KAST-ASM-IAP INTERNATIONAL WORKSHOP

SCIENCE LITERACY:
Science Communication & Science Outreach

June 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

Organized by

KAST 한국과학기술한림원
The Korean Academy of Science and Technology

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INTERNATIONAL SCIENCE, TECHNOLOGY AND INNOVATION CENTRE FOR SOUTH-SOUTH COOPERATION UNDER THE AUSPICES OF UNESCO

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PROGRAM

Day1 / June 12, 2014 (Thu)

09:00 ~ 09:15	**Opening Ceremony** **Presider : Yoo Hang Kim** *(Member, Organizing Committee / Executive Director, AASSA)*
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09:15 ~ 09:20	**Photo Session**
09:20 ~ 10:20	**Keynote Addresses**
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09:50 ~ 10:20	• Impediments to & Fundamentals for Communicative Effectiveness of Science - Hak-Soo Kim *(Chair, Organizing Committee / Professor, Sogang University, Korea)*
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11:00 ~ 11:20	• Mundus and Kennis op Straat: Two Successful Models of Communicating Science - Roberta D'Alessandro *(International officer, The Young Academy of the Royal Netherlands Academy of Arts and Science (KNAW))*
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14:40 ~ 15:00	• Challenges for Enhancing Scientific Literacy in Mongolia - Badamsambuu Khishigbayar *(Deputy Director, National Institute of Education, Mongolia)*
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15:20 ~ 15:40	**Coffee Break**
15:40 ~ 16:40	**Session 4** **Presider : Jae Chul Shim** *(Member, Organizing Committee / Professor, Korea University, Korea)*
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16:00 ~ 16:20	• Learning from Diverse Perspectives in Science Communication - Manoj Kumar Patairiya *(Adviser/ Scientist 'G', National Council for Science & Technology Communication, Ministry of Science & Technology, India)*
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09:20 ~ 09:40	• Lesson Learned and a Success Story of Science Communication - Aphiya Hathayatham *(Director, Information Technology Museum, National Science Museum, Thailand)*
09:40 ~ 10:00	• 25 Years of Research in Public Understanding of Science in India: Empirical Evidences from Kumbh Mela Survey Studies - Gauhar Raza & Surjit Singh *(CSIR-National Institute of Science Communication and Information Resources, India)*
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10:20 ~ 11:50	**Discussion Session** **Presider : Hak-Soo Kim** *(Chair, Organizing Committee / Professor, Sogang University, Korea)*
	• How to Enhance SHER Communication and Education at the Age of Asia Collaboration
11:50 ~ 13:00	**Luncheon** *(Crystal Room)*
13:30 ~ 21:30	**City Tour and Dinner for Foreign Speakers**

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KEYNOTE ADDRESSES

*Presider : **Yoo Hang Kim** (Member, Organizing Committee / Executive Director, AASSA)*

Science, Engineering and Technology and the UN sustainable Development Goals 2016-2030

*- **Lee Yee Cheong** (Chair, IAP SEP Global Council / Chair, ISTIC)*

Impediments to & Fundamentals for Communicative Effectiveness of Science

*- **Hak-Soo Kim** (Chair, Organizing Committee / Professor, Sogang University, Korea)*

Lee Yee Cheong

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Academician Dato' Ir. (Dr.) Lee Yee Cheong is the Malaysian Chairman, Governing Council, International Science Technology and Innovation Centre for South-South Cooperation under the auspices of UNESCO (ISTIC); Chairman, Global Council, InterAcademy Panel (IAP) Science Education Program (SEP); Member of the National Science and Research Council, Malaysia; Pro-Chancellor, Infrastructure University Kuala Lumpur; Chairman of Governing Board, the Institute of Energy Policy and Research (IEPRe), University Tenaga Malaysia (UNITEN); Member of Global Science Innovation Advisory Council (GSIAC); Patron of the International Young Professionals Foundation; Member of the International Advisory Board of "Engineers Without Borders" Canada; and Honorary Fellow of the Institution of Engineering and Technology, UK, the Institution of Civil Engineers, UK, Engineers Australia and the Institution of Engineers, Mauritius.

He was President and now Distinguished Honorary Fellow of the Institution of Engineers Malaysia; Chairman and now Honorary President of Commonwealth Engineers Council (CEC); the first Asian President of the World Federation of Engineering Organisations (WFEO) 2003-2005; He represented WFEO as Co-chair of the "International Science and Technology Community" Major Group of UN Commission on Sustainable Development 2000-2006 and attended UN World Summit on Sustainable Development Jo'burg 2002 and World Summit on Information Societies Tunis 2005. He was Co-chair of Task Force "Science, Technology and Innovation" of the United Nations Millennium Project 2002-2005; Member of the Board of Trustees of Engineers Against Poverty, U.K; Member of the International Commission for Education for Sustainable Development Practice, Earth Institute, Columbia University 2006-2008; Member of International Advisory Board of Grand Challenges Canada and Member of the National Economic and Social Council Kenya and a Commissioner of the Energy Commission of Malaysia 2005-2009.

He is founding Secretary General and Senior Fellow of the Academy of Sciences Malaysia; the founder President of the ASEAN Academy of Engineering and Technology; former Secretary General of FASAS; Foreign Fellow of the Australian Academy of Technological Sciences and Engineering. He served as a founding Board member of the InterAcademy Council (IAC) 2001-2004. He was advisor to the Minister of Science, Technology and Innovation Malaysia 2006-2007.

He was co-author of the UN Millennium Project Science Technology and Innovation Task Force Study Report "Innovation: Applying Knowledge in Development", 2005. He published his autobiography "Think Malaysia, Act Global" September 2010. He was awarded the Jiang YoungSil Grand International Science and Culture Prize, Korea; the Malaysian State Awards of DPMP and KMN and the Honorary Officer in the Order of Australia (AO)

ABSTRACT

Science, Engineering and Technology and the UN Sustainable Development Goals 2016-2030

Academician Dato Ir. Lee Yee Cheong
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The UN Millennium Development Goals (MDGs) will end in 2015. The paper will review the progress made by MDGs 2000-2015 that has been largely due to the application of science, engineering and technology. UN MDGs will be replaced by UN SDGs that will cover the period 2016-2030. The UN SDGs are much more holistic and inclusive and redress significant MDG omissions like youth employment and energy. They also envisage more significant roles for business and industry and civil society. In the defining document "A New Global Partnership Eradicate Poverty and Transform Economies Through Sustainable Development" by High Level Panel of Eminent Persons led by Indonesian President, Liberian President and UK Prime Minister, the importance of technology is repeatedly emphasized. However science is hardly mentioned. Neither is Research Development and Commercialization. Quality Education and Lifelong learning stop at vocational and technical education rather than going all the way through university education to the production of an adequate supply of research scientists and engineers. Business and Industry are not urged to contribute to STEM education to assure their own human resource pipeline nor to contribute more to GERD (Gross Expenditure in Research and Development). The author considers this as a signal failure in science communications and outreach and will suggest ways to redress this.

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"Science Engineering and Technology (SET) and the UN Sustainable Development Goals (SDGs)"

By Academician Dato Ir. (Dr.) Lee Yee Cheong
Chairperson, IAP SEP Global Council, Malaysia

1.0 Introduction

The critical and urgent challenges for our world in this century are twofold:

Combating global poverty
Combating climate change

Merely confronting the environmental and ecological challenge is not sufficient to achieve sustainability on earth.

We must at the same time address the equally urgent problem of global poverty.

2.0 The World at Year 2000

World Population >6.0 billion.

(i) Rich (0.8 billion),
(ii) Transitional(1.2 billion)
(iii) Poor (4.0 billion)

Criterion: GDP in US$ per capita (PPP)
(i) >16,000,
(ii) 4000-16,000,
(iii) < 4,000 respectively.

The Rich have Nine times the Wealth, Eight times the Energy Consumption and the Eight times Carbon Emission of the Poor.
20% Richest : 86% of World Consumption
20% Poorest : only 1.3%.
1.3 billion live in Abject Poverty, on Daily Income <US $1.00;
3 billion have Daily Income of <US$ 2.00;
800 million Suffer from Food Insecurity;
50 million are HIV positive;
1 billion Suffer from Water Scarcity;
2 billion have No Access to Energy.

(Professor John Holdren, Science Advisor to President Obama, Harvard University, IAP Millennium Sustainability Transition Conference Tokyo 2000)

3.0 The World 2050

World Population: 9-10 billion

Population of the developed world and high income developing world is declining

Population Increase will be largely in urban cities in the Developing Countries, aggravating youth unemployment, slum and social unrest

4.0 The UN Millennium Development Goals 2000-2015 and the UN Millennium Project

United Nations Millennium General Assembly 2000 adopted UN Millennium Declaration.

Millennium Development Goals (MDGs) of the Declaration are specific targets by 2015.

The Millennium Project (MP) 2002-2005 reviews current practices, identifies policy implementation, and evaluates financing.

The MP's Objective is to Ensure All Developing Countries Achieve the MDGs.

Millennium Development Goals (MDGs) 2000-2015

Goal 1: Eradicate poverty and hunger

Goal 2: Achieve universal primary education

Goal 3: Promote gender equality and empower women

Goal 4: Reduce child mortality

Goal 5: Improve maternal health

Goal 6: Combat HIV/AIDS, malaria and other diseases

Goal 7: Ensure environmental sustainability

Goal 8: Develop a global partnership for development

UN MP Task Forces

1 Poverty and Economic Growth (Goal 1& 8)

2 Hunger (Goal 1)

3 Education and Gender Equality (Goals 2 & 3)

4 Child Health and Maternal Health (Goals 4 & 5)

5 Expanding Access to Essential Medicines (Goal 6 & 8)

MP Task Forces

6 Environmental Sustainability (Goal 7)

7 Water and Sanitation (Goal 7)

8 Improving the Lives of Slum Dwelle (Goal 7)

9 Trade and Finance (Goal 8)

10 Science, Technology and Innovation (Goal 8)

5.0 UN MP "Science, Technology and Innovation" Task Force

As President of the World Federation of Engineering Organisations (WFEO), I was appointed Co-chair of the UN Millennium Project "Science, Technology and Innovation" (STI) Task Force.

STI Task Force Focus Issued its Report "Innovation: Applying Knowledge in Development" January 2005, http://www.unmillenniumproject.org/reports/tf_science.htm


STI Task Force Report Focus
Report is very much oriented away from the Supply Side of Science toward the Demand Side of Engineering, Technology and Innovation that is Vital for Employment and Wealth Creation in the Developing World,
Emphasis is devoted to Infrastructure for Development and Nurturing of Small and Medium Enterprises in Developing Countries.


My Successful Contributions to the UN Millennium Project
▪ Advocacy of Infrastructure as Foundation of Development
▪ High and Middle Income Developing Countries as Donors for the MDGs
My Failures
▪ Energy not included in Study Scope
▪ Youth not included in Study Scope
My failures were due to the above two vital issues and others not originally included in the UN MDGs

The UN MDGs are due to expire in 2015

- **Many developing countries are still off track in achieving MDGs.**

- **One Major Reason is due to the MDGs being fragmented and isolated in scope.**

- **The UN and the Member States are in the process of finalising the Post 2015 Development Agenda since Rio+20 in 2012.**

5.0 UN Sustainable Development Goals (SDGs) 2016-2030

UN Secretary-General Ban Ki Moon convened a High Level Panel of Eminent Persons to begin the deliberation. The Panel issued its Report in 2013
http://www.post2015hlp.org/the-report/

"A NEW GLOBAL PARTNERSHIP: ERADICATE POVERTY AND TRANSFORM ECONOMIES THROUGH SUSTAINABLE DEVELOPMENT"
The Report of the High-Level Panel of Eminent Persons on the Post-2015 Development Agenda

Co-Chairs:
Dr Susilo Bambang Yudhoyono , President, Indonesia
Ellen Johnson Sirleaf , President, Liberia
David Cameron, Prime Minister, United Kingdom

Panel Salute Remarkable Achievements by MDGs Since 2000

- Half a billion fewer people in extreme poverty;
- About three million children's lives saved each year.
- Four out of five children now get vaccinated for a range of diseases.
- Maternal mortality gets the focused attention it deserves.
- Deaths from malaria have fallen by one-quarter.
- Contracting HIV is no longer an automatic death sentence.
- In 2011, 590 million children in developing countries attended primary school.

The UN Post-2015 Agenda

A universal agenda. It needs to be driven by five big, transformative shifts:

1. Leave no one behind.
2. Put sustainable development at the core.
3. Transform economies for jobs and inclusive growth.
4. Build peace and effective, open and accountable institutions for all.
5. Forge a new global partnership.

Proposed UN SDGs

1.End Poverty
2. Empower Girls and Women and Achieve Gender Equality
3. Provide Quality Education and Lifelong Learning
4. Ensure Healthy Lives
5. Ensure Food Security and Good Nutrition
6. Achieve Universal Access to Water and Sanitation

Proposed UN SDGs

7. Secure Sustainable Energy
8. Create Jobs, Sustainable Livelihoods, and Equitable Growth
9. Manage Natural Resource Assets Sustainably
10. Ensure Good Governance and Effective Institutions
11. Ensure Stable and Peaceful Societies
12. Create a Global Enabling Environment and Catalyse Long-Term Finance

6.0 ISTIC Comments on UN Hi Level Report as conveyed to Amina Mohammed, UN Sec-Gen Special Advisor on Post 2015 Development Agenda, 12 April 2014:

- A well argued and holistic document.
- A remarkable framework document for stakeholders in both the developed and the developing world.
- Unlike the MDGs, it proposes SDG for youth employment and sustainable energy.
- It advocates infrastructure development in its widest context as the basis for poverty eradication through economic growth.

ISTIC Comments on UN Hi Level Report

My Concerns:

- The Report repeatedly highlights the importance of Technology and Innovation yet no emphasis of "Scientific Research, Development and Commercialisation" (RD&C)

- Without RD&C, it will not be possible to develop the necessary and relevant innovative technologies for low carbon economies and disaster resilient societies.

I cite the remarkable achievements of medical and health sciences since 2000, originating in research laboratories in universities in both the developed and developing world.

- In advocacy of quality education and life-long learning, the Report emphasizes vocational and technical education. We should instead embrace education in holistic manner, offering the best and the brightest opportunities for university education and post graduate training so that we will have sufficient number of research scientists and engineers to create the high and green technologies for the world of the SDGs

ISTIC Comments on UN Hi Level Report

The role of business and industry is crucial especially in developing countries.

- Business and Industry must be partners of government in Science, Technology Engineering and Maths (STEM) Education to assure their own human resources supply pipeline.
- Business and Industry must invest in RD&C so that the Gross Expenditure in Research and Development (GERD) as a percentage of GDP can be raised in developing countries so that they can become competitive contributors in the global supply chain.

ISTIC Comments on UN Hi Level Report

- Since the publication of the Report, UN have been flooded with numerous lengthy submissions.
I don't think lengthy comments however valid can be added to the Report, which is a framework report.
- It should still be possible to add a word or two or a sentence or so to emphasize "Science and Technology" instead of Technology; "Research Development and Commercialisation"; "University Education and Research Scientists and Engineers", and "Business and Industry's contribution to STEM and GERD".

7.0 My Plea

I am recommending and appealing to IAP member academies and affiliates that in our Science Literacy agenda, there is currently nothing more urgent than convincing the UN and its member states that in the Declaration establishment the UN SDGs during the 2015 UN General Assembly, the important roles of S.E.T in achieving the SDGs by 2030 must be more explicitly stated.
We must lobby at UN and UN Specialised Agencies, Inter-Government Institutions, Regional Economic Groups and National Governments to have those important words inserted in appropriate places in the Declaration.
The Korean S.E.T community is particularly important as UN Sec-Gen Ban Ki Moon is Korean and World Bank President Dr. Jim Kim is ethnic Korean!

8.0 Conclusion

With the Global S.E.T Community solidly behind the UN SDGs, then as the UN Hi-Level Report predicts:

By 2030 the World would have:

- 1.2 billion more people connected to electricity
- 190 to 240 million hectares more of forest cover
- \$30 trillion spent by governments worldwide transparently accounted for
- People everywhere participating in decision-making and holding officials accountable
- Average global temperatures on a path to stabilise at less than 2° C above pre-industrial levels
- 220 million fewer people who suffer crippling effects of natural disasters

Thank You

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RECENT EMPLOYMENT RECORD

1992 - present	Full Professor, School of Communication, Sogang University
2006 - 2009	Dean, School of Communication, Sogang University
2005 - 2009	Dean, Graduate School of Mass Communication, Sogang University
1987 - 1992	Associate Professor, School of Communication, Sogang University

EDUCATIONAL BACKGROUND

Mar. 1982	University of Washington, Ph.D. (Communication Research)
Feb. 1977	Seoul National University, M.A. (Communication Research)
Feb. 1974	Yonsei University, B.A. (English & Journalism)

SOME RECENT "English" PUBLICATIONS

"Climate Change, Science and Community," Public Understanding of Science, 21(3), (April 2012), pp. 268-285.

"Engagement: The Key to the Communicative Effectiveness of Science and Ideas," in: Bernard Schiele, Michel Claessens & Shunke Shi (Eds.), Science Communication in the World: Practices, Theories and Trends (New York: Springer, 2012), pp. 269-280.

"Measuring PEP/IS, a New Model for Communicative Effectiveness of Science," in: Martin Bauer, Rajesh Shukla & Nick Allum (Eds.), The Culture of Science: How the Public Relates to Science Across the Globe (New York: Routledge, 2012), pp. 375-384.

"Nehru's Scientific Temper as Battling Against Pseudo Sciences," in: Hasan Jawaid Kahn, Gauhar Raza, Surjit Singh & Subodh Mahanti (Eds.), Quest for Scientific Temper (New Delhi, India: CSIR-NISAIR, 2012), pp. 113-123.

"PEP/IS: A New Model for Communicative Effectiveness of Science," Science Communication, 28(3), (March 2007), pp. 287-313.

SOME PROFESSIONAL ACTIVITIES

2011 - present	Chairperson, Policy Studies Division, The Korean Academy of Science and Technology (KAST)
2011 - present	Member, Board of Directors, The Institute for Basic Science (IBS), Korea.
2010 - present	Member, Editorial Advisory Board, Public Understanding of Science, Sage Publications Inc. US.
2006 - 2008	Vice-President, The International Network on Public Communication of Science & Technology (PCST Network).
2001 - 2002	President (28th), The Korean Society for Journalism & Communication Studies (KSJCS).
2002	Co-Chair and Host of the 52nd International Communication Association (ICA) annual conference in Seoul, as the 28 h President of the Korean Society for Journalism & Communication Studies (KSJCS)

SOME AWARDS & HONORS

Nov. 2007	Elected as Fellow of The Korean Academy of Science & Technology (KAST)
April. 2001	Awardee, The Order of Science & Technology Service Merit Woong-bi Jang (third class of service), awarded by President of the Republic of Korea.
June. 1998	Awardee, The First Excellence Award for the Faculty Achievements, Sogang University.
1978	The Graduate Fellowship, The Rotary Foundation of Rotary International (for studying in the US).

Keynote Addresses

ABSTRACT

Impediments to and Fundamentals for Communicative Effectiveness of Science

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To argue for fundamentals for communicative effectiveness of science, I point out what kinds of major impediments exist in our establishment's thoughts on science communication. Those impediments are: The Scientist's Viewpoint; Obsession with Transportation; Body Attribution; and Solution-First. We need to disrupt these impediments to find out what fundamentals we need for communicative effectiveness of science. Finally, I delineate a theory-based new model for communicative effectiveness of science. It rejects Drunkard's Search and political or anecdotal movements such as STEM, STEAM, and PES (Public Engagement with Science).

ENGLISH TEXT

Impediments to and Fundamentals for Communicative Effectiveness of Science

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Keynote speech paper delivered at the KAST-ASM-IAP International Workshop on 'Science Literacy: Science Communication and Science Outreach', Seoul, Korea, June 12-13, 2014. (Jointly organized by The Korean Academy of Science & Technology, The Academy of Sciences Malaysia, and IAP – the global network of science academies)

To argue for fundamentals for communicative effectiveness of science, I will try to point out what kinds of impediments exist in our establishment's thoughts on science communication. We need to disrupt those impediments to find out what fundamentals we need for communicative effectiveness of science.

