term further three years programme was designed to be conducted not just in Kutch but also in other seismic areas all over India. 10,000 kits are produced and distributed by Vigyan Prasar, DST, Govt. Of India.

Primarily under this programme, the earthquake prone North-East region of the country is being covered by Manthan, where the “Understanding Earthquake” kits are being distributed.

The earthquake related material prepared by Manthan is being translated in many languages so that it can be used more extensively.

An important aspect of the project is that due to its continuous nature and work with a large cross-section of people, mathematical estimates could not be prepared. It is a learning process that is still going on and being updated by us and so, statistics are not available about the extent of the reach of our project in different areas.

Conclusions

These kind of low-cost science popularization material and methods help in broadening the perspective of people with regard to science.

They are instrumental in disbanding a range of superstitious beliefs and myths which obstruct logical thinking and are prevalent in rural areas

These kinds of scientific tools should be used in developing countries as they are easy on budget and help in creating a scientific temper in the masses which is also the ultimate goal of Manthan.

Preparedness and understanding of earthquakes will help us in making our life more secure.

Nature can be both kind and unkind, the earthquakes are an unkind manifestation of nature which can’t be predicted or controlled, but we must conquer them by the weapon of knowledge.

Parallel session 5: PCST Challenges and tools directed to young people

BRINGING BRIGHT MINDS BACK TO SCIENCE – THE ADVANCED STUDY PROGRAM

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Abstract

Students in Australia are turning away from science. In response to this problem, The University of Queensland has established the ***Bright Minds™*** Project. This initiative includes an integrated package of resources and programs designed to encourage students to study science through school and university, and build a society which values science and scientists. The project includes the Advanced Study Program in Science, which provides an enhanced learning environment for high-achieving undergraduates. The Program uses a number of innovative educational approaches to help sustain students' interest in science, and enhance their critical thinking skills.

Key words: innovation, science education

Text

The modern biotechnology revolution will be central to both our medical and economic health in the twenty-first century. Yet a worrying trend is emerging – students in the formal education system are turning away from science (Mattick 2002). Of great concern is that many of our brightest and highest achieving students are leading this move to abandon science as a career (Sadler 2002). In response to this problem The University of Queensland (UQ) established the ***Bright Minds™*** project. This initiative includes an integrated package of resources and programs designed to re-awaken and sustain students' interest in science. Our multiple target audiences include school students from Year 6 to 12, tertiary students of science, parents, teachers and school guidance officers.

Our mission is to increase the retention rates of students studying science as they progress through secondary school and into tertiary education. There are many hurdles to be overcome, including the perceived lack of relevance and job options, the paucity of visible role models, and the lack of opportunities for teachers to update their skills and practices. Traditional forms of science education can lead students to pursue shallow learning strategies and even develop an "undesirably naïve view" of science (Sandoval & Reiser 2004, p. 346). Many standard teaching practices fail to adequately develop the creative and critical thinking skills valued by employers (Wood & Gentile 2003).

One of our educational innovations to tackle these issues is the "Advanced Study Program in Science" (ASP). The ASP targets high achieving students who are entering their first year at university and are considering a research-based scientific career. We provide the ASP participants with an enriched program of undergraduate study, challenging them to broaden their horizons, improve their higher order thinking skills, and reach their full potential. The program thus aims to overcome the problem of these students becoming disenchanted with their studies as a result of boredom, or feeling that the materials they are studying are irrelevant to their career goals.

The ASP is innovative both in its emphasis on providing unparalleled access to the university's best researchers, and its emphasis on collaborative learning. In their first semester at university, the ASP students attend a series of informal seminars that introduce them to prominent research scientists, their work and their career paths. The students find this early exposure to research culture highly motivating. Another key activity is a two day field trip which provides the students with the opportunity to get to know each other and do some field-based research. Every effort is made to provide a supportive and non-competitive environment, in which the students bond to form a cohesive learning community.

The first formal course in the Advanced Study Program (ASP) is BIOL1017 Perspectives in Science. This course investigates socioscientific issues from a variety of perspectives. Experts from both the sciences and humanities are brought in to discuss possible solutions to real-world problems. Students are encouraged to integrate their university learning into these new contexts, appreciate the interdisciplinary nature of research, discuss scientific issues from an ethical perspective, and enhance their communication skills. The course also aims to improve general levels of scientific literacy and help students gain insight into the nature of science.

Both student and staff satisfaction with this program is very high. Numerous UQ staff have contributed to the seminars and group discussions, opened their laboratories to the students and agreed to act as mentors. These participants are keen to continue their involvement, largely because they find the students' enthusiasm and program format invigorating. Applications from students far exceed the number of positions available in the ASP (in 2002 and 2003 the quota was 40 students per year, this was increased to 50 in 2004). Student entry into the program is by written application and interview. There is a good level of awareness of the program, and vacant positions are readily filled.

We believe it is important to encourage and retain the interest of those who gravitate toward science and technology, so that they are positively predisposed to considering a career in the area. Of course, not all students will want to be scientists – but in our increasingly technologically complex world, all students will benefit from possessing a greater level of scientific literacy.