1. Impediment-1: The Scientist's Viewpoint

Science is usually considered to investigate particular phenomena and discover some order underlying them. In this process, induction or deduction is mobilized as basic methodology. The former is to generalize essential elements and relationships of phenomena and to go forward to discovering a theoretical system; the latter is to construct a theoretical system through logical necessity and test it through observable phenomena. However, the former's work is more common than the latter's one. It seems natural for scientists to pay initial attention to examining phenomena rather than to imagining a theory.

Those particular phenomena are outcomes and products whose prior processes have already been quite elusive. As a matter of fact, (traditional) science is focused on particulars that are so varied and divisional. Scientists (both natural and social) are inevitable to adopt a division of labor for covering their relevant particulars. All of them tend to produce as knowledge some discovery of essential structures of only some particulars. And their community, which is called a field or a discipline, is eventually a group of investigating those some particular phenomena (outcomes and products). Now, we see why and how most scientists are narrowly focused and structure-minded. They are prone to miss the process of behavior or function before the fact.

In a word, scientific knowledge is specialized, because it comes from a very limited scope of particulars. It is closely related to structural characteristics as well as shapes of those limited particulars. Their factuality gets to be critical for settling for knowledge. Puzzles regarding such factuality are the scientists' main research questions. Now, we see why and how every science is so difficult to communicate with every other science and, above all, society, full of the nonscientists or the general public. Thus, the so-called deficit model applies to not only the public but also the scientists themselves, as follows: One scientist's sufficiency of scientific knowledge about some particulars; another scientist's or a nonscientist's deficiency of it.

A scientist is a (scientific) knowledge producer and/or provider. Another scientist or a nonscientist is a knowledge consumer. There exists inherently a huge gap between the information producer and the information consumer. Now, we see how important it is for the information producer or provider to take into account the information consumer's viewpoint (problem, need, situation, and so on), as the former tries to communicate with the latter.

2. Impediment-2: Transportation Obsession

Let me tell you an analogy. When we are hungry, we are desperate to obtain food. At that time, two problems are salient. One problem relates to food's availability. Some kind of food should be ready. The other key problem relates to food's transportation. Somebody should transport food to us. Unless we solve either one of the two problems, we would get at starvation. However, the world's current food–related problem is often simplified: Food is sufficiently produced on a global level; its transportation system is deficient, resulting in severe food shortage in many developing countries. Of course, the second problem of transportation deficiency implies some other problems, for example, logistical cost and technology. Transportation comes into the main picture.

The same picture comes on transporting scientific knowledge or information. Scientific knowledge or information is loaded in verbal and/or audiovisual messages tooled by diverse languages. Scientific messages are considered as food for the audience. They may be composed of scientific facts, opinions, and/or attitudes. Scientists want to feed the audience with those scientific messages like food, whose expected outcome is termed scientific literacy or public understanding of science. In this science-dominant world, the scientists produce an enormous amount of scientific messages. However, they deplore that there is no effective transportation system that can reach the audience.

Media, whether they are speeches, exhibits, museums and centers, or mediating systems such as printed publications, TV, Internet, and so forth, are basically transportation technologies. Development of media, including social network services (SNS), is to produce and expand “connections” between people. In a word, media transport scientific messages. As media are further developed, the network of and by connections is bigger and denser. Now we see why message (food) -centered and/or media (transportation) -centered thoughts have prevailed in the history of communication notion and research.

The notion of information transmission or persuasion, which is mentioned to be the essential function of communication, is closely related to the function of transportation. At present, we don't lack transports, thanks to development of computer-mediated technologies such as Internet. Thus, we can't longer deplore deficiency of transportation. However, we still have a huge gap between the scientists and the general public, even though enough connections between them are made possible. No more transportation problem! We need to bear in mind that connection does not guarantee sharing attention and cognition. We rarely co-focus attention on and think together about the same scientific information, though we are readily connected through media transports. This indicates that a scientist should heed bringing or summoning another scientist's or a nonscientist's engagement with the same scientific knowledge or information. But the latter would not engage in the former's scientific information. Thus, this difficulty is related not to transportation but to the process of collective engagement between the former and the latter, for example, how they could co-focus attention on and co-cognize the same topic.

3. Impediment-3: Body Attribution

Wishful thinking is for us to harbor a subjective, projected hope or dream, no matter what outcomes it may result in, in effect. Notwithstanding, wishful thinking is often confounded with reality, that is, mistaken as an actual realization. For example, agreement is almost an impossible goal for us to achieve, if not pretty arbitrarily, but persuasion assumes that it is readily achievable. That's why communication is taken as persuasion. Even, mutual understanding about a coorientational object is not easy to accomplish through communication. These effect-oriented products, accruing from wishful thinking, focus mostly on "bodies" of the sender and the receiver rather than their behavioral processes.

If a scientist's communication does not lead to a counterpart's gain of scientific knowledge or information, or change of scientific opinions and attitudes, s/he is likely to attribute that failure to the counterpart's (inside-) body conditions, for example, obstinacy or low persuasibility. This is a typical attribution for explanation of the failure. Attribution is to elicit (in fact, impose!) some attributes that are believed to be nested within body. Those attributes are the body-centered sources for explanation of behavioral outcomes. Successful outcomes are often attributed to the sender's characters; failed outcomes to the receiver's ones. But the both are body-centered explanations, like psychology's personality theory.

This body-centered attribution is basically trans-situational, because those attributes are conceived to be constituted within body as products of a long history of experiences. For example, obstinacy, persuasibility, attitude or schema is a trans-situational product notion that is believed to result from many past experiences. So, if such is assumed to be existent to someone, it is not easy for us to change it by simple intervention of communication, whether its content is informational or value-laden.

This body-centered attribution neglects the process of (collective) behavior between the sender and the receiver, which is likely to be more flexible and developmental. If we know that process, we could enhance communication's intervention effectively for removing the gaps between a scientist and another scientist or a nonscientist. That's why we need to pay more attention to the behavioral process than the body condition.

4. Impediment-4: Solution First

Scientific knowledge or information is mostly about answers or solutions. The answer-related information comes from resolving puzzles; the solution-related information from solving problems. The former, scientific factual information, is usually research products of natural sciences asking questions toward nature, while the latter, technological information, is usually research products of engineering sciences tackling problems threatening humanity. The scientific factual information is often utilized for producing the technological information too. Thus, scientific information is closely related to the "solution" aspect in a broad sense, beyond puzzles and problems themselves.

Scientific policies are also close to solution. Policymaking is, in principle, to make a solution for a societal problem. Thus, whether a scientist deals with scientific information or social policy related to science, s/he is apt to be solution-oriented.

When a scientist transmits scientific information to another scientist or a nonscientist, s/he is likely to adopt a "solution-first" communication strategy. Of course, any solution presumes its corresponding problem. However, if that initial problem is not well addressed and shared in advance, it is very difficult to achieve mutual understanding and agreement on its solution. Notwithstanding, most scientists are eager to make counterparts understand and accept whatever they tell. Then, scientific information treated as a bullet ends up passing by or hurting (not helping!) the counterparts. Those counterparts would not even listen to it in the first place. Complete failure of communication occurs.

This "solution-first" science communication overlooks the grand and critical sequence from problem to solution. That's one reason why scientific information is not favored by journalism. Journalism is basically to sell problem to the public so that the public or the society could afford to survive by recognizing and overcoming it. Humanity is always concerned, first, with problems threatening its survival. Thus, problem solving is the most basic condition for any entity in the universe. Awakening a problematic situation is the primary condition for summoning our focal attention. Therefore, engagement with problem should precede engagement with scientific information which tends to be closely related to solution.

5. Conclusion: Fundamentals

Now, we can derive new, effective fundamentals, quite different from the traditional base of the establishment's science communication research and practices. The establishment seems to be rather impedimental as well as almost futile. It is usually based on learning theory of pushing knowledge gain and/or on persuasion theory of changing attitude or summary value. The following are new fundamentals:

1) Take the information consumer's viewpoint.

A scientist's specialized scientific knowledge about limited particulars is so difficult to be understood by another involved in other particulars. Therefore, the former's communication need to, first, engage in what the latter, information consumer is interested in.

2) Never get into scientific information from the beginning.

Most of scientific information is about solution, that is, endpoint. So, without allowing its beginning point, i.e., problem, to be shared in the first place, that solution is not going to attract the receiver's focusing attention and cognition.

3) Start to communicate with a problem, the source of its solution.

Humanity is always concerned about ever-present problems, because they threaten its survival. Thus, problem that is always engaging people is the starting point for communication and ensuing engagement.

4) Build up a common agenda for problem between you and your counterpart.

Without establishing a community of interest with a common agenda, the sender and the receiver can't proceed to think together. With an agenda, they can begin to remove the gaps between each other.

5) Now, relate science to solving that agenda.

Engagement with science is a very hard task for everyone. Finally, science can be mobilized for problem definition and/or solution construction of the agenda.

6) Expect an impression of science, not knowledge of and/or attitude toward it.

It is extremely difficult to exchange scientific knowledge without prior engagement with a common problem. Even the (gained) knowledge does not keep in memory for long. However, problem provides readiness to evoke potential impression, and so, science's contribution to problem solving makes an impression of science that is meaningful or significant to our own respective self. Above all, impression often guides our behavior, for example, for science, like a science-related career.

7) Lastly, confirm team or community capitals such as trust and agreeability.

This (communicatively effective) process is not a unidirectional communication from a scientist to another scientist or a nonscientist. Rather, this process is close to removing the gaps between them by collective problem-solving efforts. Thus, it must produce team or community capitals of mutual trust and agreeability. Those capitals will function to facilitate other problems to be solved with further communicative effectiveness of science.

8) Don't be a damn fool in science communication like the Drunkard's Search: A drunkard searching under a street lamp for his house key, which he had dropped some distance away.

References

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Kaplan, Abraham (1964). The Conduct of Inquiry. New York: Thomas Y. Crowell Co.

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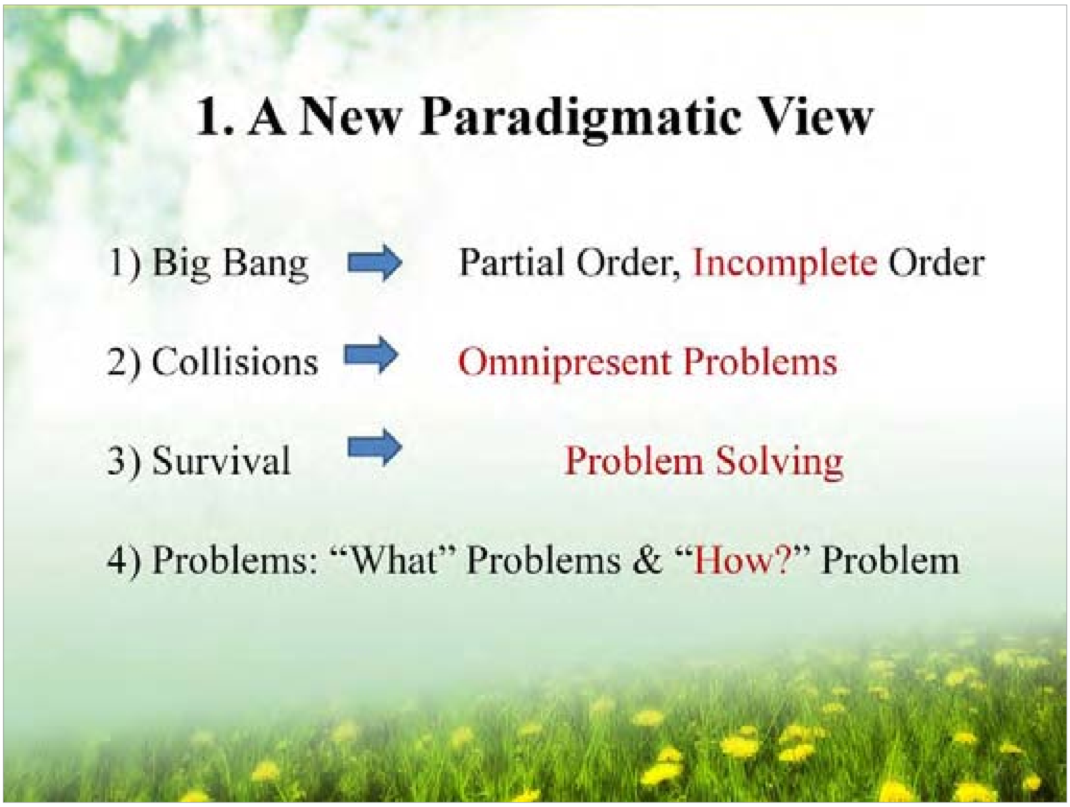
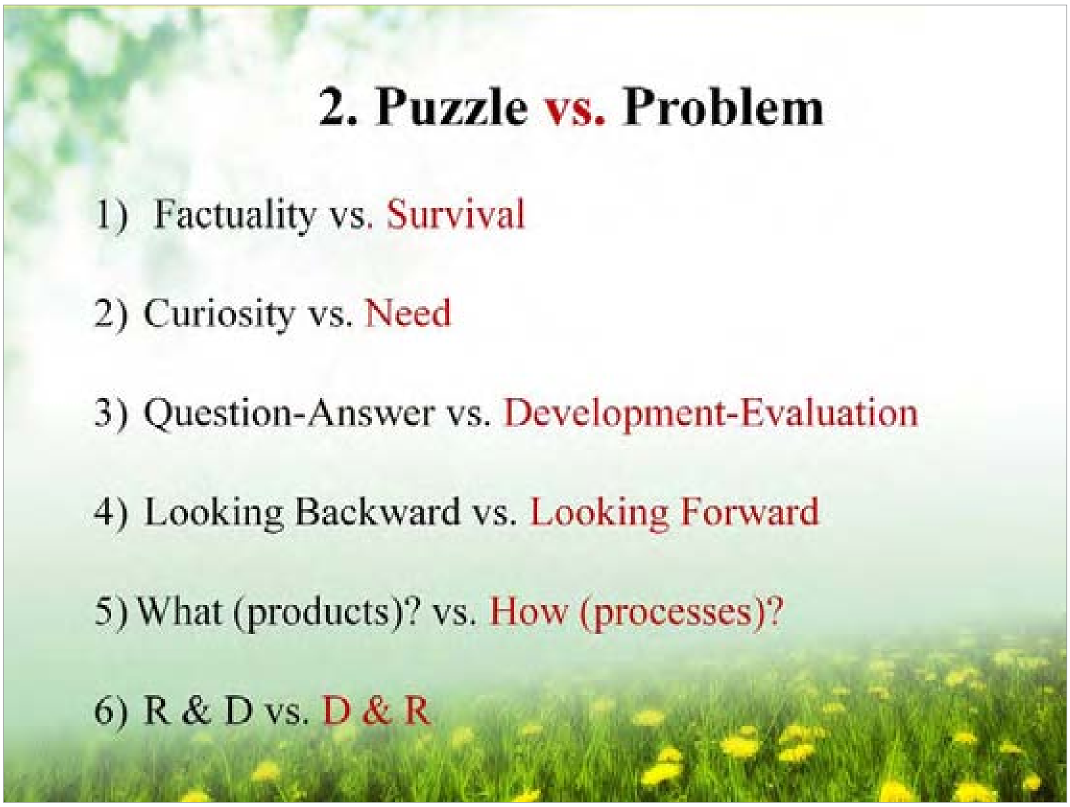
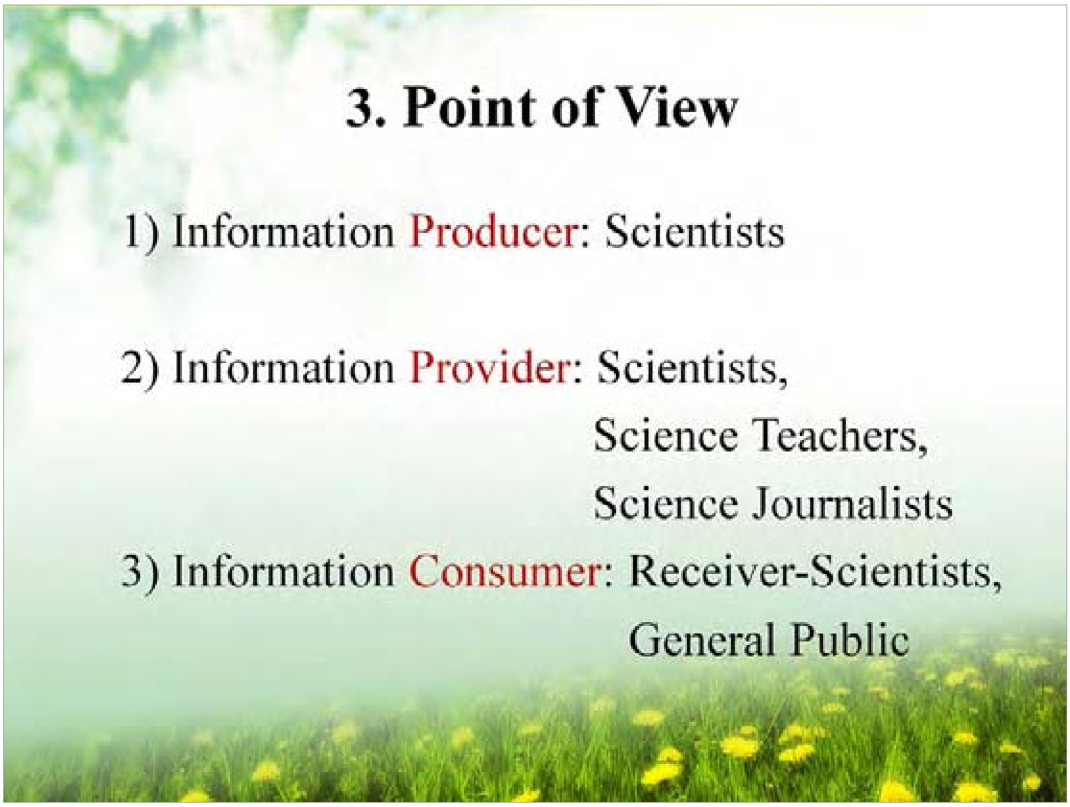
Kim, Hak-Soo, 2012.Climate Change, Science and Community. Public Understanding of Science, 21(3): 268-285.


Impediments to and Fundamentals for
Communicative Effectiveness of Science
By
Hak-Soo Kim, PhD
Professor, School of Communication
Sogang University
Seoul, Korea
Fellow & Chair, Policy Studies Division
Korean Academy of Science & Technology
E-mail: hskim@sogang.ac.kr
Keynote speech delivered at the KAST-ASM-IAP International Workshop on 'Science Literacy: Science Communication & Science Outreach', Seoul, Korea, June 12-13, 2014. (Jointly organized by The Korean Academy of Science & Technology, Academy of Sciences Malaysia, and IAP – the global network of science academies).

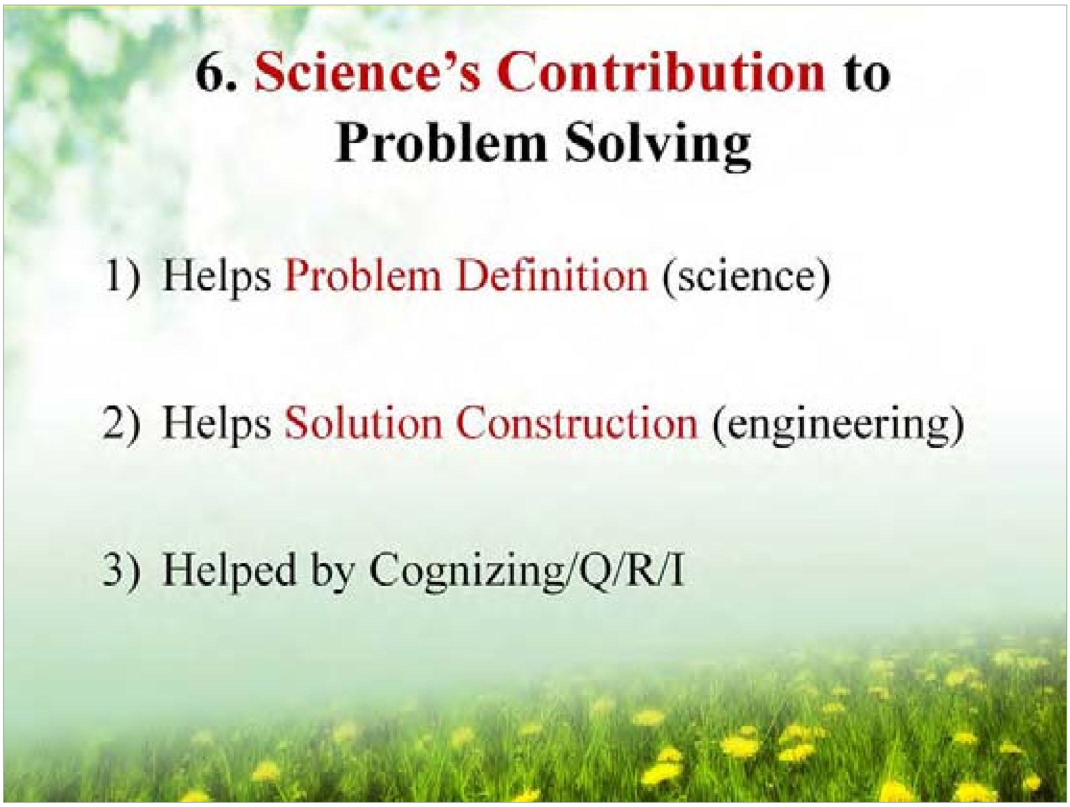

1. A New Paradigmatic View
1) Big Bang
Partial Order, Incomplete Order
2) Collisions
Omnipresent Problems
3) Survival
Problem Solving
4) Problems: "What" Problems & "How?" Problem


2. Puzzle vs. Problem
1) Factuality vs. Survival
2) Curiosity vs. Need
3) Question-Answer vs. Development-Evaluation
4) Looking Backward vs. Looking Forward
5) What (products)? vs. How (processes)?
6) R & D vs. D & R


3. Point of View
1) Information Producer: Scientists
2) Information Provider: Scientists,
Science Teachers,
Science Journalists
3) Information Consumer: Receiver-Scientists,
General Public


4. The Process of Engagement for Problem Solving
1) Exposing
2) Focusing Attention
3) Cognizing, Questioning, Imagining, Remembering
4) Moving


5. Communication's Contribution to Engagement of Problem Solving
1) Helps Exposing (surveillance of problems)
2) Helps Focusing Attention (selective agenda)
3) Helps Cognizing/Q/R/I (construction of solution)
4) Helps Moving (coordination of moves)


6. Science's Contribution to Problem Solving
1) Helps Problem Definition (science)
2) Helps Solution Construction (engineering)
3) Helped by Cognizing/Q/R/I


7. Product of Science Communication
1) Impression: Meaningful, Situational
2) Idea: New, Creative
3) Fact: Knowledge, Information (Very Low)
4) Value: Opinion, Attitude (Ambivalent)


8. PEP/IS:A Theory-Based New Model
1) Public Engagement with
2) Problem or Issue
3) relative to Science
4) Not Political or Anecdotal Slogans
(e.g., STEM, STEAM, PES)


9-1. Fundamentals for
Communicative Effectiveness
1) Take the information consumer's viewpoint.
2) Never get into science from the beginning.
3) Start to communicate with a problem,
never its solution.
4) Establish full relevance by changing
that problem into a shared agenda.
5) Relate and mobilize science to defining the
problem agenda and constructing its solution.

9-2. Fundamentals for Communicative Effectiveness

6) Expect an impression about science, not knowledge of and attitude toward it.

7) Confirm team or community capitals such as mutual trust and agreeability.

8) Don't be a damn fool like the *Drunkard's Search*.

10. References

1) Hak-Soo Kim. 2007. PEP/IS: A New Model for Communicative Effectiveness of Science. ***Science Communication***, 28(3): 287-313.

2) Hak-Soo Kim. 2012. Climate Change, Science and Community. ***Public Understanding of Science***, 21(3): 268-285.

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

SESSION 1

Presider : ***Ho Chee Cheong*** *(Senior Fellow, Academy of Sciences Malaysia (ASM))*

Cultivating the Students' Interest on STI while Young

- ***Hong Lee Pee*** *(President, ASEAN Academy of Engineering and Technology (AAET))*

Mundus and Kennis op Straat: Two Successful Models of Communicating Science

- ***Roberta D'Alessandro*** *(International officer, The Young Academy of the Royal Netherlands Academy of Arts and Science (KNAW))*

University Science Camp for Youth: Bridging Universities and Informal Science Education to Youth

- ***Zhi Min Zhang*** *(Researcher, China Research Institute for Science Popularization (CRISP))*

Kosai – The Virtual Science Town: Integrated Application to Reach Remote People All over Indonesia

- ***Dyah Ratna Permatasari*** *(CEO, DoctoRabbit Science Inc., Indonesia)*

SESSION 1

Presider

Ho Chee Cheong

Senior Fellow, Academy of Sciences Malaysia
cchoho2001@yahoo.com

Dr. Ho was a former Professor and Head of Department, Department of Chemistry, University of Malaya where he served from 1975 to 1999. He was the R&D Director of a glove factory from 1999 to 2002 and later became the Foundation Dean of the Faculty of Applied Sciences of University AIMST where remained until 2007.

Currently he is an Adjunct Professor at the University Tunku Adbul Rahman, Kuala Lumpur and also provides consultancy services to the rubber, latex and chemicals industries.

He is the Past President and the current council member of the Malaysian Institute of Chemistry. He is also the Council member and Fellow of the Academy Sciences of Malaysia (ASM). He is a Fellow of the Institute Chemistry Malaysia, Royal Society of Chemistry, ASEAN Academy of Engineering and Technology and the Malaysian Scientific Association. He is a chartered Chemist and a Chartered Scientist.

He has more than 40 years' experience as a research scientist and has published 90 peer-reviewed papers in international journals in the areas of materials science, rubber latex chemistry and technology, pollution and environmental protection and education. He holds six international patents as co-inventors.

In recent years, Dr. Ho has been actively engaged in the promotion of public understanding of science, technology, engineering and mathematics (STEM) education, in promoting science education in schools, in organizing workshops on improving the teaching and learning of science and maths in schools through science projects. Recently he was involved in the organization of a hugely successful inaugural KL Engineering and Science Fair (KLESF) 2014 held at the National Science Centre, Kuala Lumpur. He sits in several committees of the Ministry of Education tasked with improving the quality of teaching and learning of science and mathematics in schools.

He serves as judges for many years for the National Science Challenge and Quiz organized by Academy Sciences Malaysia, the National Science Fair and Competition organized by Ministry of Education, the International Invention Innovation Technology and Exhibition (ITEX) organized by MINDS, The School Science and Technology Projects Competition, organized by the Association of Chinese Chambers of Commerce and Industry Malaysia (ACCCIM) and lastly the International Panel of Judges for the Intel International Science and Engineering Fair (ISEF), USA.

BSc (Hons) in Chemistry, University of Malaya (1968)
PhD in Physical Chemistry, University of Bristol, UK (1973)
DSc in Chemistry, University of Bristol (1998).

Hong Lee Pee

President, The ASEAN Academy of Engineering and Technology
hlp@edasu.com

EDUCATION

1973	Bachelor of Engineering, University of Malaya, Malaysia1969
1969	Diploma Civil Engineer, Technical College, Kuala Lumpur

PROFESSIONAL CAREER

Since 2007	Honorary Consul of the Republic of Lithuania in Malaysia
Since 2009	President of ASEAN Academy of Engineering & Technology (AAET)
Since 2013	Council Member, Institution of Engineers Malaysia (IEM)
2011 - 2013	Council Member, Academy of Science Malaysia (ASM)
2011 - now	Chairman of Science, Technology & Industrial Linkage Committee (STILC), Academy of Science Malaysia (ASM)
2000 - 2009	National Council Member and treasurer, the Associated Chinese Chambers of Commerce & Industry of Malaysia (ACCCIM)
2004 - 2009, 2013 - now	Chairman of STI Committee. the Associated Chinese Chambers of Commerce & Industry of Malaysia (ACCCIM)
2005 - 2009	General Secretary, Malaysian Chinese Economic Consultative Council (MCECC)
2001 - 2009	Chairman, Social Security Organization Malaysia (SOCSO)
Since 1997	Visiting Professor, Nanjing University of Science and Technology, China
1996	Committee Member, The Malaysian Industry-Government Group for High Technology (MIGHT)
1980 - 1998	Chairman and CEO of Pilecon Bhd
1975 - 1980	General Manager of SEA Drillers Ltd

PROFESSIONAL QUALIFICATION

2013	Senior Fellow of ASEAN Academy of Engineering and Technology
2006	Hon. Fellow of ASEAN Federation of Engineering Organizations

2004	Fellow of ASEAN Academy of Engineering and Technology
1996	Fellow of Academy of Sciences Malaysia
1992	Fellow of Institution of Civil Engineering, UK
1985	Fellow of Institution of Engineers, Malaysia
1981	Professional Engineer, Board of Engineers Malaysia
1980	Member and Chartered Engineer of Institution of Civil Engineering, UK
1979	Member of Institution of Engineers, Malaysia

AWARD & TITLE

2008	Panglima Jasa Negara, Bintang dan Pingat Persekutuan (Federal title conferred by the King of Malaysia)
1990	1st Prize for invention of 'IFP Penetrometer' in the Malaysian Invention & Design Competition
1990	The IEM Award For Contribution to The Engineering Profession in Malaysia
1989	1st Prize for invention of 'Tripile' in the Malaysian Invention & Design Competition

INNOVATION & INVENTION

Innovated/ invented a number of engineering products, processes and systems, and out of the total 13 Innovations/Inventions over the period of 15 years between1984-99, 7 of them were filed for Patents. Among his most notable innovation and inventions are,

- Tripile
- Penetrometer
- Intermediate Plate Pile
- Stepped Bored Pile
- Underpinned Drive Pile
- Expandable Bored Pile
- Airport Over the Sea

LECTURES, TALKS & PAPERS

Over 60 lectures and papers were presented to engineering & business communities and students in high school and undergraduates in the higher learning institution. Also submitted a number of policy papers related to science and technology fields to social, economic and statutory bodies.

ABSTRACT

Cultivating the students' interest on STI while young

Hong Lee Pee
President, The ASEAN Academy of Engineering and Technology (AAET)
hlp@edasu.com

It is important to cultivate the students' interest and develop their capability and capacity on Sciences Technology and Innovation (STI) during their younger days.

The talk will highlight or deliberate on some of Hong's works over the past years for promoting the importance of STI to the young population in Malaysia and subsequently in other ASEAN countries.

The works include the development of Story-telling Method for cultivating an innovation culture, annual STI competition, sciences and engineering professions' lecture for and interaction with students, and Kuala Lumpur Engineering Sciences Fair (KLESF) for increasing the young students interest in STEM.

Keywords : ASEAN, Malaysia, Science, Technology, Engineering, Mathematics, education, innovation

Cultivating the students' interest on STI while young

By
Datuk Engr. Hong Lee Pee
CEng, FIEM, FICE, Senior FAAET, Hon FAFEO
President of ASEAN Academy of Engineering & Technology (AAET)

12June 2014

Cultivating the students' interest on STI while young

- In the past few decades, the research in the fields of psychology, cognitive science, neuroscience, anthropology and economics have all agreed on a same finding:
- i.e. the **early experience of children** will have strong influence on their cognitive capability, social emotional competence, health, brain structure and neurotransmitters.
- It is important to cultivate the students' interest and develop their capability and capacity on Sciences Technology and Innovation (STI) during their younger days

Cultivating the students' interest on STI while young

Works for promoting the importance of STI to the young population

- Story Telling Method
- Annual STI Competition for Secondary School Students
- SET professions' Talks & Interaction with students
- Annual Kuala Lumpur Engineering Science Fair (KLESF) & Mentorship program

Cultivating the students' interest on STI while young

Story Telling Method

- **Children love stories.**
- In 2007, while heading the STI Committee of the Associated Chinese Chambers of Commerce Malaysia (ACCCIM), **I developed a method** to invoke children's or young one's interest, awareness, and curiosity towards STI.
- This is **by telling stories** on discoveries, inventions, innovation and creativity to children.

Classic story & inventions of common Items

Cultivating the students' interest on STI while young

Story Telling Method

- To help the student understanding the various attributes to the **success in innovation** and **value of STI** at a young age;
- To prepare the children for the **exciting future world which thrives on creativity & innovation.**
- I had compiled **125 short stories** on innovation, inventions & discoveries ,and published a book in 2008 **for secondary students**.
- Had distributed to many secondary schools in Malaysia

Cultivating the students' interest on STI while young

Story Telling Method

- Under AAET, selected **38 stories** out of 125 **for primary students**, and rewritten them in simpler language.
- The **moral of every story** is highlighted at the end; to reinforce the reader's learning on the various attributes for success in innovation.
- **Example**: *Airplane inventors, the Wright Brothers - the moral is their persistency and courage in facing failures.*
- *If someone fails 10 times and intended to abort, by remembering Wright Brothers' story, it may prompt him to continue and may succeed on the 11 attempts.*

Cultivating the students' interest on STI while young

Story Telling Method

- The 38 stories were published in a new book in English on Nov 2010.
- Translated into Khmer and Myanmar languages and widely adopted by the primary school teachers in these two countries.

- Promoting the story telling method to other ASEAN countries

Cultivating the students' interest on STI while young

Annual STI Competition for Students

- Inaugural STI Competition in 2007 under the ACCCIM
- Objective: inculcating the spirit of innovation and creativity in high school students.
- Entry can be by individual student or a team of not more than three students
- The entry project shall be designed and developed with innovation/ creativity/research components.

Launching of the Inaugural STI Competition in 2007

Cultivating the students' interest on STI while young

Annual STI Competition for Students

- The project can be conducted in the following categories:
  - Life Sciences (Biology, Botany, Food Science, etc)
  - Physical Sciences (Physics, Chemistry, Astronomy, etc)
  - Medicine and Health Sciences
  - Earth and Environmental Sciences
  - Engineering and Technology
  - Computer Science and Information Technology
  - Mathematical Sciences
  - Behavioral and Social Sciences
  - Interdisciplinary Sciences
- Recently decided, the excellent projects will be sponsored for participating in the renowned Annual Intel Engineering Science Fair
- In the 2014 STI Competition, a total of 195 teams had submitted their projects

Cultivating the students' interest on STI while young

Annual STI Competition for Students

Award Giving Ceremony of past STI Competitions

Entry of 2014 Competition: Sleep Inducing Pillow

Entry of 2014 Competition: Easy Fan Mop

Entry of 2014 Competition: Rainproof Um-bag

Cultivating the students' interest on STI while young

Talks and Interaction with students

- Initiated by me while heading the ACCCIM STI Committee
- To arrange prominent scientists, engineers & technopreneurs visiting the high schools:
  - to deliver talks ; and
  - to interact with the students
- Objective:
  - to promote the awareness of the importance of STI
  - to inculcate an innovation culture among the young generation
  - as Role Model to stimulate students' interest in STI professions & career.

Cultivating the students' interest on STI while young

Talks and Interaction with students

SET professions' Talks

Interaction with students


An innovation talk inspiring one's life
Chu Jenn Weng
Siaw Kok Tong
VITROX Corporation Bhd.
Both are ex-IIPM. Founded VCD in 1998. Turn public in 2004. Today Market Cap is RM 150 million. Business: machine vision and automation. (met Chu on 18-03-2013)
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PATENTED TECHNOLOGIES
ViTrox have filed 6 patented technologies under the Intellectual Property of Malaysia
PI20093216
Inspection system for plurality of Depth of View
Product that uses this patent:
Vs5SPP-Dual
PI20095353
Front Light for 3D SMD Semiconductor Inspection
Product that uses this patent:
Vs3DJLi
PI20093217
Inspection system for plurality of depth of view with no module conversion
Product that uses this patent:
Vs5SPP-NC
PI20090612
Vision Inspection Illumination Apparatus for Electronic Components
Product that uses this patent:
VsML, VsMLOP, VsIPML
PI2010003652 (MALAYSIA)
Vision Illumination Apparatus for Semi Translucent Device
201110208070.2 (CHINA)
Vision Illumination Apparatus for Semi Translucent Device
Product that uses this patent:
VsMP / VsMOP / VsIPMP (for ODFN units)
ViTrox Technologies ©

An innovation talk inspiring one's life

Dear Prof. Lee,

Datuk Hong's talk at Chung Hwa High School is one of the talk that I will never forget as it planted a seed into my heart that I will need to study hard so that one day I can be as successful as him as an engineer & entrepreneur.
It's my great honour to be mentioned in Datuk Hong's talk in future.

Dear Datuk Hong,

My sincere appreciation to you for inspiring my life and lead me to what I am today .Thanks & best regards,

CHU Jenn Weng 朱振榮
21-03-2013

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Cultivating the students' interest on STI while young

Kuala Lumpur Engineering Science Fair (KLESF)

Background and Rationale

- There is increasing concern in Malaysia as well as worldwide about the declining interest among children in sciences subject in schools.
- It is less than 37% of Malaysian high school students are taking science subjects.
- According to the report of PISA 2012, Malaysia ranked poorly among the 65 countries or economies surveyed for the mathematics, science and reading literacies. We are below the average score of OECD countries and even behind Vietnam and Thailand. (Korea ranked 5th)

Cultivating the students' interest on STI while young

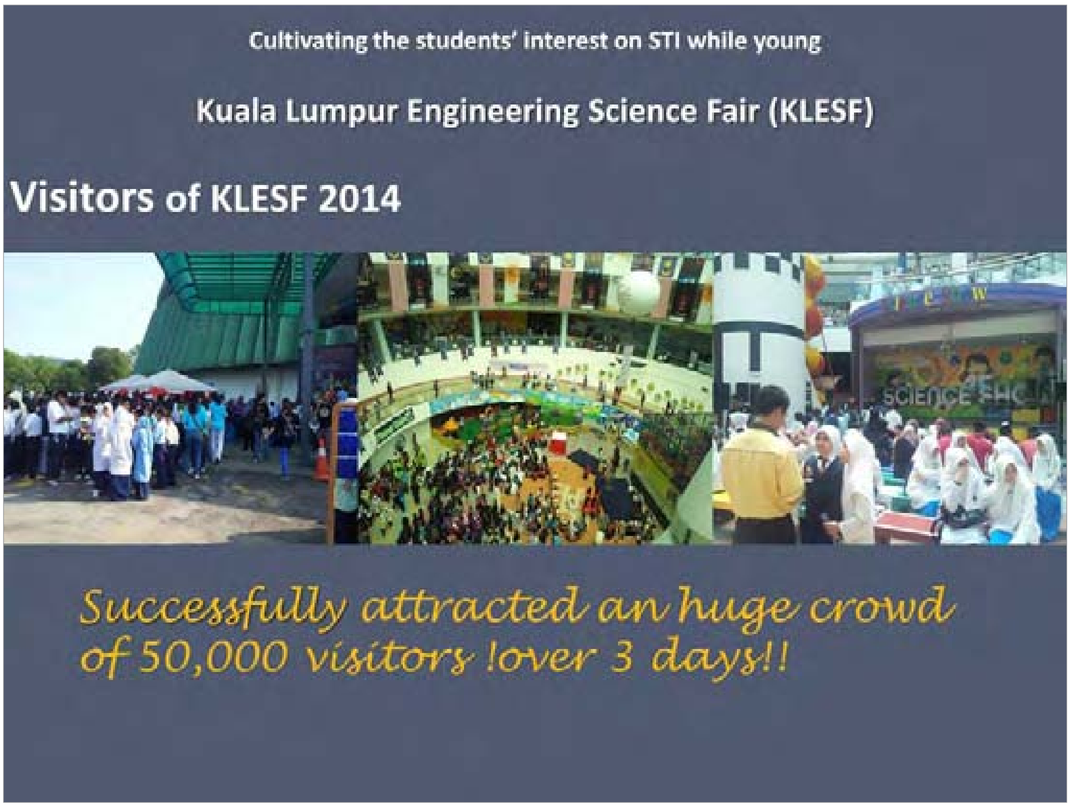
Kuala Lumpur Engineering Science Fair (KLESF)