Our goal is to both encourage students to study science through school and university, and help build a society which values science and scientists.

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Plenary session 5: PCST challenges and tools directed to young people

SCIENCE COMMUNICATION AT HIGHER EDUCATION INSTITUTIONS: A RELATIONSHIP STUDY BETWEEN THE KEY ROLE PLAYERS IN SOUTH AFRICA

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Abstract

The core of South African scientists is centred at Higher Education Institutions (HEI). HEI is a valuable source of scientific knowledge. A major function of Communication Specialists at HEI is communicating science to stakeholders, especially the youth.

South African born Mark Shuttleworth is a walking example of motivating young children to become aware of the importance of science. More examples like these are required to enhance science.

Although study results have not been finalised, it is clear that science messages do not reach the youth and other stakeholders in South Africa effectively. An improved focus on science journalism is required.

Key words*:* Role player relationships, trust, empowerment

Text

1. SOUTH AFRICAN CONTEXT OF SCIENCE COMMUNICATION

1. 1 Challenges

South Africa, as a developing country is even more dependent on science and technology to support industries in order to reach informed decisions and to be competitive in the international marketplace. However, most people cannot distinguish between scientific, non-scientific or pseudo-scientific subjects. For these reasons, communicating science to various stakeholders – schools, government, decision-makers, general public and the media – is a necessity.

Although the covering of topics referring to science is increasing in the media, highly technical, sometimes biased articles often dominate the media (Joubert, 2001:324). The youth does not receive the correct information and therefore does not understand the importance of science. More role models like South African born Mark Shuttleworth – space shuttle guest to the moon in 2001 - should participate in endeavors to promote science amongst the youth.

Another challenge is to raise awareness and enthuse young people about the practical applications of science. By actively engaging learners in the scientific process of observation, interpretation and verification of information, a positive attitude towards science is instilled.

1.2 Tools

South Africa has initiated a number of science activities to communicate science to the public. Communication specialists at HEI are often tasked to participate in science activities, including National SET (science, engineering and technology) weeks, Sasol TechnoX and SciFest, Science Centres, Planetariums, Mobile science centres, such as the Tsebo Koloing (meaning "technology in motion") truck of the University of Pretoria to promote science to the youth.

Experilab, a small chain of science shops, have a few outlets throughout South Africa. This concept holds untapped potential, providing business opportunities and can also be an enjoyable leisure activity.

The Internet also provides an important channel for direct communication between scientists and the public (Errington, 2002). South Africa should indulge in interactive web sites where scientists can respond to questions from the youth.

Many indigenous cultures in South Africa have oral traditions where storytelling is the preferred way of communication. Science Theatres and soap operas as tools could improve the message of science.

Some scientists have used even poetry in the past to promote their science and other enlightened scientists have added a melody to their verse and created a song. South African scientists should be encouraged to promote their research through popular tools of communication.

2. OBJECTIVES

2.1 Determining the importance of science communication in South Africa

The most important single information source for the public about science and technology is the mass media. Unfortunately, South Africa lacks skilled science journalists and above all, proper training of journalists. Currently, science journalism is almost non-existing in South Africa.

2.2 Determining the relationship between key role players

Communication specialists specifically tasked to promote science are not trusted well enough by their institutions and are not empowered to make decisions on their own when science communication is applicable (Steyn & Puth, 2000: 34). A relationship of trust between key role players in science communication (Executive Management, Scientists, Communication Specialists and Journalists) empowering communication specialists to promote science is a necessity to reach the youth effectively.

3. METHODS

A self-administered survey method was used in the study. Questionnaires were distributed to the abovementioned four populations (role players).

4. RESULTS

Results of the study have not been finalised. However, the overview of the results states that science messages do not reach the youth effectively. Too many institutions do not participate in science activities and do not regard science communication as a high priority in South Africa.

A lack of trust among key role players and a lack of empowering communication specialists cause distorted messages reaching the general public, especially the youth. There seems to be no working relationship amongst role players. A shortage of training in science writing is a major concern. Very few of the role players obtained proper science writing training.

5. CONCLUSIONS AND RECOMMENDATIONS FOR THE FUTURE

A recent study proofed that although there is a positive attitude towards science, there is a lack of understanding amongst the public and the youth does not obtain enough information on science (Joubert, 2002:317). In South Africa the coverage of science in the media is generally very low.

Practitioners of science communication, particularly the younger generation, lack a network and work largely in isolation, with no capacity to act and lobby as an influential group. South Africa needs a more sustained and coordinated effort, backed by research, infrastructure and expertise.

Training is required for journalists, scientists and communication specialists to write about and broadcast science in various languages so that it can be comprehended by the youth. There is no graduate course in South Africa for science students wanting to specialise in science communication.

Communication specialists could be used more effectively to promote research findings, profile science achievers and build media relations with scientists and journalists to communicate science to the youth.