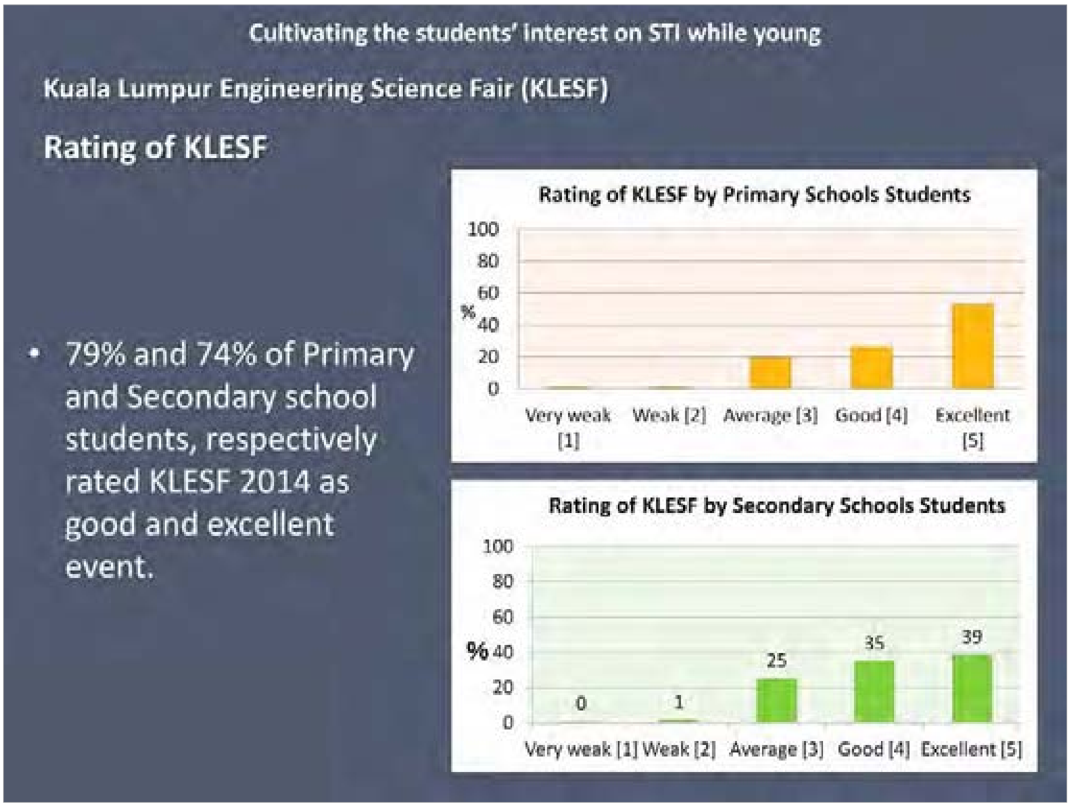
- The Inaugural KLESF (KLESF 2014) held on 25-27 April at National Science Centre (NSC), Kuala Lumpur is the first of a series of annual programs aimed to promote interest in STEM among upper primary and lower secondary school students, and
- encourage them to pursue future careers in STEM fields.
- Organized by:
  - AAET, UTAR, MIGHT, IEM, NSC
- Supported by:
  - MOE, MOSTI, ASM, ACCCIM, NCP

National Science Centre, KL


Cultivating the students' interest on STI while young
Kuala Lumpur Engineering Science Fair (KLESF)
Officiating Ceremony inaugurated by the Minister of Education II Malaysia


Cultivating the students' interest on STI while young
Kuala Lumpur Engineering Science Fair (KLESF)
Six Components of KLESF 2014
School Engineering & Science Design Mentorship Programme
Science Hands-on Demos and Experiments
Mathematics and Mental Literacy Activities
School STEM projects exhibition
Industry Science, Technology & Engineering Exhibition
Posters and Videos Exhibition on STEM

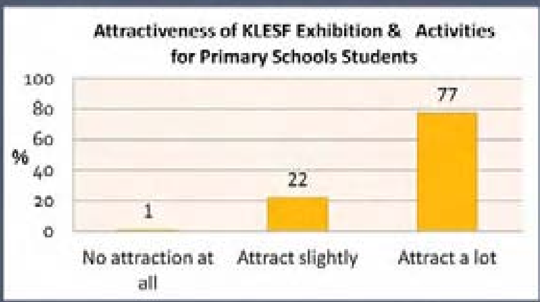

Cultivating the students' interest on STI while young
Kuala Lumpur Engineering Science Fair (KLESF)
Visitors of KLESF 2014
Successfully attracted an huge crowd of 50,000 visitors !over 3 days!!

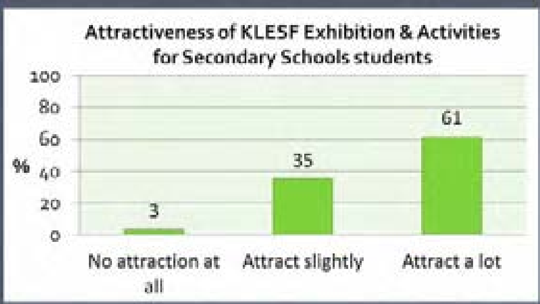

Cultivating the students' interest on STI while young
Kuala Lumpur Engineering Science Fair (KLESF)
Rating of KLESF
• 79% and 74% of Primary and Secondary school students, respectively rated KLESF 2014 as good and excellent event.
Rating of KLESF by Primary Schools Students
100
80
60
%
40
20
0
Very weak [1]
Weak [2]
Average [3]
Good [4]
Excellent [5]
Rating of KLESF by Secondary Schools Students
100
80
60
%
40
20
0
0
1
25
35
39
Very weak [1]
Weak [2]
Average [3]
Good [4]
Excellent [5]

Cultivating the students' interest on STI while young

Kuala Lumpur Engineering Science Fair (KLESF)

Attractiveness of KLESF





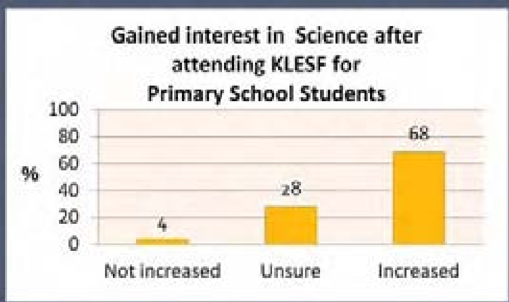
- In general, students felt that the exhibition & activities in KLESF were attractive.
- Primary students (77%) had greater fun at the fair than secondary students (61%).
- Only less than 3% of the students felt that the fair is not attractive.

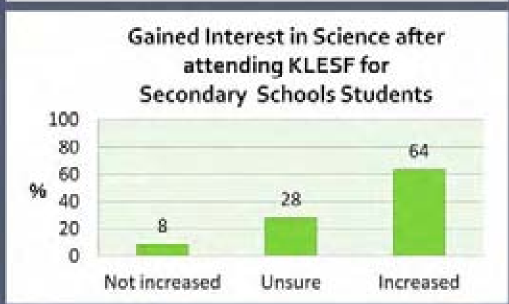
Cultivating the students' interest on STI while young

Kuala Lumpur Engineering Science Fair (KLESF)

Effectiveness of KLESF in Promoting Students' Interest in STEM

- KLESF has successfully achieved its objective to promote interest in STEM among Primary and Secondary school students.
- **68%** and **64%** of the Primary and Secondary school students, respectively, stated that their interest in STEM increased after visiting KLESF2014.





Cultivating the students' interest on STI while young

Kuala Lumpur Engineering Science Fair (KLESF)

Survey on Secondary Students' interest on STEM

Subject	Interested	Unsure	Not Interested
Sciences	68.2%	19.1%	12.7%
Mathematics	59.7%	20.8%	19.5%
Technology	39.8%	34.8%	25.4%
Engineering	30.1%	39.0%	30.9%

- Students are more interested with sciences and mathematics than technology and engineering.
- This shows the students' lack of awareness and wrong perception on technology and engineering.
- More efforts are required to promote the students' awareness and interest on technology and engineering fields

Cultivating the students' interest on STI while young

Kuala Lumpur Engineering Science Fair (KLESF)

Future Plans of KLESF

- To extend the School Engineering and Science Design Mentorship Programme to more schools nationwide
- To organize workshops for STEM Educators
- To open Engineering and Science Design Hobby Club & Café @ National Science Centre and other sites
- To launch Mobile KLESF
- To establish international links with STEM activities of other countries, particularly ASEAN state members.
- To replicate the successful model of KLESF in other ASEAN countries.

SESSION 1

Roberta A.G. D'Alessandro

International officer, The Young Academy of the Royal Netherlands Academy of Arts and Science (KNAW)
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EDUCATION

2004	Ph. D., Linguistics, Stuttgart University, Germany
2000	Laurea (MA) in Foreign Languages and Linguistics, University of L'Aquila, Italy
1997 - 2003	Visiting student at Helsinki, Cornell, Girona, Siena, Utrecht

MAJOR ACTIVITIES

2007 - Present	Full professor and Chair of Italian Language and Culture, Leiden University, The Netherlands
2007 - Present	Director of the BA program in Italian Language and Culture
2014 - Present	Member of the Global Young Academy
2013 - Present	Board member of the Young Academy of the Netherlands, KNAW (International officer)
2013 - Present	Chair of the Leiden University Centre for Linguistics (LUCL) Institute Council
2013 - Present	Member of AcademiaNet, network of excellent women researchers [Robert Bosch Stiftung, Spektrum, Nature].
2012 - Present	Board member, GLOW (European Linguistics Association)
2011 - Present	Member of the Young Academy of Science, KNAW
2010 - Present	Principal Investigator of the project on Splitting and Clustering Grammatical Information
2006 - Present	Fellow of the Philological Society of Great Britain
2007 - Present	Marie Curie Fellow
2007 - Present	Darwin college alumna, University of Cambridge
2007	Research Associate, Université du Québec à Montréal
2005 - 2007	Marie Curie Post-Doctoral Research Fellow, University of Cambridge, Darwin College
2004 - 2005	Research assistant, Butler-Hill/ Microsoft, Redmond, USA

Ed tor/Author of 6 vo umes (two of wh ch for Cambr dge Un vers ty Press). Ma n author of 13 top A-journa art c es and 30 book chapters/art c es. 32 Keynote addresses/ nv ted ectures and 42 peer-rev ewed, se ected paper presentat ons at nternat ona conferences.
Rev ewer for 8 A-journa s and for Mouton de Gruyter, Cambr dge Un vers ty Press, Oxford Un vers ty Press, and B ackwe ; externa eva uator for RCHSS Government of re and, Sw ss Nat ona Sc ence Foundat on, Un vers ty of Ven ce, Endangered Languages Documentat on Programme, SOAS, London.

ABSTRACT

Mundus and Kennis op Straat: two successful models of communicating science

Roberta D'Alessandro
International officer, The Young Academy of the Royal Netherlands Academy of Arts and Science (KNAW)
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One of the main goals of the Young Academy of the Netherlands is to communicate science at all levels to the general public. This presentation will illustrate two very successful programs from recent years: Mundus, for science communication to school children, and Kennis op Straat (Knowledge on the street), for the general public.

Mundus is a fun educational game with the purpose of helping pupils familiarize themselves with scientific research. 'Science' in Mundus refers not only to the natural sciences, but also to the humanities and the social sciences. The game shows pupils that science is not about 'knowing a lot', but rather about curiosity, creativity and logical thinking. It is the story of three scientists who discover a new planet, Mundus, and get to know its inhabitants, the Mundians. The pupils' task is to figure out this planet, by trying to answer all sorts of questions through investigating pictures, texts and other sources: they go on a class expedition. An introductory video with English subtitles can be found here: http://bit.ly/1gyl2vr.

Kennis op straat is a program which the Young Academy developed to put the general public in touch with science. Scientists of the Young Academy offer to give public lectures on several different subjects. These lectures are listed on a website which is easily accessible for everyone (only in Dutch, as the main target groups are people residing in the Netherlands: http://www.kennisopstraat.nl/). Associations, schools, festivals, everyone can invite a scientist to give a free lecture at their institution. To advertise this initiative, the Young Academy produced postcards with the line "Book a scientist!", which were distributed in public places in the Netherlands, including bars and discos.

ENGLISH TEXT

Mundus and Kennis op Straat: two successful models of communicating science

Roberta D'Alessandro
International officer, The Young Academy of the Royal Netherlands Academy of Arts and Science (KNAW)
r.dalessandro@hum.leidenuniv.nl

One of the main goals of the Young Academy of the Netherlands is to communicate science at all levels to the general public. This presentation will illustrate two very successful programs from recent years: Mundus, for science communication to school children, and Kennis op Straat (Knowledge on the street), for the general public.

MUNDUS

Mundus is a fun educational game with the purpose of helping pupils familiarize themselves with scientific research. The game is about a team of scientists specializing in different disciplines and sent into outer space. Their mission: to find a planet that is inhabitable for human beings. During the mission, the team comes across an unknown planet. There is intelligent life there, creatures who call the planet "Mundus".

Pupils are introduced to the game through this story:

PLANET IN SIGHT (introductory story)

Millions of kilometers from Earth, the spaceship Explora is speeding through the universe. It is quiet on board. The three passengers are asleep. Suddenly, a bell starts to ring in the control room. A text appears on one of the computer screens: 'planet_in_sight'.

Sara sits straight up in bed. 'Huh? What was that?' She looks through the porthole and sees that they are slowly but surely drawing near an unknown planet. 'Wow. I would like to take a look around there!' Sara cries. She wakes up the other two passengers.

'It's only 14 minutes past five!' Sophie grumbles. 'I am entitled to another 76 minutes of sleep.' But then she sees Sara standing at the porthole.

'Come look, it's beautiful!' says Sara. 'I see an ocean. And hills and a river. And all that green stuff – can those be plants?'

Sophie's eyes begin to shine. 'It is lovely, isn't it.' Finally, even Milan wakes up. When he looks through the porthole and sees the strange planet, his mouth falls open in amazement. 'It looks like there is life on that planet. Aliens…'

'Let's go there. We are going to land,' says Sara. The other two look at her in astonishment.

'But isn't that dangerous?' Sophie asks. 'I remember that a group of French astronauts disappeared in 2007 when they…'.

'Nonsense!' Sara replies. 'Have you forgotten that we are scientists? The purpose of our trip is to discover an unknown planet. So let's go explore!'

'Whatever we do, we better reduce speed now or we will be in real trouble,' says Milan.

They get to work straight away in the control room. Sophie carefully navigates the Explora closer to the new planet. They keep the spaceship suspended a safe distance above the surface of the planet. They get out their binoculars.

'Yes, there are plants growing there! And look, I see animals too. We have discovered alien life!' Milan says.

Sara grins at him. 'Hey, I see animals with a sort of shell. I'll call them shellbeasts for now. Have you two noticed those creatures there? Do you think they built all those houses?'

'Wait a minute,' Milan replies. 'What makes you so sure that they are houses? They could be very unusual trees. We need more information before we can say for sure, don't you think, Sophie?'

'You are right,' says Sophie. 'The Mayas in South America had all sorts of buildings that turned out to be temples, not houses. Let's take some notes so that we don't forget everything later on.'

Sophie takes her laptop and starts typing. 'There seem to be different species of animals here, and different varieties of plants.'

'They have paint too – have you noticed?' Milan points to one of the creatures, who is painting yellow shapes.

'Maybe there is iron in the soil,' says Sophie. 'We use that on Earth to make yellow paint.'

'OK, we are about to land!' says Sara, and grasps the spaceship's steering wheel. They land the Explora carefully in an open area. They have arrived. Sophie takes her laptop, a thermometer and a few other items and they go outside. Now that the engines have been switched off, it is suddenly eerily quiet.

But then they hear a chorus of voices crying 'Pi! Pi! Pi!' They see the creatures that they had spotted from the spaceship emerge from the woods from all different directions. The creatures make a sign with their fingers – a sort of triangle. Sara carefully raises both her hands into the air. Nothing happens. The creatures stop a short distance away. Then one of them steps forward and says to Sara 'Yanna Mundion. Apa lo bozo?'

From this moment on, the three scientists (which are represented by all the pupils) need to figure out this planet, by trying to answer all sorts of questions through investigating pictures, texts and other sources: they go on a class expedition.

The scientists explore the planet. What is the force of gravity there, and does the planet have seasons? Is the local wildlife dangerous? What is the language of the inhabitants like? And what do those yellow triangles mean? Expedition Mundus is an exciting game with cards with research questions for students to explore an unknown planet. They have to gather information, exchange data and publish results. In short: they have to work like a team of scientists.

'Science' in Mundus refers not only to the natural sciences, but also to the humanities and the social sciences. The game shows pupils that science is not about 'knowing a lot', but rather about curiosity, creativity and logical thinking. Mundus is played in class, at school, or in any case with a large group of students, and coordinated by one or more teachers. Hints and raw "data" are distributed in class, attached to walls, like in a large scale treasure hunt.

Mundus has different layers of meaning. It is a scientific expedition on Mundus; it is a game that can be played and won; it is educational material. One key aspect of the game is that many facts about Mundus, research questions, answers and sources are interdependent, thus not in a straight line from one question to one answer, to one fact to be found on one source. Rather, it is a network of heavily cross-linked information. We spent a lot of thought and work into making this information internally consistent. That makes Expedition Mundus the perfect starting point for inquiry-based learning.

Since its introduction in the Netherlands in 2011, the game has been enthusiastically received by pupils and teachers at all levels and it continues to be a classroom favorite in secondary education. In 2013, a new version of Expedition Mundus was published for primary education. The game is being distributed online and through the 'science nodes' at universities, which also organize workshops and other game-related activities. More than 1200 primary schools have received their copy and embarked on an expedition. The original version was intended for pupils aged 12 and up, but since 2013 Expedition Mundus is also available for pupils aged 8 to 12.

Mundus in since this spring available also in English (Mundus is in fact the English name: the Dutch name of the game is Moendoes). It is distributed freely upon requests to schools, but it can be purchased for large commercial distribution. Some guidelines have been developed for translating Mundus in other languages. An introductory video with English subtitles can be found here: http://bit.ly/1gyl2vr.

The team that has more points at the end of the game wins. When time (usually 1 hour) is up, this concluding story is read to the class:

MUNDIAN DRAWINGS (concluding story)

Sara, Sophie and Milan are standing at the door of the school talking to two Mundians. Inside, the class is having an arithmetic lesson. Sara swats away a ringfly that is buzzing around her head. One of the Mundians produces a large white climb-up berry and gives it to Milan.

'Pika lo,' whispers Sophie in his ear. 'That means thank you.'

'Pika lo!' Milan says out loud.

'Apa steppe kapuki maya?'

'What does that mean, Sophie?' asks Sara. 'You speak Mundian better than we do.'

'He says that he wants to take us to the big maze. You know, that big structure at the edge of the village. How exciting!'

They walk between the houses. Some of them have a garden where they see spiceherb plants growing. The Mundians are hard at work in their gardens, but they give the three scientists a friendly wave as they pass by. Once they have left the village, the huge old structure finally comes in view.

'Kapuki maya!'

They enter the maze, with Sara and the Mundians in the lead. They walk through a warren of corridors, turning left, right, right again, left, and right again until they are completely turned around. At each turn, it gets darker and colder, and they realise that they must be very deep into the maze by now. Finally, they enter a huge, dark hall.

Sara, Sophie and Milan look breathlessly at the walls. They are covered from top to bottom in drawings.

Look,' says Milan, 'they are drawings of Mundians and shellbeasts...'

'Here is a drawing of a whole Mundian village!' says Sara. 'Look at this – the houses look very different than the ones we've been seeing. And the village looks much bigger!'

'Slip dok dok,' says one of the Mundians softly, and points to the drawings.

'That was in earlier times. They call it the very good era,' Sophie explains. 'It was before the volcano erupted.'

The drawings show all sorts of things: Mundians hunting shellbeasts, and Mundians playing music and dancing. All of the Mundians in the drawings are wearing brightly coloured clothes.

'Look at this,' says Milan. 'There's another animal in this drawing and it is much bigger than a shellbeast. It must be the animal whose skeleton we found during the excavation.'

'The kalif maya,' Sophie adds.

'Gee,' says Milan, 'look at the lovely dark purple coat it had. And those heavy, hairy paws...'

Suddenly they hear a loud rumbling, creaking and squeaking. When they turn round, they see Sara several paces away with her arm plunged into a hole in the wall.

'What have you done?' Sophie cries. 'Are you stuck?'