To enhance relationship with the young generation, communication specialists must take part in organising structured visits to science events and institutions and invite schools to interesting science experiments.

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¿CÓMO VES? A POPULARIZATION OF SCIENCE MAGAZINE FOR TEENAGERS

Martha Duhne Backhauss

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Abstract

¿Cómo Ves? is a magazine edited by the Universidad Nacional Autónma de México, UNAM, with the purpose of offering its readers (mostly teenagers) a true and comprehensive panorama of different scientific themes.

¿Cómo Ves? has been published, in a monthly basis, for more than five years, which in Mexico, a country where science themes are almost non existent in the media, is a great achivement. With the idea of making it accesible to low income students, it is the cheapest popularization of science magazine in the country. This is possible becouse 70% of the cost of the magazine is financed by the UNAM and 30% by the readers.

Key words: popularization of science magazine

Text:

¿Cómo Ves? is a monthly magazine of the Dirección General de Divulgación de la Ciencia, an institution of the UNAM, and has been published monthly without interruption since december 1998.

Objectives

The main objective of the magazine is to give our readers a true and comprehensive panorama of different scientific themes. We are convinced that popularization of science is much more than a translation of a complex language to a more understandable one, or just a way to simplify scientific knowledge in order to make it more digestible. Our aim is that our readers understand the way science explains the world, and the paths science is obliged to travel in order to achieve its objectives, its methods and procedures, how scientific knowledge is validated, and that this knowledge is continually changing.

Methods

The magazine is divided in 15 sections (among others, science news, books, movies and web pages reviews, history of science and technology, a page written by students) and five articles.

We have a group of seven senior editors, and the editorial staff is integrated by five persons (editor, assistant editor, chief of information, chief of redaction, and designer), and two editorial assistants.

The articles are written by scientists, teachers and journalists. Each article is examined by the staff and the editorial assistants. If accepted, we ask the authors to make the changes wee think the article needs. The author has to go through and accept, the final version of the article and of the images we suggest.

Results

In more than five years, *¿Cómo Ves?* has been able to position itself in a very competitive editorial market and is recognized as a magazine that offers atractive articles for teenagers, with the depth and precision that scientific themes require. We publish 17,000 magazines monthly and it is 40 pages long.

Our readers are mainly students, but the magazine is also read by teachers, scientists and other professionals. It is also distributed by the Ministry of Public Education in 600 public school libraries.

We are very interested in communicating with our readers, and we constantlly receive letters in our e-mail address, asking questions or suggesting themes. We take them into account when we are planning future contents.

Last year *¿Cómo Ves?* obtained an important recognition, awarded by UNESCO and the Red de Popularización de la Ciencia y la Tecnología para América Latina y el Caribe, for the best popularization of science programme.

Conclusions

The main conclusion we have, is that there are many young persons interested in science, willing to make an effort to try to understand complex problems, if their interests are taken into account, and the different themes are treated with depth and are well explained. This is trully amazing, if you take a look at the lack of popularization of science materials that reach the media in Mexico. For example, in open television, that is what the vast mayority of people consume, programms with scientific contents, account for less than 1.5% of the total. And almost all of these, are not produced in Mexico.

A proyect like this magazine, depends on the quality of its contents, and this is made possible by the support we get from the scientific community, specially from the researchers from the UNAM.

We feel it is very important for the magazine to talk about mexican scientists, what they are working on, what worries them, and how they contribute to the development of Mexico.

One of our most important objectives is to reach to low income students, and that is made possible with the financial support of the University.

It would have been imposible for *¿Cómo Ves?* to reach our readers if this magazine was not proyect of the Dirección General de Divulgación de la Ciencia, an institution that for more than 30 years has been developing popularization of science programms in museums, magazines, books, radio and television.

Lessons learned

In fiver years, we have learned about the weight the images and the design have on our readers, specially becouse they are mainly students, and if they don´t like the way the magazine looks like, probably they won´t take the trouble of reading it.

We have also learned that our duty is not only to inform, but to transmit the passion we feel for science. *¿Cómo Ves?* is not a scientific journal, so we need to learn to reach not only our reader´s minds, but also their hearts. Our best articles were written by authors that have a lot of information, but also have a vast culture, can write well and love the theme they are writting about.

Parallel session 5: PCST challenges and tools directed to young people

PROMOTING SCIENCE IN DEVELOPING COUNTRIES – A YOUNG SCIENTISTS' INITIATIVE IN MOZAMBIQUE AND ANGOLA

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Abstract

Science for Development is a grass-root association of young Portuguese and African researchers, working voluntarily to promote internationalisation of scientific activity and the application of science and technology in the developing world. Activities target researchers, through technical workshops aimed at specific local demands, and junior graduates, through discussion-based courses aimed at promoting the scientific activity. We believe that the structure and mode of action of Science for Development represents an alternative to address the needs of science development in poorer countries. Today, initiatives such as this face several challenges: which tools can be developed to broaden our audience in the developing world and engage more people with science? How can the impact of activities be evaluated? How can we ensure their long-term effects?

Key words: Grass roots organization; science; sustainable development

Text

Context

It is increasingly recognized that science and technology are critically important for global sustainable development, and that developing countries can no longer be excluded from this trend. Developing countries have a huge potential in terms of natural resources, traditional knowledge and human potential. It is building on this knowledge and resources potential that a sustainable social and economic development can be ever achieved. Promoting science and technology in the developing world is now a stated objective of UNESCO (1) and, recently, two reports delivered to United Nations Secretary-General Kofi Annan make a strong appeal that developing nations should build up their scientific institutions (for a comment see ref. 2 and ref. 3). As Dr. Mohamed Hassan, president of the Third World Academy of Sciences, puts it, "science alone cannot save Africa, but Africa without science cannot be saved" (4). It is therefore urgent to strengthen skilled research communities, and make them capable of translating scientific knowledge into technological solutions for social and economical problems.

While governments and international bodies publicly recognize that research should no longer be a luxury of richer countries, it is much less common that structures emerging from civil society attempt to address the same issues. In 2001, a group of Portuguese PhD life science students and Mozambican researchers created the not-for-profit organization Science for Development. This organization aims to support the development of strong and independent thinking scientific communities, able to act responsibly and propose well-adapted solutions to achieve sustainable development. Science for Development acts by promoting scientific careers and improving networks amongst scientific communities, in particular in countries that face language barriers in accessing scientific knowledge (such as in Portuguese speaking countries). All members of the organization have many years of experience in different fields of scientific research and are geographically distributed in five different countries of Europe, Africa and the United States of America and consequently, a broad range of scientific contacts which reflect on the quality of the activities organised.

Programme

Science for Development implements four types of activities:

1. Courses aimed at discussing the scientific activity and the application of science in developing countries. These courses use discussion and problem solving activities to alert university students from different Life Science branches (Medicine, Veterinary Sciences, Agriculture, etc) to the applications of Life Sciences and Biotechnology as ways to solve economical and social problems in developing countries. They provide tools to help to follow a career in science and to access scientific information across the world.

2. Public debates on scientific issues and the impact of science in society with the participation of the general public, governmental entities and NGOs.

3. Advanced technical workshops aimed at responding to specific local demands. These workshops bring together international specialists in a chosen topic, local researchers, and policy makers, and provide an environment for knowledge sharing and the generation of adapted recommendations for the problem under study.

4. An exchange programme that allows short-term training of young scientists and technicians in methodologies not available in their home countries. These are aimed to further increase international cooperation between research institutions.

In all activities Science for Development takes care to ensure that the approach is to stimulate critical thinking and independence, which breaks away from the scholastic attitude common in universities. This aims to develop problem-solving skills, necessary in scientific and technological research. Additionally, all activities aim to promote links between different scientific communities and institutions.

Challenges

Science for Development is now on its third year of activity. Two courses aimed at promoting the scientific activity, a public debate and an advanced workshop on veterinary research tools and approaches have taken place in Mozambique, with encouraging results. We are now extending our activities to Angola, a country recently coming out of a devastating civil war. However, this does not come without difficulties. Despite based on voluntary work and run on a project-basis funding (thus, quite cost-effective), longer-term funding strategies need to be put in place to ensure the durability of the project. Science for Development has been supported in the past by international charities, such as the Calouste Gulbenkian Foundation in Portugal and the Gatsby Foundation in the UK, by the universities and by the Ministries for Science in Portugal and in Mozambique.

Science for Development faces other challenges common to organisations involved in the promotion of science and public engagement with science, such as: Which tools can be developed to broaden our audience in the developing world and engage more young people with science? How can the impact of those tools and activities be evaluated? We are developing a website to be a resource of information and a tool for discussion and networking. This site will also have a pack of practical information on how to access scientific information through the Web, how to get funding, how to write Curricula and motivation letters as we have found this information to be very useful to the participants of our workshops. Evaluation of our activities has been based on summative questionnaires. So far, we have not performed an extensive evaluation of the impact of activities, but in the future we plan to use the website and mailing lists to establish a follow up evaluation process. In addition, we are trying to develop other forms of evaluation.

Science for Development represents an alternative created by young scientists to address the needs of science development in poorer countries. We think this is a model worth of attention and hope to motivate other young scientists to engage in these types of activities.

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scientists@work, BRINGING YOUNGSTERS IN A BIOTECH LAB

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Abstract

Many teachers of 16-18 year olds plan experiments in life sciences with their pupils, but they only have limited means. scientists@work offers them the possibility of working with a scientific team in a laboratory.

In accordance with techniques that teachers identified, VIB selected projects. Classes choose one project. The hosting scientist provides information, pupils can also ask other European scientists questions. By recording the results the group enters the competition. Finally ten finalists present their project.

868 students from 54 schools participated in this first edition. The enthusiasm of schools and scientists shows that this project answers to unfulfilled needs.