'No, I'm fine,' Sara calls back. 'There's a handle in this hole! Watch this!' Slowly, part of the wall slides sideways. A bit of grit falls, but it then grows quiet. A dark corridor has appeared behind the wall. There are thin strands hanging down from the ceiling that resemble cobwebs. They walk into the corridor, which ends at the top of a long spiral staircase. They see a faint light shining far down below.

'Pi!' the Mundians say in fear.

Sara, Sophie and Milan look at one another.

'Come on,' says Sara, 'let's go explore.' And she descends the first step of the spiral staircase.

KENNIS OP STRAAT

Kennis op straat is a program which the Young Academy developed to put the general public in touch with science. Scientists of the Young Academy offer to give public lectures on several different subjects. These lectures are listed on a website which is easily accessible for everyone (only in Dutch, as the main target groups are people residing in the Netherlands: http://www.kennisopstraat.nl/). The website offers a list of possible speakers and topics from which those who are interested can select some. They get in touch directly with the scientists, that agree on a date/time for their talk.

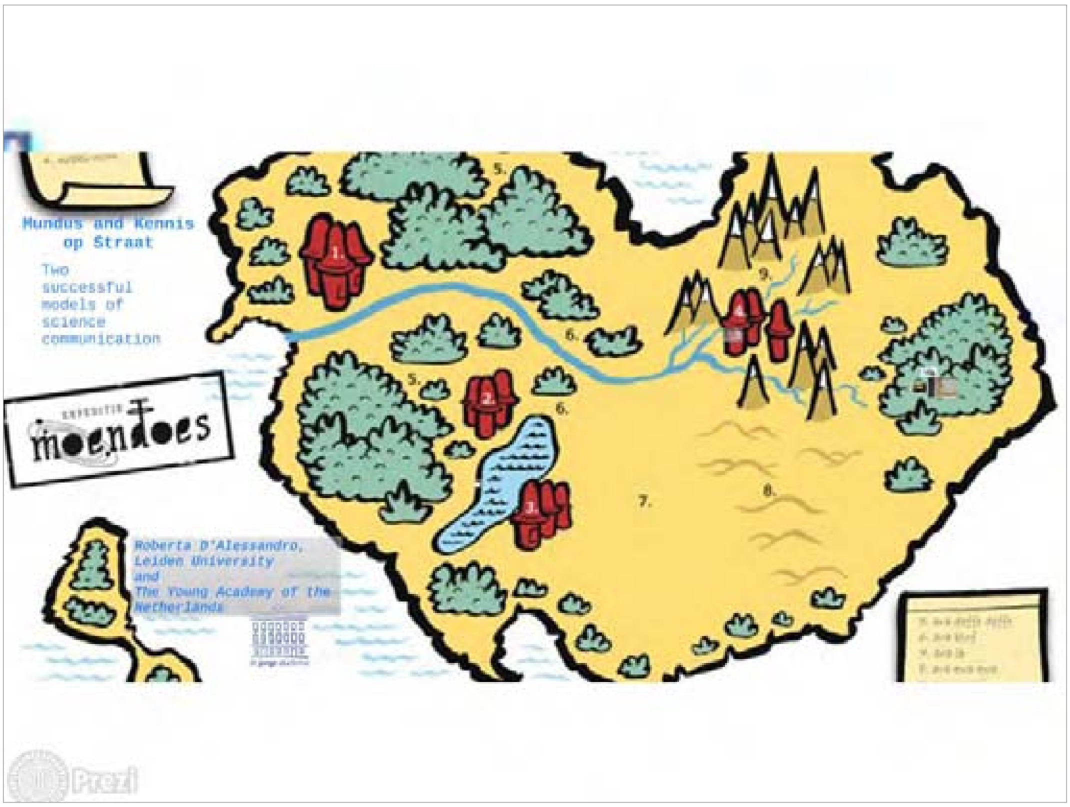
Associations, schools, festivals, everyone can invite a scientist to give a free lecture at their institution. Business companies and commercial organizations are instead charged for a lecture.

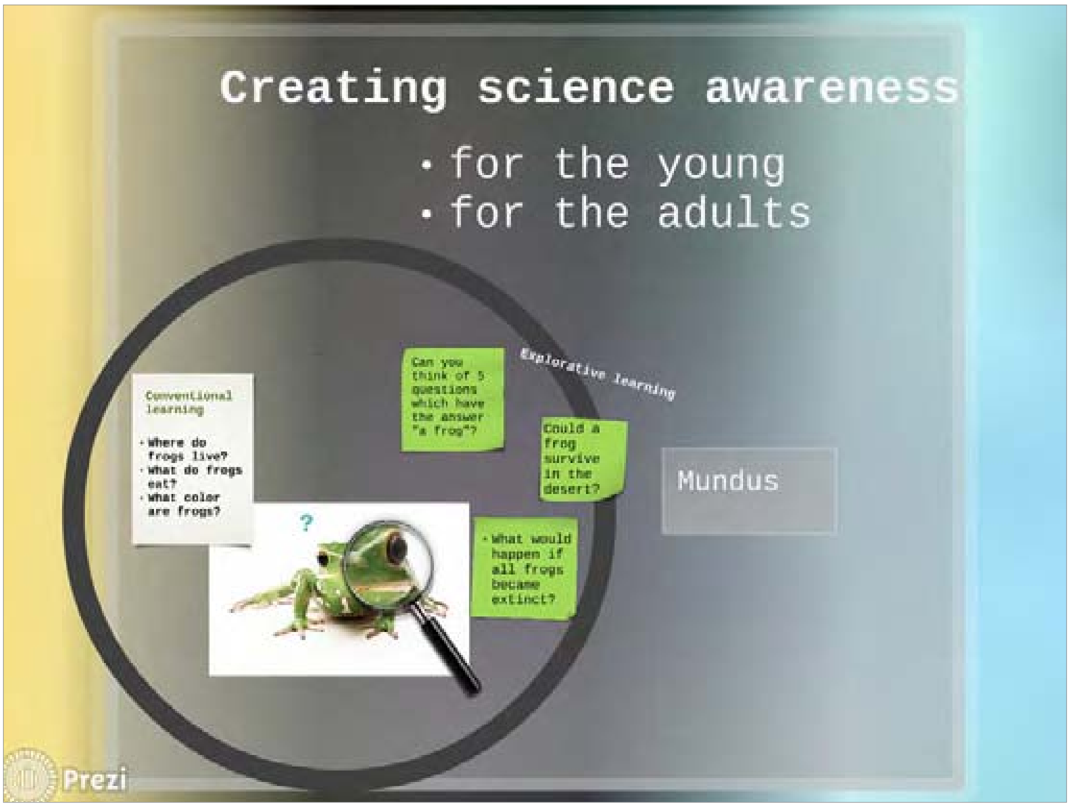
Kennis op straat:

- Offers lectures in any place in the Netherlands, at any time of the day
- Is aimed at creating scientific curiosity
- It shows how scientific research works, and it illustrates scientific results in simple words
- Explains and presents cutting edge results

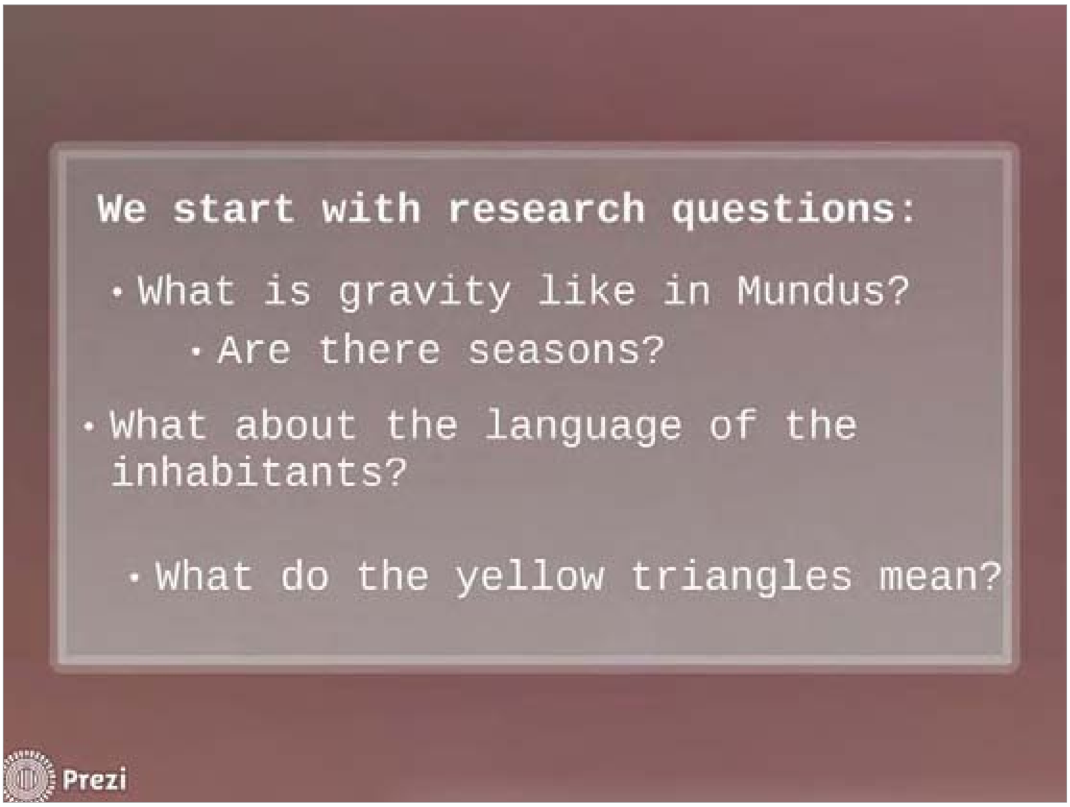
Members of the Young Academy are appointed for 5 years, and need to be top researchers. In addition, they have a dedication to science popularization. They are, in other words, very good speakers and presenters, which makes the Kennis op Straat initiative very successful. Their lectures are in Dutch or in English.

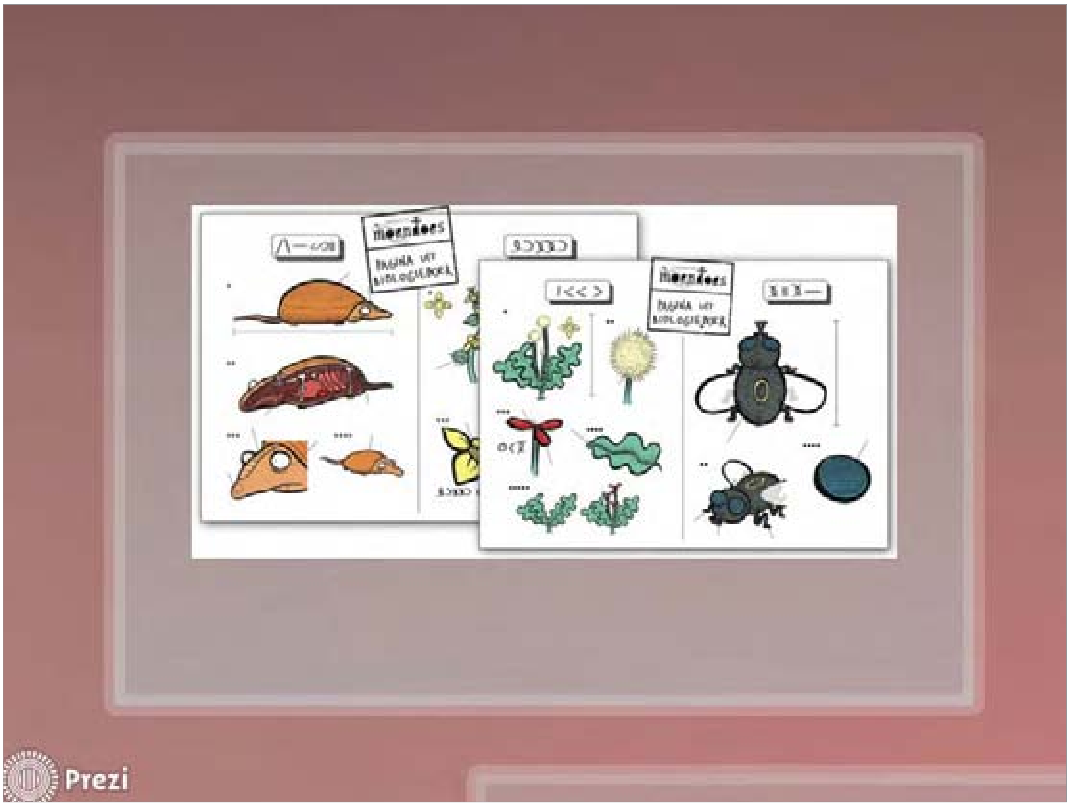
To advertise this initiative, the Young Academy produced postcards with the line "Book a scientist!", which were distributed in public places in the Netherlands, including bars and discos. The program is ongoing, and to date about 100 lectures have been given.

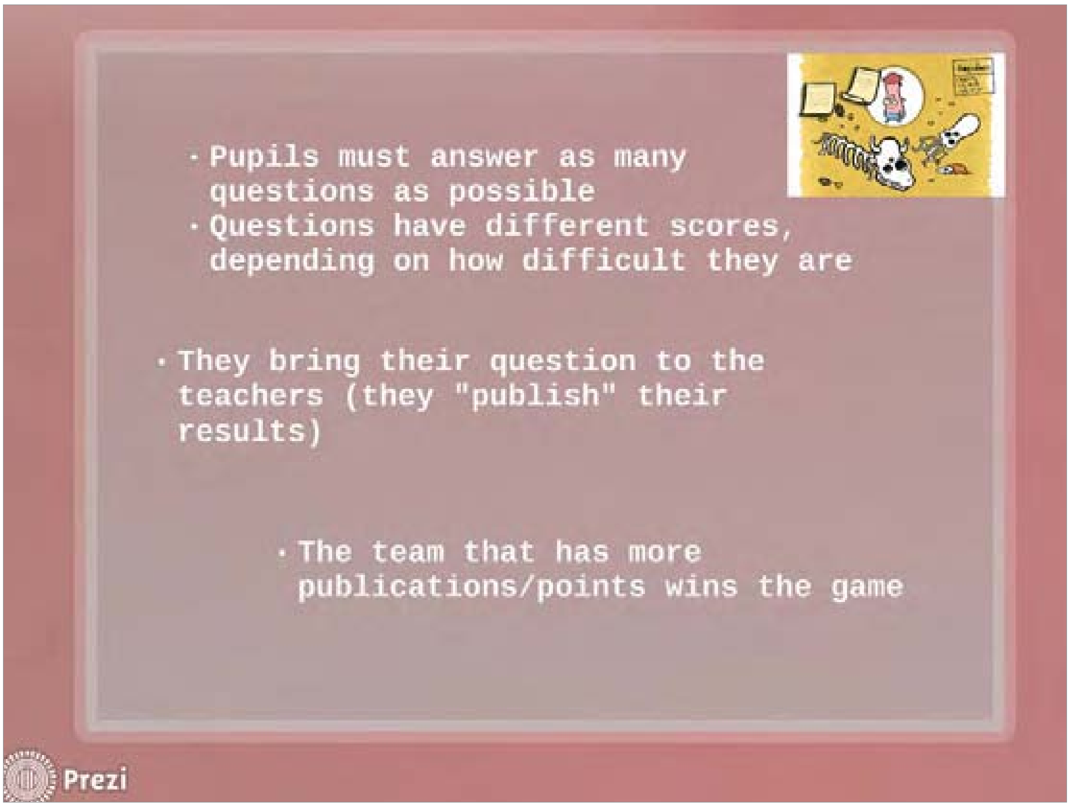

Mundus and Kennis op Straat
Two successful models of science communication
EXPEDITIE moendoes
Roberta D'Alessandro, Leiden University and The Young Academy of the Netherlands
Prezi

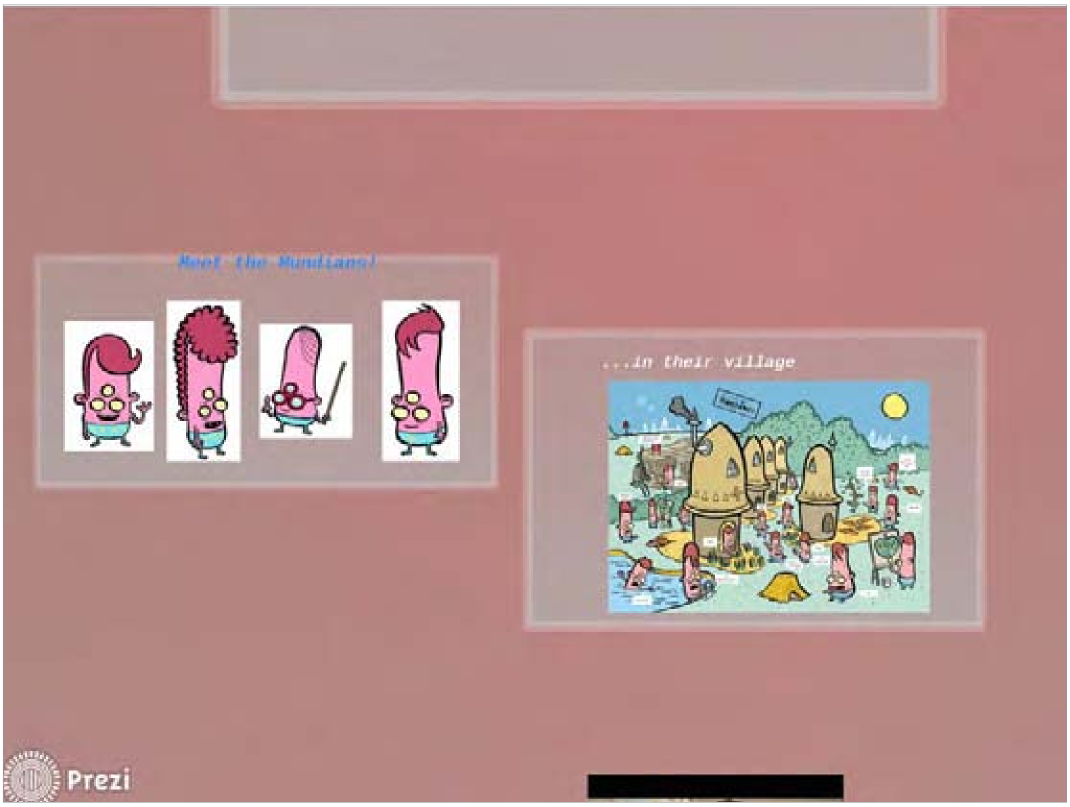

Creating science awareness
• for the young
• for the adults
Conventional learning
• Where do frogs live?
• What do frogs eat?
• What color are frogs?
Can you think of 5 questions which have the answer "a frog"?
Explorative learning
Could a frog survive in the desert?
• What would happen if all frogs became extinct?
Mundus
Prezi


1.Nature?
2. Language?
3. Culture?
Prezi


We start with research questions:
• What is gravity like in Mundus?
• Are there seasons?
• What about the language of the inhabitants?
• What do the yellow triangles mean?
Prezi




• Pupils must answer as many questions as possible
• Questions have different scores, depending on how difficult they are
• They bring their question to the teachers (they "publish" their results)
• The team that has more publications/points wins the game
Prezi