Key words: school competition, life sciences, laboratory, experiments, hands on

Text

Context

In accordance with the curriculum, many teachers in the 2nd and 3rd grade secondary school (14-18 years old) are planning, together with their pupils, to carry out a scientific experiment in life sciences. With scientists@work, VIB offers them the possibility of doing this together with a real academic or industrial scientific team.

Objective

The unique thing about this project is that it builds a bridge between education and research, demands a clearly defined input, enables different teachers to work together and stimulates creativity. VIB aims to acquaint unbiased young people with the life of a scientist, and hopes that this would stimulate them to opt for science-oriented studies.

Methods

All information teachers need to work out a project with their class is provided on www.scientistsatwork.be; this Dutch-language website, together with contact through email, leads them through the competition.

In accordance with the techniques that teachers have identified, VIB gathered –for the first edition- 41 scientific projects in academic and industrial biotech laboratories with a broad variation in topics and techniques used. This puts teachers in the possibility to choose the most suitable project. The enumeration on the website of the foreseen techniques and some keywords per project makes this choice easier. Another important aspect is the geological distribution of the projects; it should be possible to find a project very nearby the school, which circumvents some possible logistic difficulties.

Teachers choose one project and conduct with their pupils experiments in the lab of the hosting scientist. This project-guide provides information about the lab, the research and supervises the experiments. He is not the only source of information. Pupils can also ask questions to other European scientists in the field by email. This collaboration with EFB (European Federation of Biotechnology) allows them to place their work in a broader context, which is important for the awareness of the pupils.

This tool is also available for visitors of the scientists@work-website who don't take part in the competition.

A project and a competition

Each project is coached by a scientist who receives the group two afternoons (14.00 - 16.30 hrs) in his lab. He provides the pupils with information about the lab, the research and together they will perform experiments or a part of them combined with a demonstration. They are to record their results and findings in a concluding essay, which must comply with a number of criteria:

1. The work must comprise an introduction, materials and methods, results, conclusions, summary, references and presentation of the group:

Introduction: location of the test, how the test fits in with the guide's research, what that research is, interactions with scientists from abroad, etc.

Materials and methods: how the test was carried out

§ Results: what test was carried out and its results

§ Conclusions: what can be concluded from the test

§ References: references to articles or sources that were used in this work

§ Summary: max. 1 to 2 pages

§ Presentation of group: who took part and who did what (attach group photo).

2. The use of figures and illustrations is free

3. Language: Dutch

VIB puts the summaries of the essays together to publish them in a booklet (Figure 2).

Provided the concluding essay is entered in time, the group takes automatically part in the scientists@work competition.

An independent jury selects 10 finalists from the essays that have been sent in. The most important criterion for being selected is the production of a final essay with strong content. Those selected are given an opportunity at the final happening in Ghent to present their project to the general public by means of a poster and a verbal presentation of 7 minutes per team with room for questions of the jury. This jury selects the three winners, who receive a prize.

Results

The success rate of this first year's edition is enormous. 868 students from 54 schools participated and have chosen one of the 41 projects. 37 scientists from universities, colleges and companies guide the 79 teams. 51 class groups handed in their final assay and on 21 April, 10 laureates presented their work in Ghent. During this final happening The Ghent University auditorium was bubbling over with energy and enthusiasm! 10 classes gave it their best and presented their scientists@work project with brio!

The winner of scientists@work2003-2004 is 'De Heilige Familie' from Sint Niklaas with their project on telomeres: 'Who gets the short end of the stick?' (Figure 3)

Teacher: Cor Vandevelde Team: 12 students from 6th (senior year) sciences-mathematics, Latin-mathematics and Latin-sciences Hosting scientist: Sofie Bekaert, Ghent University, Agriculture Dept., Ghent

Conclusions

scientists@work offers students and teachers the possibility to get in touch with scientists working in a biotech lab. The enthusiasm of both parties shows that this project answers to unfulfilled needs in both the educational and scientific community.