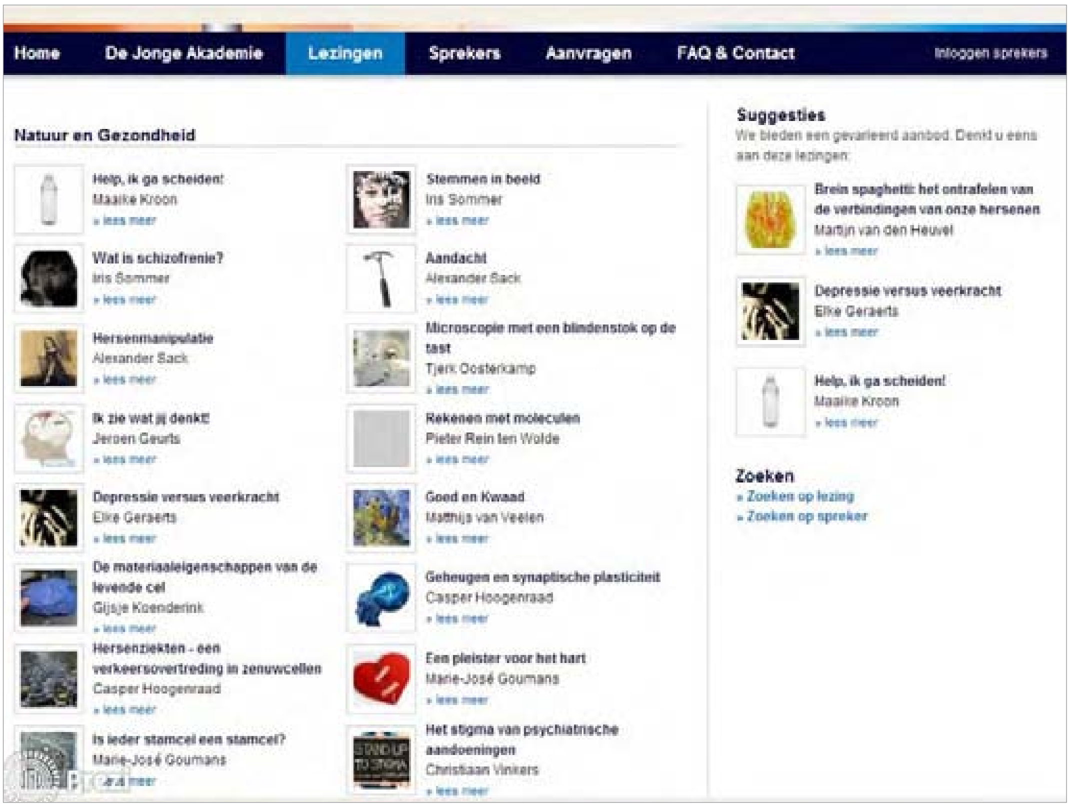

Meet the Mundians!
...in their village
Prezi

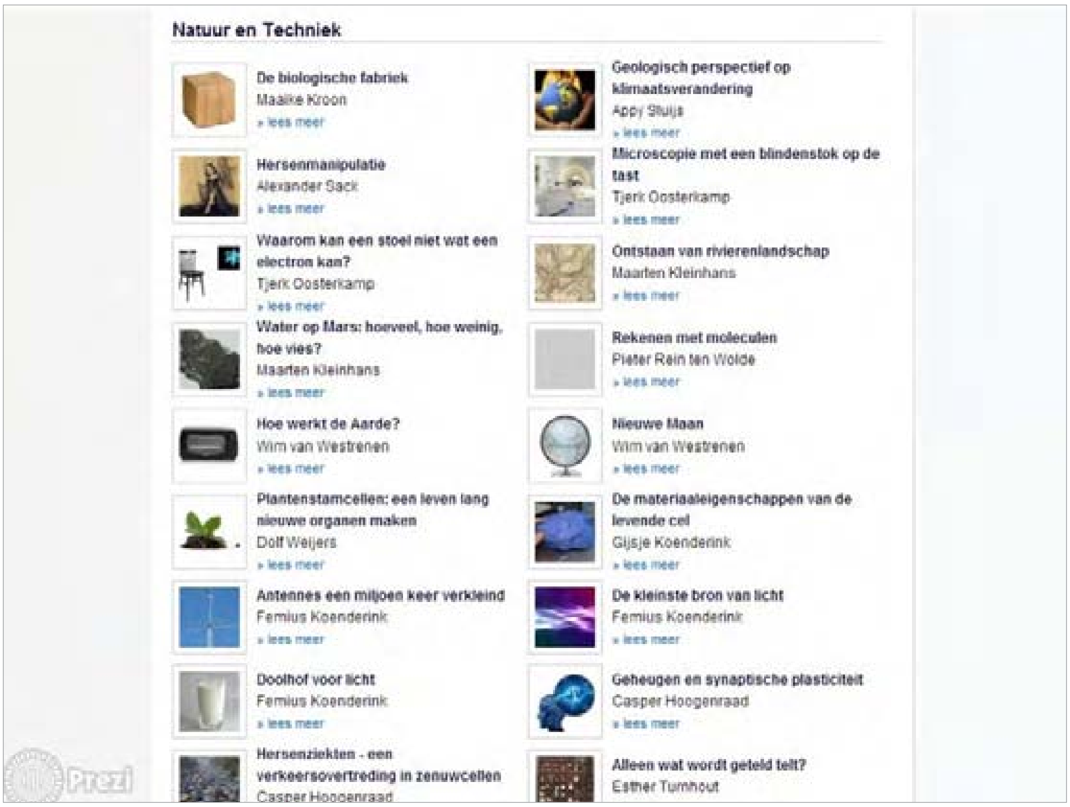

They find inhabitants on this planet.
ntelligent beings who call the planet Moondus.
YouTube
Prezi

SESSION 1

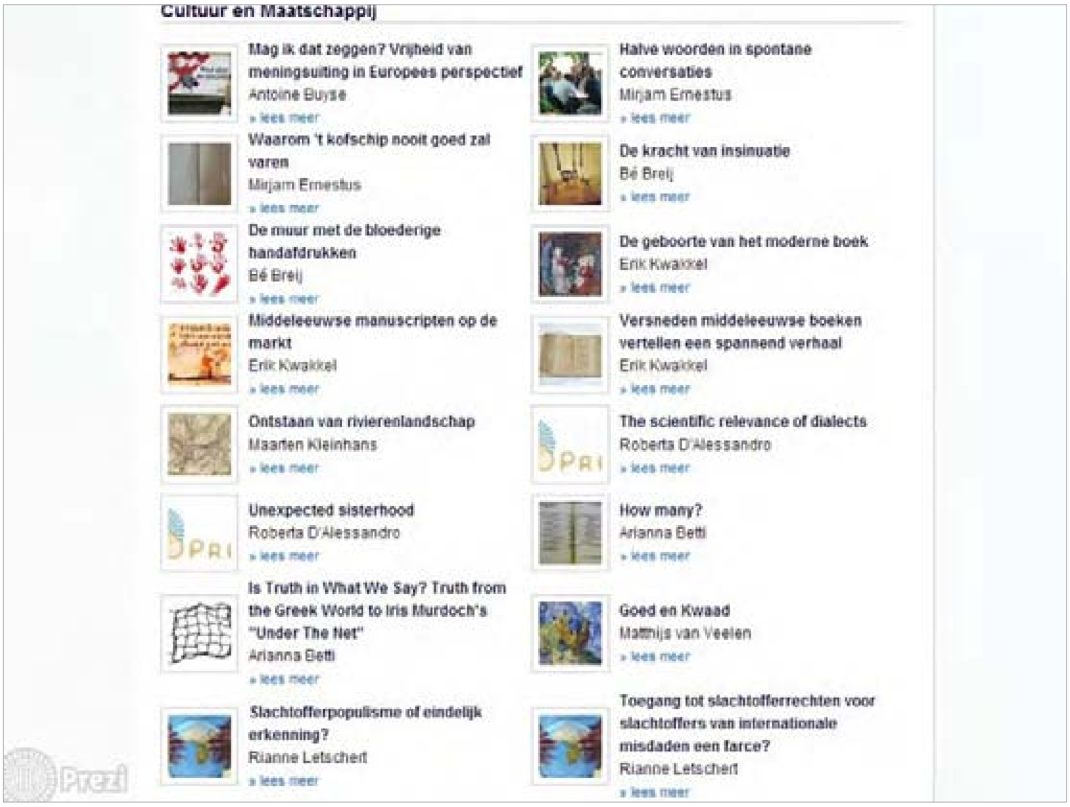

de jonge
akademie
on wheels
Prezi


Kennis op Straat
Publiekslezingen van enthousiaste wetenschappers
Home
De Jonge Akademie
Lezingen
Sprekers
Aanvragen
FAQ & Contact
Inloggen sprekers
De verwondering tastbaar gemaakt
Altijd al willen weten wat er onder de huid van schilderijen schuil gaat? En hoe je zeewater slim zou kunnen ontzilten om het drinkbaar te maken? Of wat beschadigde oude manuscripten ons kunnen vertellen over het leven in de Middeleeuwen? Er is nu een laagdrempelige manier om meer te weten te komen over deze en vele andere wetenschappelijke vragen: Kennis op Straat. Dit initiatief van De Jonge Akademie, een groep jonge en enthousiaste wetenschappers uit allerlei vakgebieden, verzorgt korte publiekslezingen die niet alleen een inhoudelijk thema willen overbrengen maar ook de onderzoekende houding die aan wetenschap eigen is: de verwondering tastbaar maken.
Kennis op straat:
biedt lezingen aan op locatie voor een inspirerende ochtend, middag of avond
wil een groot publiek nieuwsgierig maken
laat zien hoe wetenschap werkt en hoe kennis wordt verworven
zet de ramen open en deelt de nieuwste inzichten
biedt voor elk wat wils: van dode taal tot levende hersenen, van nanodeeltje tot supernova
De sprekers van 'Kennis op straat' zijn enthousiast en spreken met passie. Ze zijn expert op hun vakgebied, maar kijken ook over de grenzen van hun vak heen. Ze spreken op een toegankelijke manier, gaan graag in gesprek en staan open voor kritische vragen. Lezingen zijn mogelijk in het Nederlands en Engels. Klik hier voor een korte impressie.
Ga met ons op ontdekkingsreis door al het boeiende dat de wetenschap te bieden heeft en boek een lezing!
Suggesties
We bieden een gevarieerd aanbod. Denkt u eens aan deze lezingen.
Eten met je neus?
Sanne Boesveldt
» lees meer
Veiligheid is een keuze
Renée Frissen
» lees meer
Wat is astrobiologie?
Inge Loes ten Kate
» lees meer
Zoeken
» Zoeken op lezin
» Zoeken op spre
Prezi


Home
De Jonge Akademie
Lezingen
Sprekers
Aanvragen
FAQ & Contact
Inloggen sprekers
Natuur en Gezondheid
Help, ik ga scheiden!
Maaike Kroon
» lees meer
Stemmen in beeld
Iris Sommer
» lees meer
Wat is schizofrenie?
Iris Sommer
» lees meer
Aandacht
Alexander Sack
» lees meer
Hersenmanipulatie
Alexander Sack
» lees meer
Microscopie met een blindenstok op de tast
Tjerk Oosterkamp
» lees meer
Ik zie wat jij denkt!
Jeroen Geurts
» lees meer
Rekenen met moleculen
Pieter Rein ten Wolde
» lees meer
Depressie versus veerkracht
Elke Geraerts
» lees meer
Goed en Kwaad
Matthijs van Veelen
» lees meer
De materiaaleigenschappen van de levende cel
Gijsje Koenderink
» lees meer
Geheugen en synaptische plasticiteit
Casper Hoogenraad
» lees meer
Hersenziekten - een verkeersovertreding in zenuwcellen
Casper Hoogenraad
» lees meer
Een pleister voor het hart
Marie-José Goumans
» lees meer
Is ieder stamcel een stamcel?
Marie-José Goumans
» lees meer
Het stigma van psychiatrische aandoeningen
Christiaan Vinkers
» lees meer
Suggesties
We bieden een gevarieerd aanbod. Denkt u eens aan deze lezingen:
Brein spaghetti: het ontrafelen van de verbindingen van onze hersenen
Martijn van den Heuvel
» lees meer
Depressie versus veerkracht
Elke Geraerts
» lees meer
Help, ik ga scheiden!
Maaike Kroon
» lees meer
Zoeken
» Zoeken op lezing
» Zoeken op spreker


Natuur en Techniek
De biologische fabriek
Maaike Kroon
» lees meer
Geologisch perspectief op klimaatsverandering
Appy Sluijs
» lees meer
Hersenmanipulatie
Alexander Sack
» lees meer
Microscopie met een blindenstok op de tast
Tjerk Oosterkamp
» lees meer
Waarom kan een stoel niet wat een electron kan?
Tjerk Oosterkamp
» lees meer
Ontstaan van rivierenlandschap
Maarten Kleinhans
» lees meer
Water op Mars: hoeveel, hoe weinig, hoe vies?
Maarten Kleinhans
» lees meer
Rekenen met moleculen
Pieter Rein ten Wolde
» lees meer
Hoe werkt de Aarde?
Wim van Westrenen
» lees meer
Nieuwe Maan
Wim van Westrenen
» lees meer
Plantenstamcellen: een leven lang nieuwe organen maken
Dolf Weijers
» lees meer
De materiaaleigenschappen van de levende cel
Gijsje Koenderink
» lees meer
Antennes een miljoen keer verkleind
Femius Koenderink
» lees meer
De kleinste bron van licht
Femius Koenderink
» lees meer
Doolhof voor licht
Femius Koenderink
» lees meer
Geheugen en synaptische plasticiteit
Casper Hoogenraad
» lees meer
Hersenziekten - een verkeersovertreding in zenuwcellen
Casper Hoogenraad
Alleen wat wordt geteld telt?
Esther Turnhout
Prezi

SESSION 1



Cultuur en Maatschappij
Mag ik dat zeggen? Vrijheid van meningsuiting in Europees perspectief
Antoine Buyse
» lees meer
Halve woorden in spontane conversaties
Mirjam Ernestus
» lees meer
Waarom 't kofschip nooit goed zal varen
Mirjam Ernestus
» lees meer
De kracht van insinuatie
Bé Breij
» lees meer
De muur met de bloederige handafdrukken
Bé Breij
» lees meer
De geboorte van het moderne boek
Erik Kwakkel
» lees meer
Middeleeuwse manuscripten op de markt
Erik Kwakkel
» lees meer
Versneden middeleeuwse boeken vertellen een spannend verhaal
Erik Kwakkel
» lees meer
Ontstaan van rivierenlandschap
Maarten Kleinhans
» lees meer
The scientific relevance of dialects
Roberta D'Alessandro
» lees meer
Unexpected sisterhood
Roberta D'Alessandro
» lees meer
How many?
Arianna Betti
» lees meer
Is Truth in What We Say? Truth from the Greek World to Iris Murdoch's "Under The Net"
Arianna Betti
» lees meer
Goed en Kwaad
Matthijs van Veelen
» lees meer
Slachtofferpopulisme of eindelijk erkenning?
Rianne Letschert
» lees meer
Toegang tot slachtofferrechten voor slachtoffers van internationale misdaden een farce?
Rianne Letschert
» lees meer
Prezi

Bestel een wetenschapper m/v
www.kennisopstraat.nl
Prezi


Thank you!
de jonge akademie
감사합니다
Prezi

Zhi Min ZHANG

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EDUCATION

2007	Ph. D., Graduate School of Chinese Academy of Social Science
2003	M.S., Inner Mongolia Normal University, China
1996	B.S., Inner Mongolia Normal University, China

MAJOR ACTIVITIES

2013 - Present	Researcher Assistant, China Research Institute for Science Popularization
	* The second author of book Introduction to Science Communication Event (In Chinese)

ABSTRACT

University Science Camp for Youth: Bridging Universities and Informal Science Education to Youth

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This presentation consists of 3 parts; cultivating future scientists national widely through University Science Camp for Youth, high quality science education resources of universities opening up to middle school students, the impact of University Science Camp for Youth.

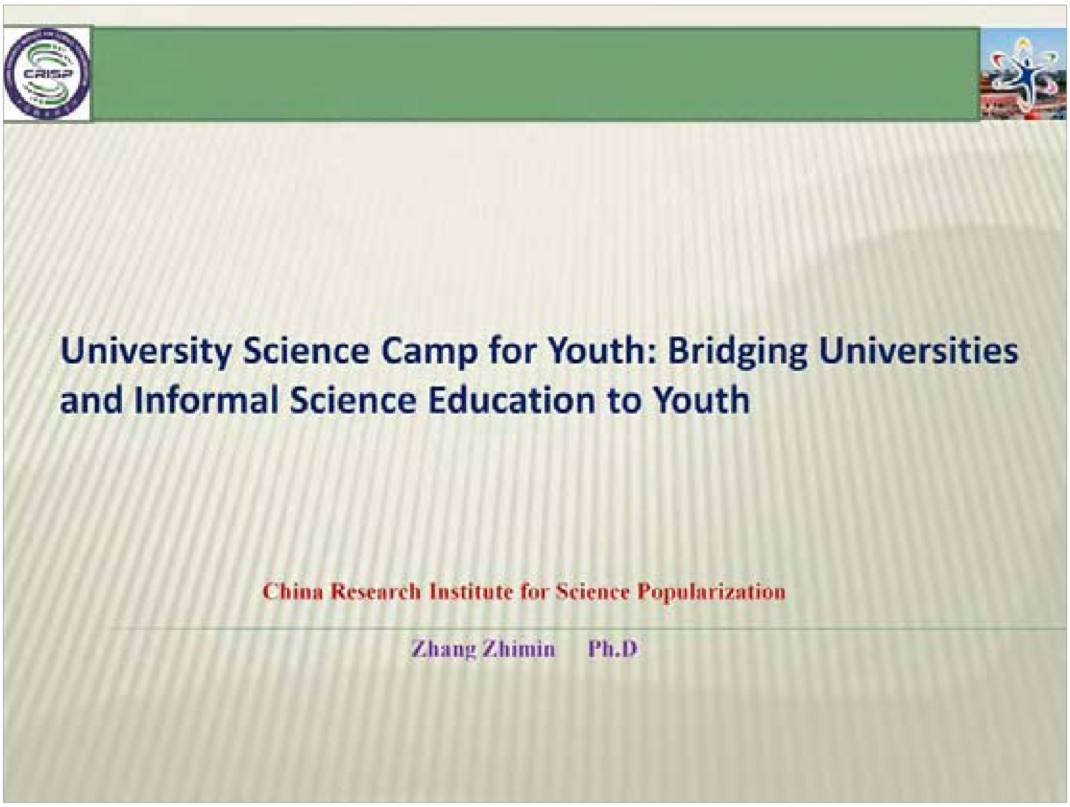
In the first part, the background and mission of University Science Camp for Youth are introduced in the context of scientific literacy building of nowadays China. Also, the current situation of how universities and institutes engaging in informal science education are described by some statistic.

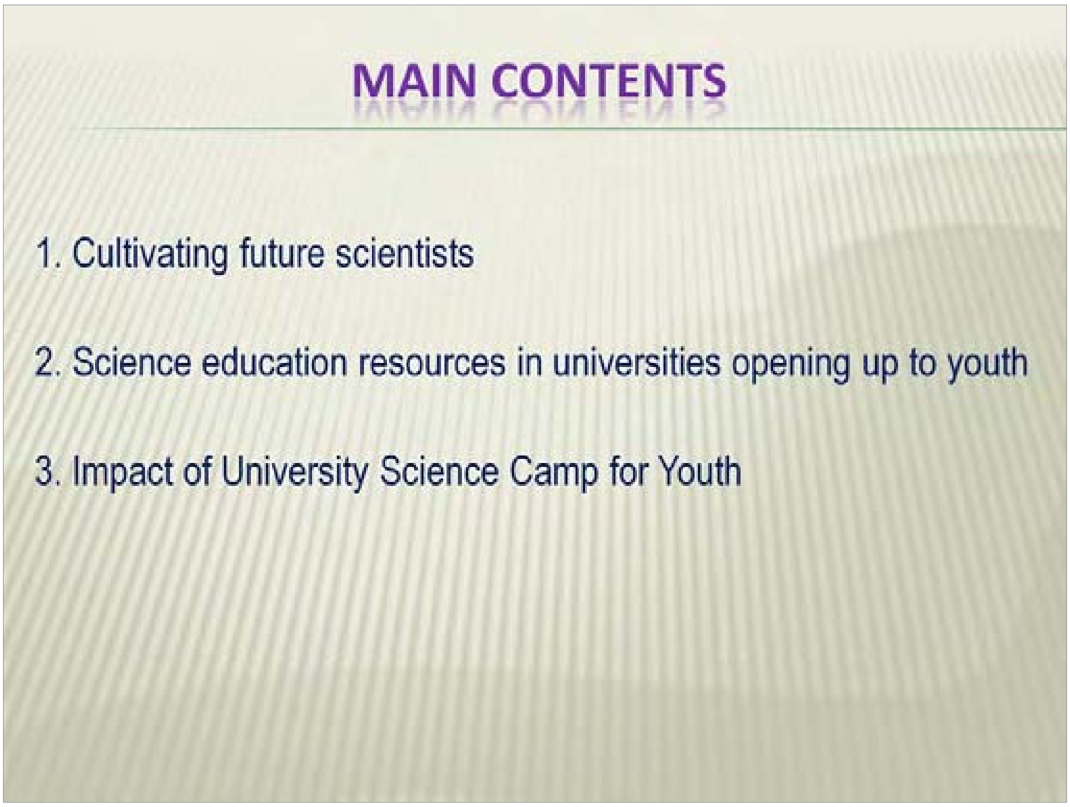
The second part elaborates how University Science Camp for Youth is implemented by universities, research institutes and enterprises jointly. The model of funding, choosing qualified University Science Camp candidates, organizing science camps, designing science education activities is described in detail.