Figures

Figure 1: the scientists@work logo

Figure 2: the booklet

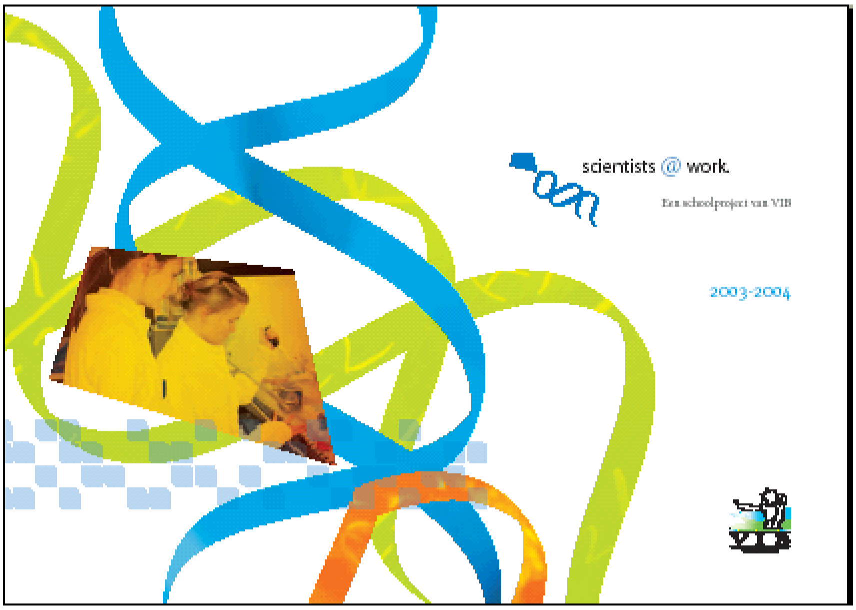

Figure 3: the winning class

Parallel session 5: PCST challenges and tools directed to young people

SOUTH KOREAN YOUTHS' IMPRESSIONS OF THE SCIENTIST: A NATIONAL SURVEY ANALYSIS

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Abstract

This study shows impressions of the scientist that Korean youths hold. The "impression" concept, indicating salience and consequentiality of an object, differs from the more identificatory "image" concept. Most elements composing those impressions are found to be related to activities (not products) of the scientist, and most cognitive relations composing them imply "power" of the scientist. And the impressions seem to originate mostly from television and books rather than from school classes.

Key words: scientist's impression, scientist's image, source of scientist's impression.

Text

The main purpose of this paper is to present Korean youths' impressions of the scientist, which are considered to be products of science communication. And then we explore how to improve them. Here, the concept of impression is assumed to reflect our consequential and salient view of an object -- better than that of image, usually limited to our identification of an object. Thus, we are more likely to behave in a certain way toward an object, here the scientist, based on an impression that is conceived to be "significant" and "meaningful" at a particular time and place. The impression is composed of at minimum one element evoked in relation to the scientist and using one cognitive relation that connects the scientist with that evoked element.

In late August and early September 2002, a national face-to-face interview survey of 1,204 youths (406 for 5th grade; 381 for 8th grade; and 417 for 11th grade) was conducted to find the South Korean youths' impressions of the scientist. Our major finding is that the most elements evoked in relation to the word scientist (41.9%) are the scientist's activities such as inventing, experimenting, researching, etc. (Table 1). A surprise is that the youths unlike adults are not impressed most by the class of accomplishments or products (e.g. automobile, airplane, refrigerator, television set, etc) of the scientist. The youths are found to compose their impressions of the scientist with two major cognitive relations: the evoked element being part of the scientist (37.0%) and being a consequence of the scientist (26.2%) (Figure 1). This implies a scientist's power to control or make a difference in the evoked element. These impressions are found to originate mostly from books (more for the primary school students) and television (more for the middle and high school students) rather than from school classes (Table 2). Also, the youths seem to be most impressed by Edison and Einstein (Table 3).

Finally, our suggestion for enhancing the youths' "consequential" impressions of the scientist is that we had better make them more aware of accomplishments and products through television and books.

Table 1: Elements of the Korean Youths' and Adults' Impressions of the Scientist

(Q: What first comes to your mind as you hear the word "Scientist"?)

Class	Category	Element	By Youths*		By Adults**	
			(%)	(%)	(%)	(%)
Activity-related	Activity itself		26.7	41.9	15.2	24.9
	Tools		11.7		3.7	
	Jargons		1.2		0	
	Activity evaluation	Positive	0.9		3.4	
		Negative	1.2		2.6	
	Study activity		0.2		0	
Human characteristics	Common char.		5.4	16.0	5.3	20.6
	Evaluation of human char.	Positive	7.7		13.4	
		Negative	2		1.9	
		Neutral	0.2		0	
	Appearances		0.7		0	
Personality	Names of profession		3.1	3.1	4.2	4.2
	Specific names	Famous scientist	13.9	14.0	8.3	8.3

		Acquaintances	0.1			
Affiliated organization			1.3	1.3	5.3	5.3
Fields	General		3.4	8.7	7.4	7.4
	Specific		5.3			
Accomplish-ments	Specific		9.4	11.5	15.1	19.5
	General	Positive	1.8		4	
		Negative	0.2		0.1	
		Neutral	0.1		0.3	
Socio-economic conditions	Economic	Rich	0.1	0.8	0.6	0.6
		Poor	0			
		Middle	0.5			
	Status		0.2		0	
Mass media-related			0.4	0.4	0	0.0
Others			1.5	1.5	1.9	1.9
No Response			0.3	0.3	7.2	7.2
None			0.7	0.7	0	0.0
Sum			100	100.0	100	100.0

*National survey of youths(1212) impression of “the scientist” in 2002: 5^{th} grade, 8^{th} grade, and 11^{th} grade.

**National survey of adults(1161) impression of “the SET”(Scientist-Engineer-Technician) in 1999.

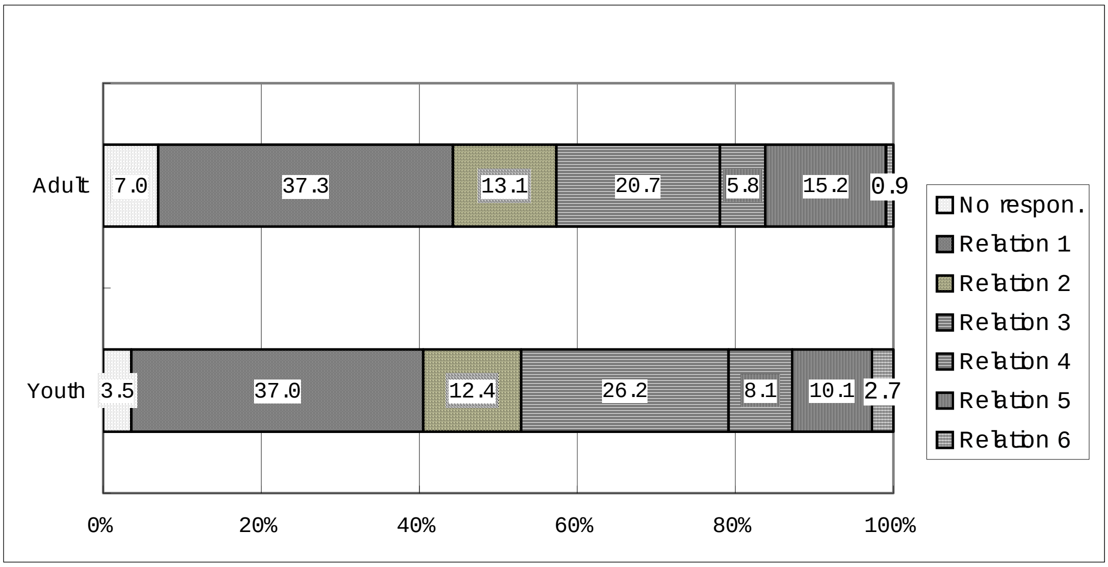

Figure 1: The Proportions of the Korean Adults' and Youths' Cognitive Relations Used to Compose Impressions of the Scientist

(Q: How do you relate the evoked element to the scientist?)

The relations on the right indicate as follows:

Relation 1: an evoked element is part of the scientist;

Relation 2: the scientist is part of an evoked element;

Relation 3: an evoked element is consequence of the scientist;

Relation 4: the scientist is consequence of an evoked element;

Relation 5: an evoked element and the scientist are the same thing;

Relation 6: an evoked element is no scientist.

Table 2: Sources of the Youths' Impressions of the Scientist

(Q: Where do you get mostly such an impression of the scientist?

Sources		Freq.	(%)
Mass media	TV	350	28.9
	Movie	31	2.6
	Radio	2	0.2

	Book	371	30.6
	Newspaper	12	1.0
	Internet	2	0.2
	Other	14	1.2
School class		152	12.5
Acquaintance		24	2.0
Off-school activity		11	0.9
Daily life		11	0.9
Common sense		48	4.0
Other		42	3.5
	No response	110	9.1
	No recall	6	0.5
	None	21	1.7
	Don't know	5	0.4
Sum		1212	100.0

Table 3. The Youths' Personality-related Impression of the Scientist

(Q: Who first comes to your mind as you hear the word "Scientist"?)

Personality	Freq.	(%)
Edison	434	37.2
Einstein	373	31.9
Newton	71	6.1
Yong-Sil CHANG	61	5.2

Nobel	42	3.6
Marie Curie	32	2.7
School teacher	22	1.9
Stephen Hocking	20	1.7
Chang-Choon WOO	11	0.9
Pavro	8	0.7
Parent	7	0.6
King Sejong	6	0.5
Bell	6	0.5
Wright Brothers	5	0.4
Hue-So LEE	5	0.4
Galileo	5	0.4
Other	60	5.1
Sum	1168	100

Parallel session 5: Challenges and tools directed to young people.

'MOTHEO' IKS PROJECT: PROMOTING THE STATUS OF INDIGENOUS KNOWLEDGE AMONG THE YOUTH BY ENGAGING LEARNERS IN PROCESSES REFLECTING ITS SCIENTIFIC AND SOCIO-ECONOMIC VALUE.

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Abstract

MOTHEO Indigenous Knowledge Systems (IKS) Project was developed from the concern African indigenous knowledge is gradually losing its status and also running the risk of being eroded. Custodians of indigenous knowledge, mainly elderly women and traditional healers do not have a system of recording this valuable knowledge. Due to the erosion of traditional mechanisms through which indigenous knowledge was transmitted from generation to generation, most of the younger generation, captured by western influence and formal education do not embrace indigenous knowledge and perceive it as backward and inferior. This state of affairs has to be reversed if the current drive to promote, develop and protect IKS in South Africa has to succeed. It is important to create the awareness among young people that IKS is a 'science' and that what makes it different from western science is the social, economic, political and cultural context.