The third part presents data from an independent evaluation of 2013 University Science Camp for Youth explaining how this project put on impact on middle schools students' scientific literacy and universities as well. Some suggestions for science camp achieving effective science education are provided, such as theme science camps are more effective than non-theme science camps to cultivate students' interest to science and science career, 150 students is a maximum of a science camp to ensure an effective science learning, a reasonable schedule is crucial for the educational effects and so on.

Keywords : Science Camp, Informal science education, Youth, Evaluation, Scientific Literacy

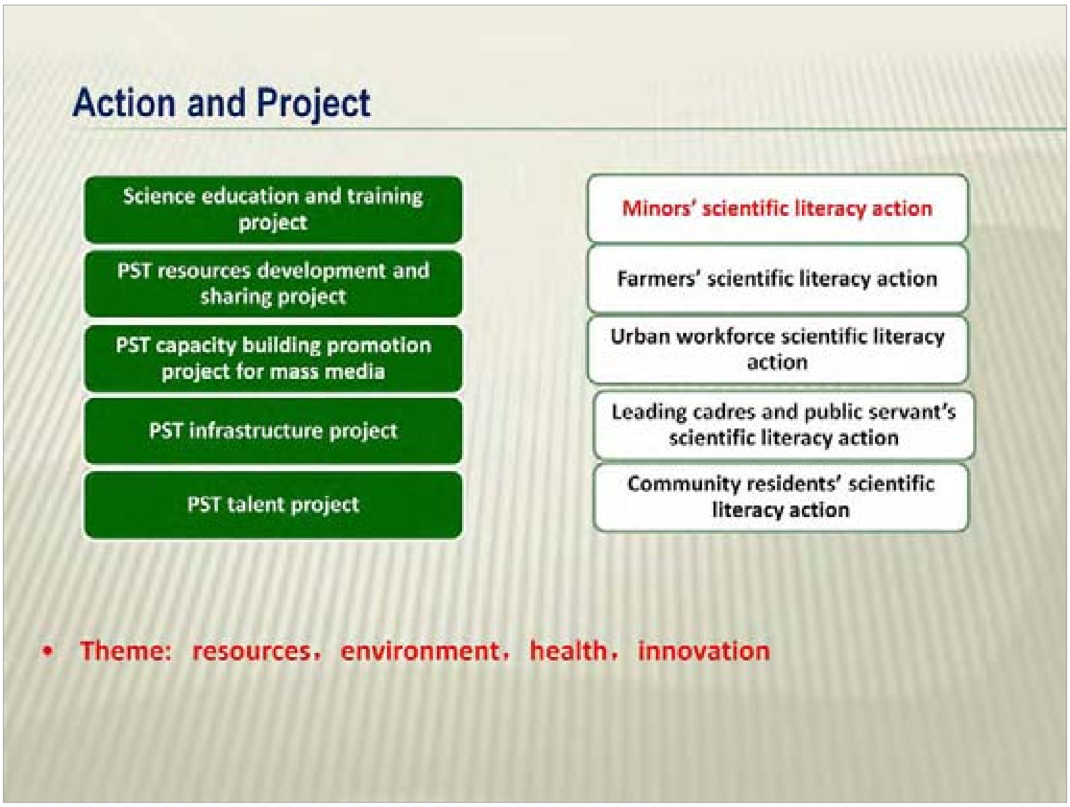
SESSION 1

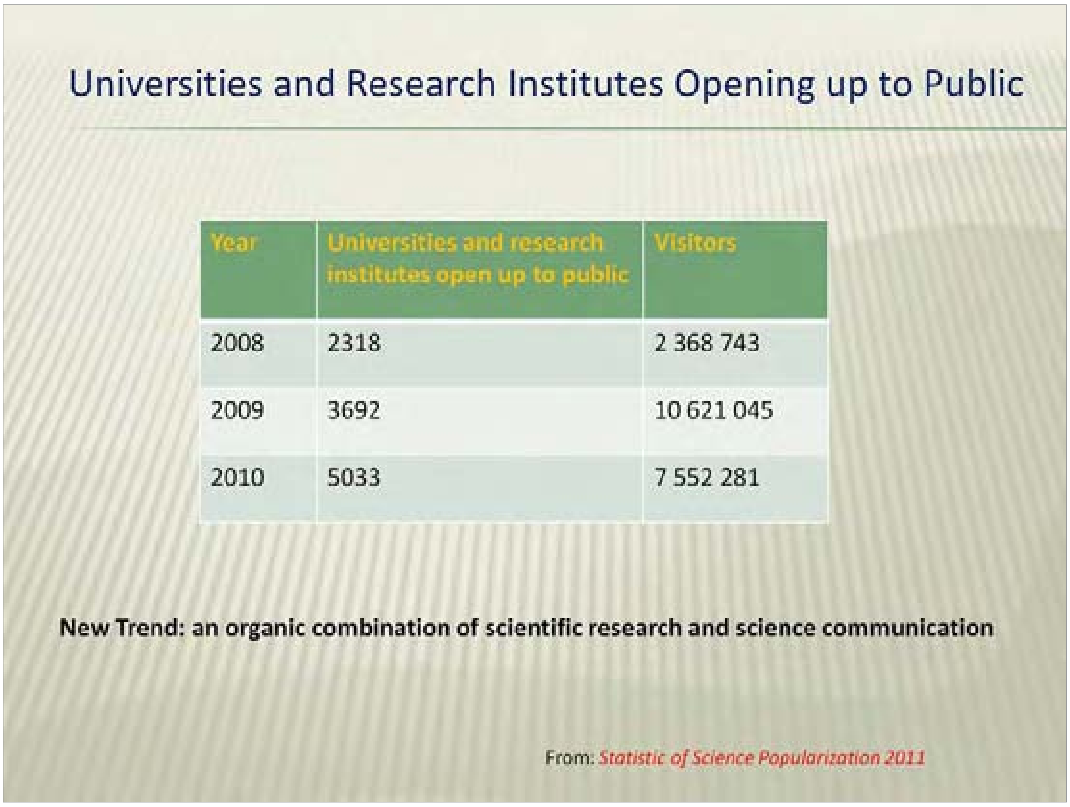

CRISP
University Science Camp for Youth: Bridging Universities and Informal Science Education to Youth
China Research Institute for Science Popularization
Zhang Zhimin Ph.D


MAIN CONTENTS
1. Cultivating future scientists
2. Science education resources in universities opening up to youth
3. Impact of University Science Camp for Youth


Part 1
Cultivating Future Scientists

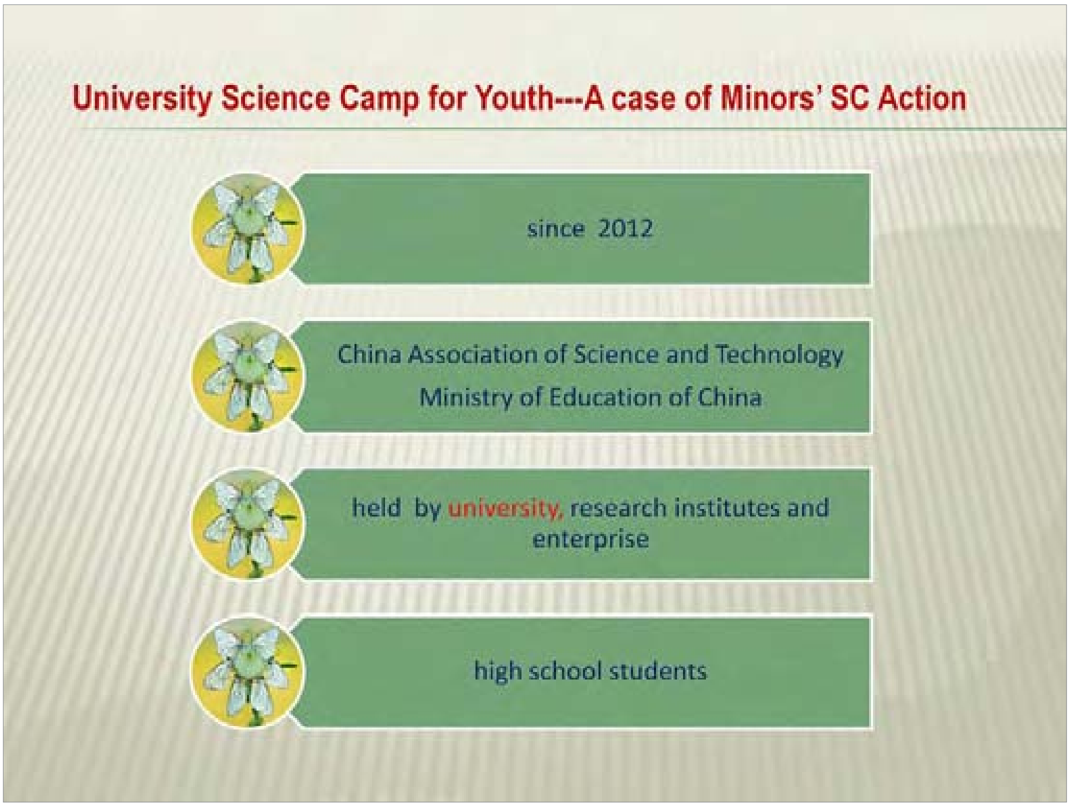

National Background: Building Citizen' s Scientific Literacy
2006, National Congress,
Outline of National Scheme of Scientific Literacy
Improve the scientific literacy of the citizen
By 2010,1980s level of major developed countries
By 2020,early 21 cuntury'slevel of major developed countries

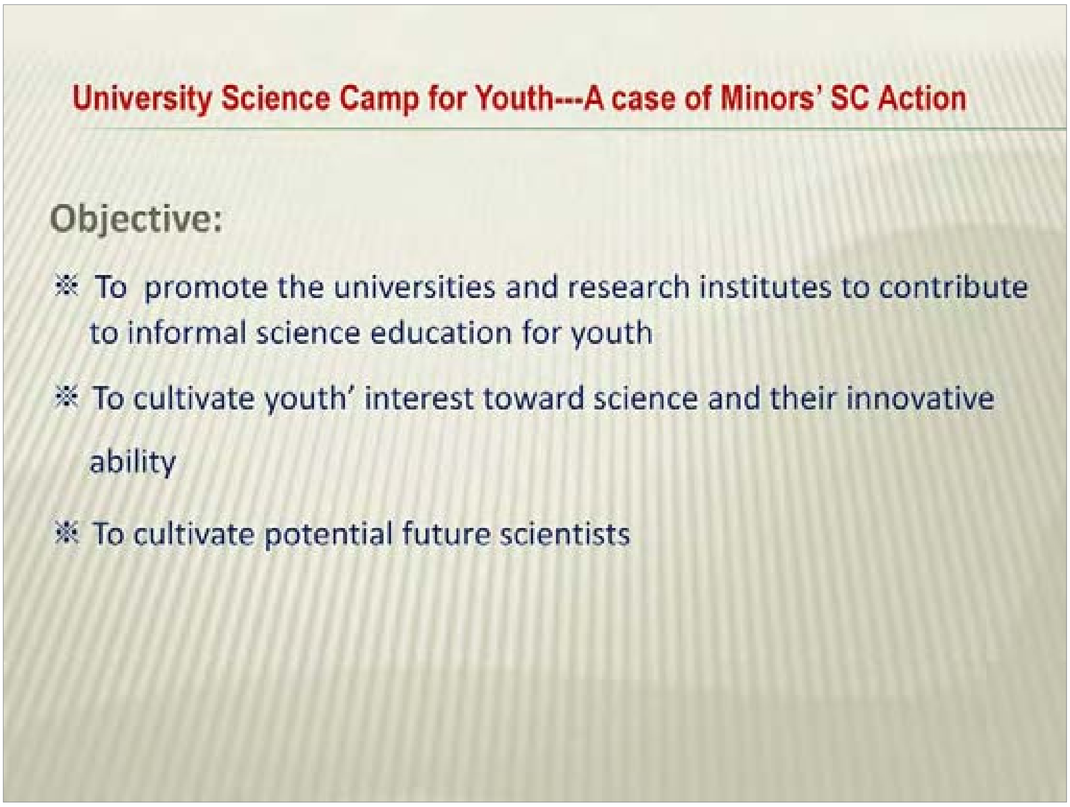

Action and Project
Science education and training project
PST resources development and sharing project
PST capacity building promotion project for mass media
PST infrastructure project
PST talent project
Minors' scientific literacy action
Farmers' scientific literacy action
Urban workforce scientific literacy action
Leading cadres and public servant's scientific literacy action
Community residents' scientific literacy action
• Theme: resources, environment, health, innovation


Universities and Research Institutes Opening up to Public

Year	Universities and research institutes open up to public	Visitors
2008	2318	2 368 743
2009	3692	10 621 045
2010	5033	7 552 281

New Trend: an organic combination of scientific research and science communication
From: *Statistic of Science Popularization 2011*


University Science Camp for Youth---A case of Minors' SC Action
since 2012
China Association of Science and Technology
Ministry of Education of China
held by university, research institutes and enterprise
high school students


University Science Camp for Youth---A case of Minors' SC Action
Objective:
※ To promote the universities and research institutes to contribute to informal science education for youth
※ To cultivate youth' interest toward science and their innovative ability
※ To cultivate potential future scientists

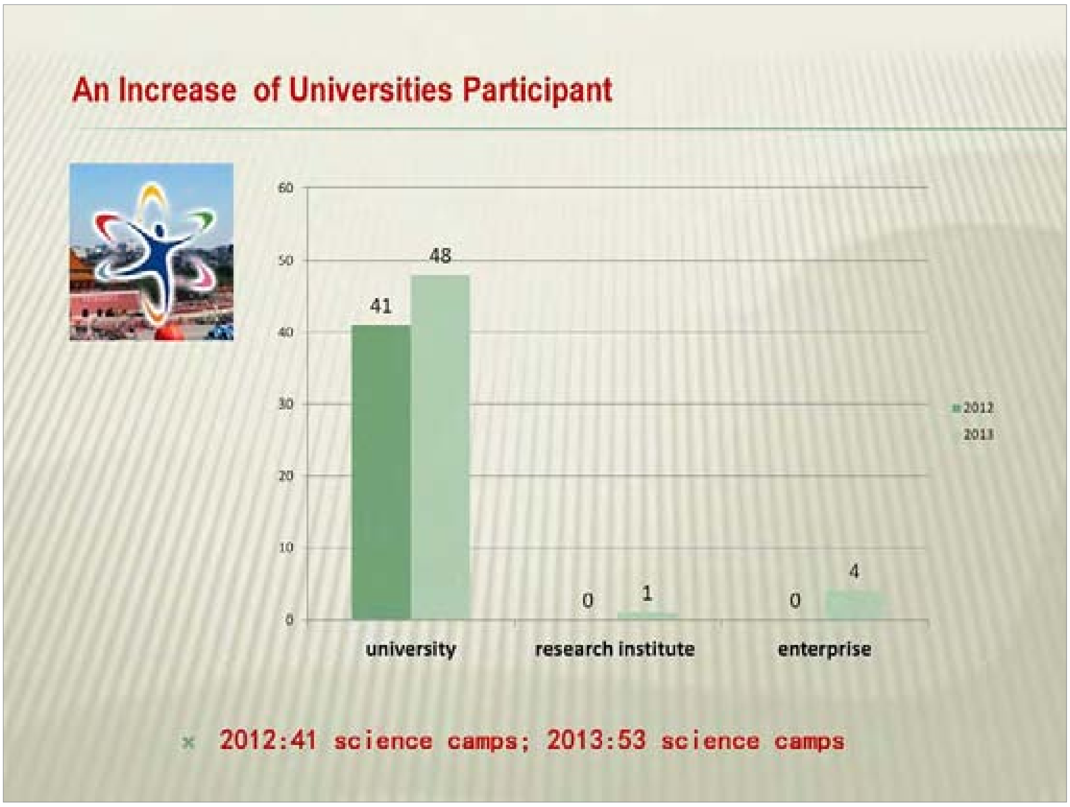
Part 2

Universities' Resources and Their Opening up to Youth

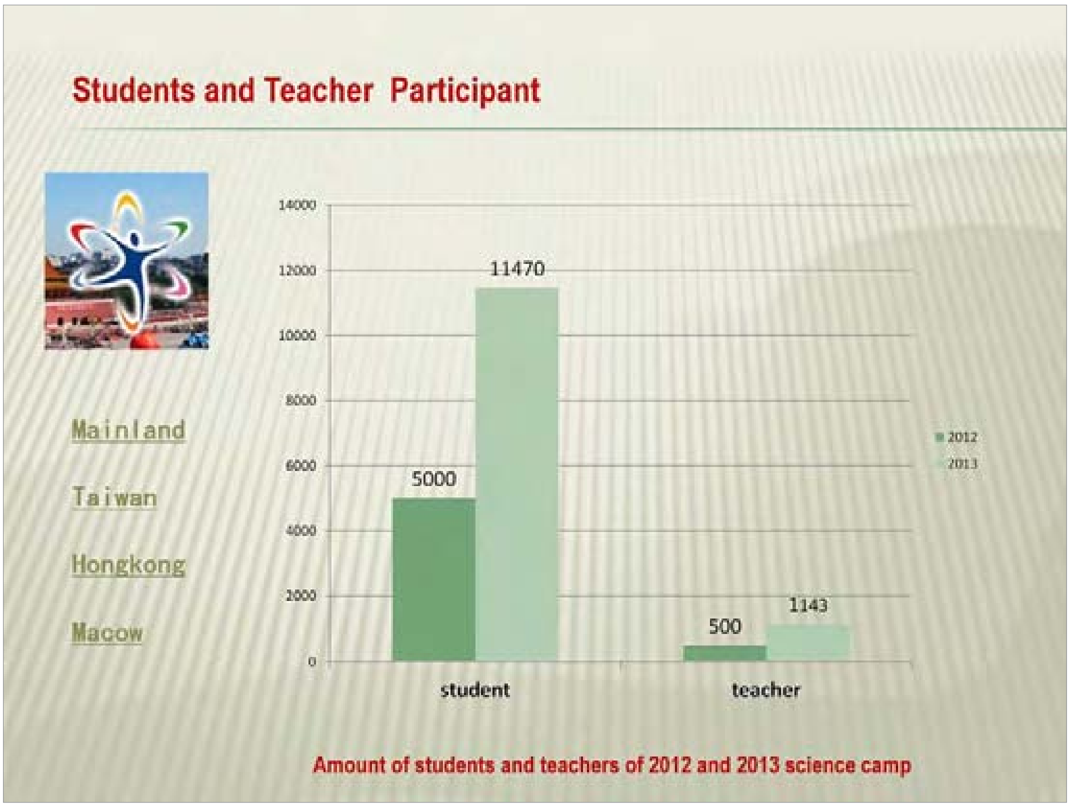
What kind of science communication resources does a university have ?