Text

Context

There is a greater realization now in South Africa and other African countries, that development is to a large extent context-bound and that knowledge systems other than the dominant Western knowledge systems should occupy their rightful place in development theory and practice. However, there is still a lingering impression that IKSs are not on par with Western knowledge systems and this perception is contributing towards the erosion of indigenous knowledge. This false impression is also perpetuated by the capturing of the 'newly modernised groups' and in particular young people by western influence and formal education which does not incorporate concepts of IKS.

What this project would like to achieve is to create the awareness of the young people that traditional knowledge like the so-called modern science, is a 'science' in its own right. What makes traditional knowledge different from modern science is that it is a product of culture informed by social, economic and political context in which it is applied.

South Africa therefore needs to develop a corpus of academics and scientists who can contribute to both the gradual transformation of scientific ethos, ethics and practice as well as towards the development of a strong system of protocols for development and protection of indigenous knowledge systems (Odora Hoppers, 2002).

It is against this background that the process of engaging learners in IKS dialogue and in documenting and recording scientific processes and other valuable uses of indigenous knowledge was initiated. The project is officially

OBJECTIVES

Primary objective:

To de-stigmatize IKS by creating the awareness of learners of its scientific and socio-economic value and the role it can play in sustainable socio-economic development.

Secondary objectives are:

To popularize indigenous knowledge systems and their related science and technology amongst schools and in communities.

To identify IK systems still practiced and biodiversity in the area as well as associated contemporary threats.

To create a database for storage and protection of gathered information as well as acknowledgement of the source.

To establish Community-Based IKS Study Groups in participating schools.

To facilitate the development and presentation of an IKS bridging course to empower and strengthen the capacity of knowledge holders and other interest groups.

Project Design

Target Groups

The project targeted Grade 11 learners from selected 10 high schools in the North West Province.

Project Approach

Learners were given an assignment using a well structure questionnaire to interview known custodians of IKS in their local villages for the purpose of collecting information that will create their awareness of the scientific and socio-economic value of indigenous knowledge. The challenge for learners was also to determine the commercialization potential of some of the indigenous resources identified. This exercise exposed learners to the S&T areas where IKS can be incorporated, such as pharmacology, biotechnology, etc.

An example is presented on the following table:

Indigenous Herbs

Types of Herbs	What they are used for		Types of Ailments used for	Any Myths?
	Medicinal	Nutritional		

Indigenous Skills/technologies used for preservation and processing of Herbs

Methods e.g. drying	Description of the process	Relationship or linkages to modern S&T	Weaknesses and Strengths	Any Myths?

Indigenous methods of conservation

Methods of Conservation	Are these methods still used/relevant	Strengths	Weaknesses	Opportunities

Scientific and economic value

Opportunities for Propagation	Opportunities for Value-Adding

Achievements

The project succeeded to generate interest among participating learners and teachers in indigenous knowledge. Awareness of the scientific and socio-economic value of this knowledge was created. It was also an effective strategy to start a dialogue between the youth and custodians of indigenous knowledge and also to link science and society. The project is now replicated to other 30 schools in the North West Province.

Conclusion

This project will promote the following areas of transformation:

Equity and redress of historic imbalances:

This project will empower learners and communities to protect IKS by ensuring that it is not used without their approval and that commercialization strategies developed will promote equitable sharing of benefits.

Nation Building:

A nation without culture is like a tree without roots – dead. This project will promote the preservation and conservation of IKS by restoring its status and removing the stigma attached to it, particularly among the youth.

Skills Transfer:

Participating groups will be trained to capture and document indigenous knowledge. Various skills will be transferred to participants – from the theory of propagation of plants and herbs to the technologies of production, processing and packaging of new products.

Creation of partnerships and opportunities for disadvantaged communities:

Disadvantaged communities will form partnerships with community schools, academic institutions, government and science and technology institutions.

References

Odora Hoppers, C.A. (2002) Editor. Indigenous Knowledge and the Integration of Knowledge Systems.

Palallel session 5: PCST challenges and tools directed to young people

WAKING-UP FOR SCIENCE OR KEEPING THE CONVERTS AWAKE?

Inês P. Mascarenhas

Calouste Gulbenkian Foundation

Abstract

There are no important societal issues at present that do not involve science or its applications. It is essential thus that we redouble our efforts in understanding the interaction between science and society. The social impact of science is directly connected to the utility of the technological solutions generated from its basic principles.

It is the duty of science to seek the dialogue with all the other true forms of knowledge in the broad communicational network that gives meaning and coherence to life.

In order to contribute to the enlargement of scientific culture in Portugal, the Calouste Gulbenkian Foundation promoted a study of the different types of public, or target publics, interested in varied science practices. The outcome of the study is the unfolding of several specific ways of relating to and circulating scientific knowledge.

Encouraging an open attitude towards nature and the environment and attracting young people to science is, for sure, a continuing need in terms of scientific culture. The experience of the series of open lectures aimed at high school student audiences "Despertar para a Ciência" is presented, as a mechanism to introduce the younger generations to the delight of discovering and the enjoyment of understanding.