- Human resource: teachers, scientists, graduate students……
- Infrastructure: laboratory, equipments……
- Knowledge: frontier


48 universities of 2013 Science Camp


An Increase of Universities Participant
60
50
40
30
20
10
0
41
48
0
1
0
4
university
research institute
enterprise
2012
2013
2012:41 science camps; 2013:53 science camps

SESSION 1


Students and Teacher Participant
Mainland
Taiwan
Hongkong
Macow
14000
12000
10000
8000
6000
4000
2000
0
11470
5000
500
1143
student
teacher
2012
2013
Amount of students and teachers of 2012 and 2013 science camp


The universities open up to students in the form of ……
Lecture


The universities open up to students in the form of ......
hands-on activities


The universities open up to students in the form of ......
experiment

SESSION 1

The universities open up to students in the form of ......

visiting Laborotary

The universities open up to students in the form of ......

outreach, party, and

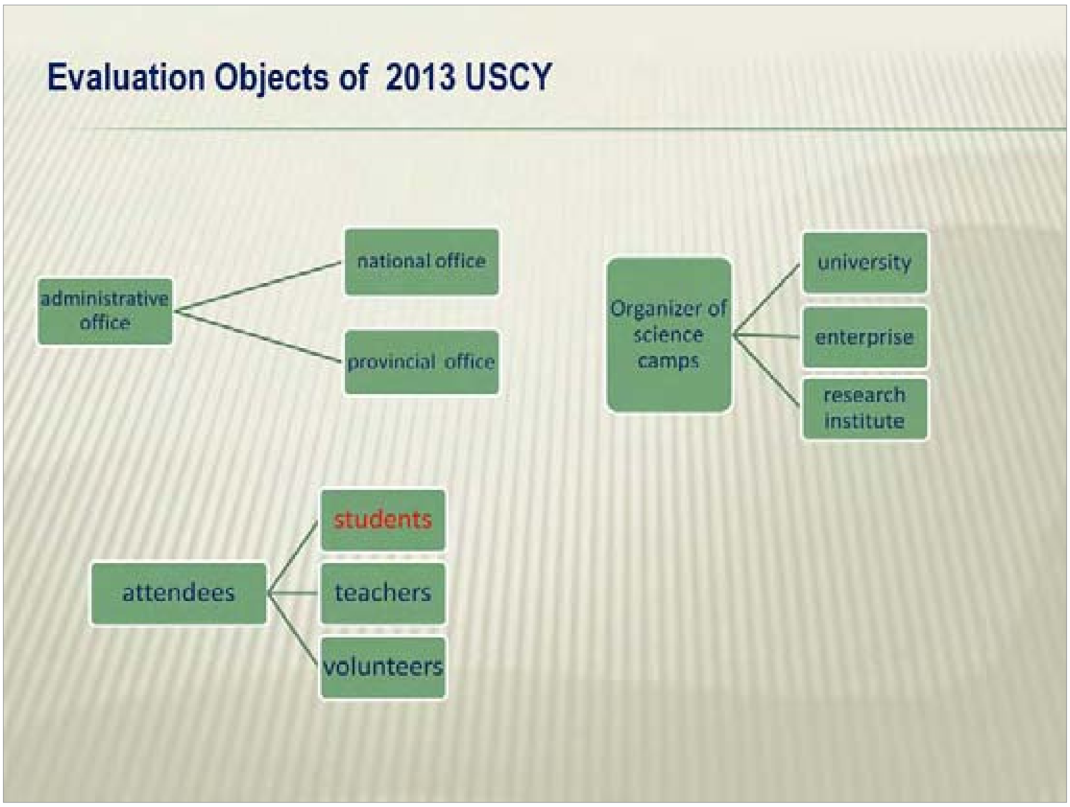
others

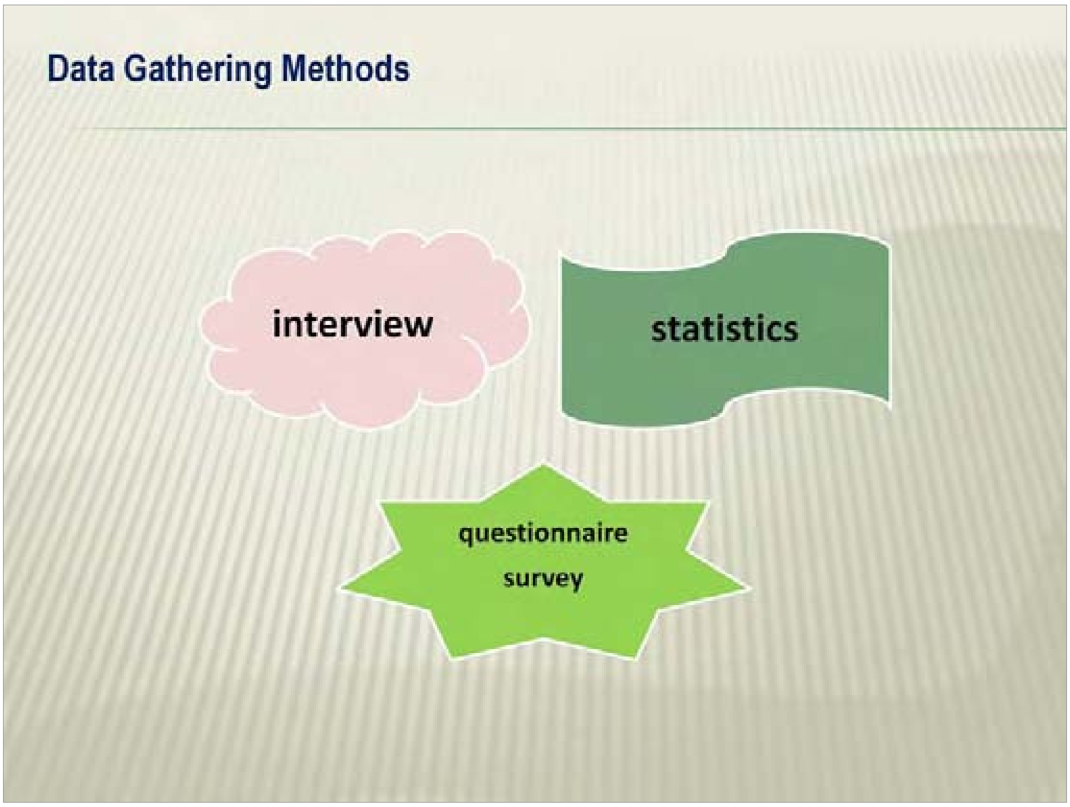
Part 3

Impact of 2013 University Science Camp for Youth

Evaluation Aims of 2013 USCY

- To be aware of the impact of the 2013 USCY
- To explore scientific management mechanism of the 2013 USCY


Evaluation Objects of 2013 USCY
administrative office
national office
provincial office
Organizer of science camps
university
enterprise
research institute
attendees
students
teachers
volunteers


Data Gathering Methods
interview
statistics
questionnaire survey

Questionnaire Survey

questionnaire	total amount	collecting amounts	collecting rate
Student questionnaire	11450	9465	82.3%
Teacher questionnaire	1143	879	76.9%

Interview

- 5 provinces
- 8 universities
- 8 science camps
- 5 provincial offices
- 55 students
- 20 teachers

Scene of interview

Impact of 2013 USCY

Educational activities held in USCY

lectures	Laboratories opening up	science hands-on activities
260 (including 43 lecture given by academicians)	238	202

Impact of 2013 USCY

Astronomy,
Navigation,
Spaceflight,
Aeronautics
Military

Impact on students

Impact	common science camps students	theme science camp students
Learned more knowledge	62. 8%	73. 1%
Be aware of the research methods and process	35. 2%	34. 1%
Be aware of the new achievements in a certain field	35. 1%	49. 8%
Make an invention	14. 1%	7. 8%
Start to be interested in science	23. 1%	19. 6%
decide to work as a scientific researcher	16. 2%	20. 4%
Experience campus life	69. 4%	64. 1%

Thank you for your attention!

Dyah Ratna Permatasari

CEO, DoctoRabbit Science Inc.
dyah@doctorabbit.com / dyah@indo.net.id

EDUCATION

1989	Postgraduate Certificate in Management, PPM Institute of Business
1988	BSc. in Chemistry, University of Indonesia

MAJOR ACTIVITIES

2011 - Present CEO & Founder of DoctoRabbit Science Inc. with the following experience:

- Initiator for DigiMom, a cafe scientifique for women
- Director and Jury for Science Quiz for elementary students on TV (2010)
- Mentor for several International science competitions (World Creativity Festival, Odyssey of the Mind, APT Junior Science Odyssey, APEC Future Scientist Conference)
- Member of Expert Team for science education development at Siak Islamic Center, managed by BPPT (2007)
- Deputy Director for Indonesian Science Festival Organizing Committee (2003 - now)
- Jury for the Science Project Competition (both elementary school students and teachers categories) at the Indonesian Science Festival (2003 – now)

1995 - 2001	Kidsports Indonesia as the General Manager
1990 - 1995	Niaga Factoring Corp as a Manager in Credit & Marketing Dept.
1989 - 1990	PPM Institute as a Junior Consultant

CONFERENCE PAPERS

DigiMom: Cafe Scientifique and Workshop to Empower Women in Digital Technology (presented paper at PCST-12 Conference in Florence, Italy, April 2012)
Science Quiz on TV: An Interactive Approach to Promote Science to Elementary School Students (presented paper at PCST-11 Conference in New Delhi, India, 2010)
Using traditional comedy theatre as a media for science communication (presented paper at PCST-10 Conference in Malmo, Sweden, 2008)
Developing Public Awareness of Science in Indonesia (presented poster at PCST-9 Conference in Seoul, Korea, 2006)

PUBLICATION

2009	Di Balik Penemuan Besar, translated from Two-Fisted Science written by Jim Ottaviani
2005	Mengenal Sains TK-A – a science workbook for Kindergarten 1
2005	Mengenal Sains TK-B – a science workbook for Kindergarten 2
2004	Pendekar Tangguh dari Lemari Dapur – an article about the benefit of baking soda

And several articles at Kompasiana.com mostly about education, science, and technology

ABSTRACT

KOSAI – THE VIRTUAL SCIENCE TOWN: INTEGRATED APPLICATION TO REACH REMOTE PEOPLE ALL OVER INDONESIA

Dyah Ratna Permatasari
DoctoRabbit Science Inc., Indonesia
dyah@doctorabbit.com / dyah@indo.net.id

Indonesia, the largest archipelago country in the world with 17,500 islands, always faces problem in bridging the gap of education quality level between big cities and remote areas. One of the reason is the various levels of teachers quality. Better salary and benefits make the best teachers are concentrated in big cities, whereas some remote areas are also very difficult to be reached because of its natural obstacles.

Teachers now are also facing a more difficult situation. A new national curriculum will be implemented nation wide started in July 2014 and teachers are expexted to become facilitators, while students will be actively learning from various sources, including internet. Unfortunately, there are very limited lesson materials, especially in Indonesian language, available in the internet, and mostly are not fun and interactive. These problems of teachers' quality and scarcity of lesson materials would endanger the national education quality.

The idea of Kosai – The Virtual Science Town, (it is still underdevelopment) could be a solution to those problems. It is designed like a computer game with an entertaining animation to attract the students to explore it. The town consists of areas designated to certain ages, such as toddlers to kindergarten, elementary school, junior high school, senior high school, and public. Those areas are contented with interactive experiments (virtual lab), virtual science museum, science games, lesson video, exam tryout, market place, and community forum for discussion among users. Teachers could also participate as contributors for its contents and get paid.

There are 6 development phases to finish this project. It would take around 20 months to complete the application. Connection to this application would be free, but there are some premium contents with very small fees to maintain the sustainability. We would work with the Ministry of Education and Culture for the mass deployment of this application.

Keywords : virtual, science, museum, remote, digital, technology

KAST-ASM-IAP INTERNATIONAL WORKSHOP

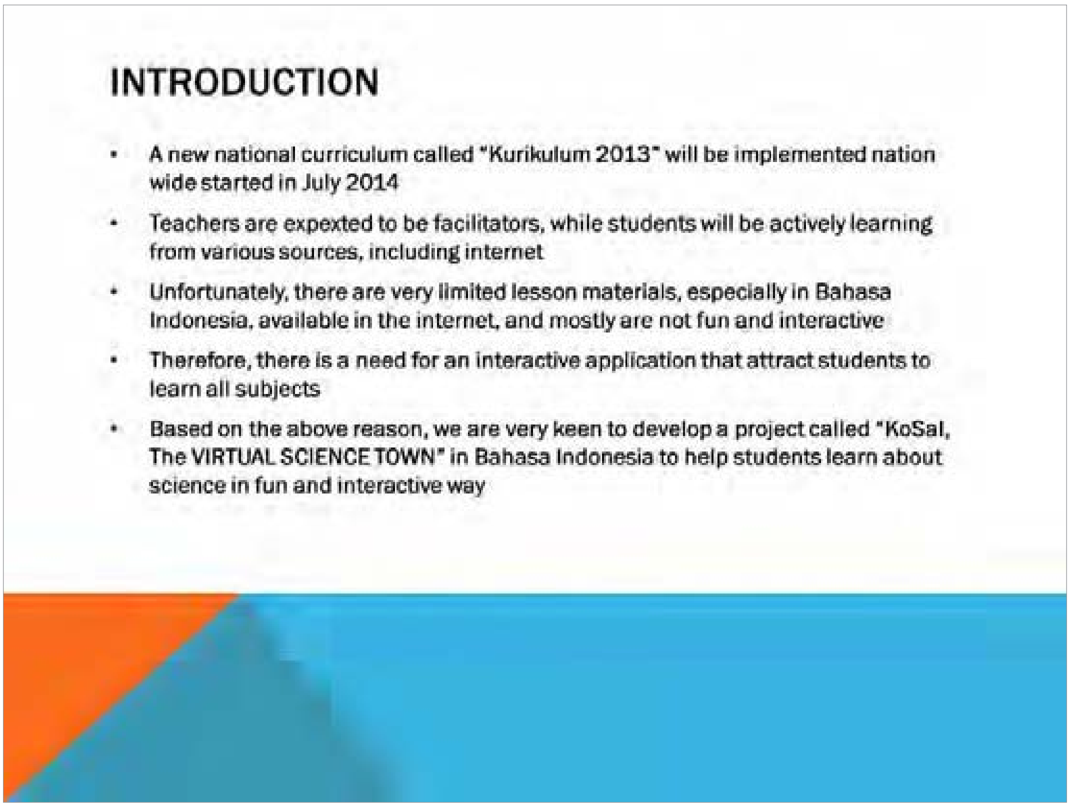
SCIENCE LITERACY: *Science Communication & Science Outreach*

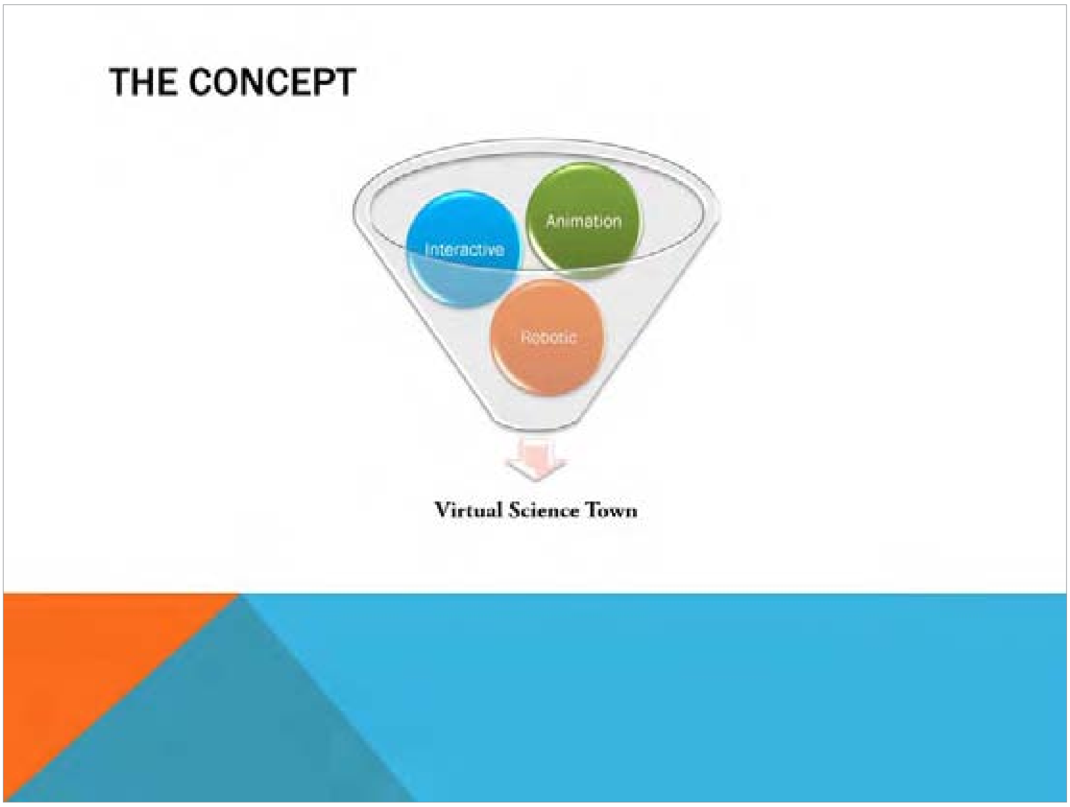
JUNE 12 - 13, 2014

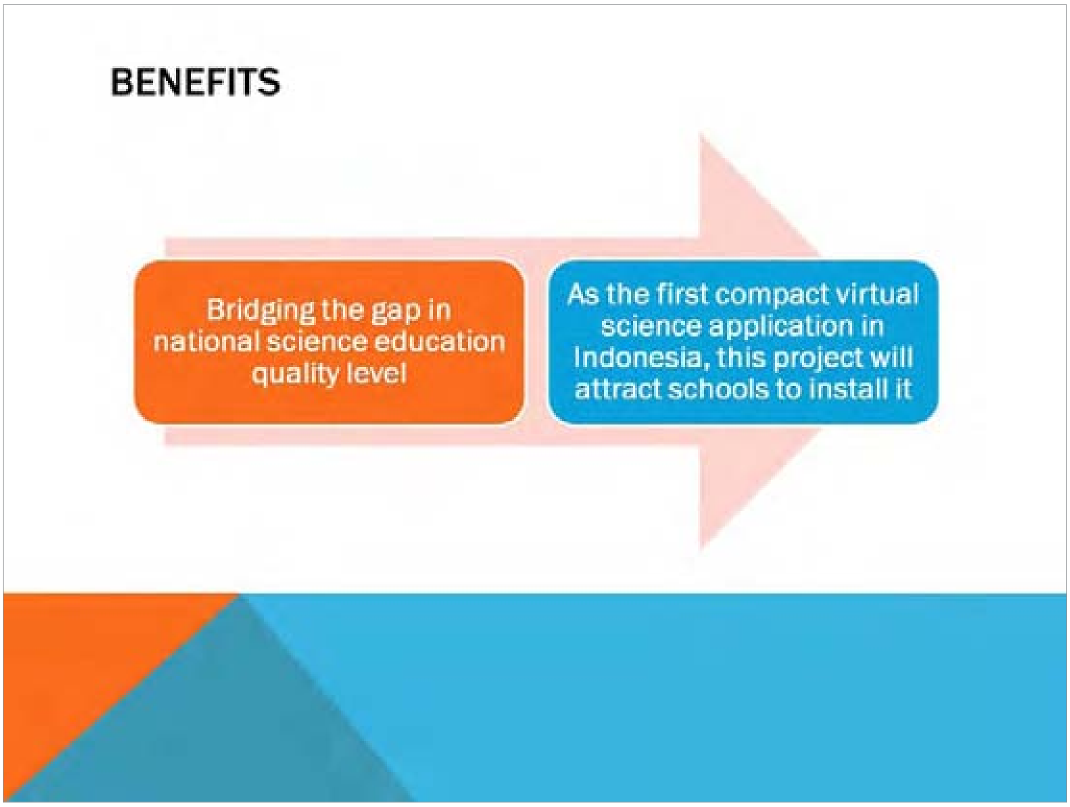
Magnolia Room, Hoam Faculty House,
Seoul National University

SESSION 1


KoSaI
INDONESIAN SCIENCE TOWN
TO IMPROVE INDONESIAN EDUCATIONAL QUALITY LEVEL


INTRODUCTION
• A new national curriculum called "Kurikulum 2013" will be implemented nation wide started in July 2014
• Teachers are expexted to be facilitators, while students will be actively learning from various sources, including internet
• Unfortunately, there are very limited lesson materials, especially in Bahasa Indonesia, available in the internet, and mostly are not fun and interactive
• Therefore, there is a need for an interactive application that attract students to learn all subjects
• Based on the above reason, we are very keen to develop a project called "KoSal, The VIRTUAL SCIENCE TOWN" in Bahasa Indonesia to help students learn about science in fun and interactive way


THE CONCEPT
Animation
Interactive
Robotic
Virtual Science Town


BENEFITS
Bridging the gap in national science education quality level
As the first compact virtual science application in Indonesia, this project will attract schools to install it

SESSION 1

"KOSAI" THE INDONESIAN SCIENCE TOWN

GLOBAL VIEW

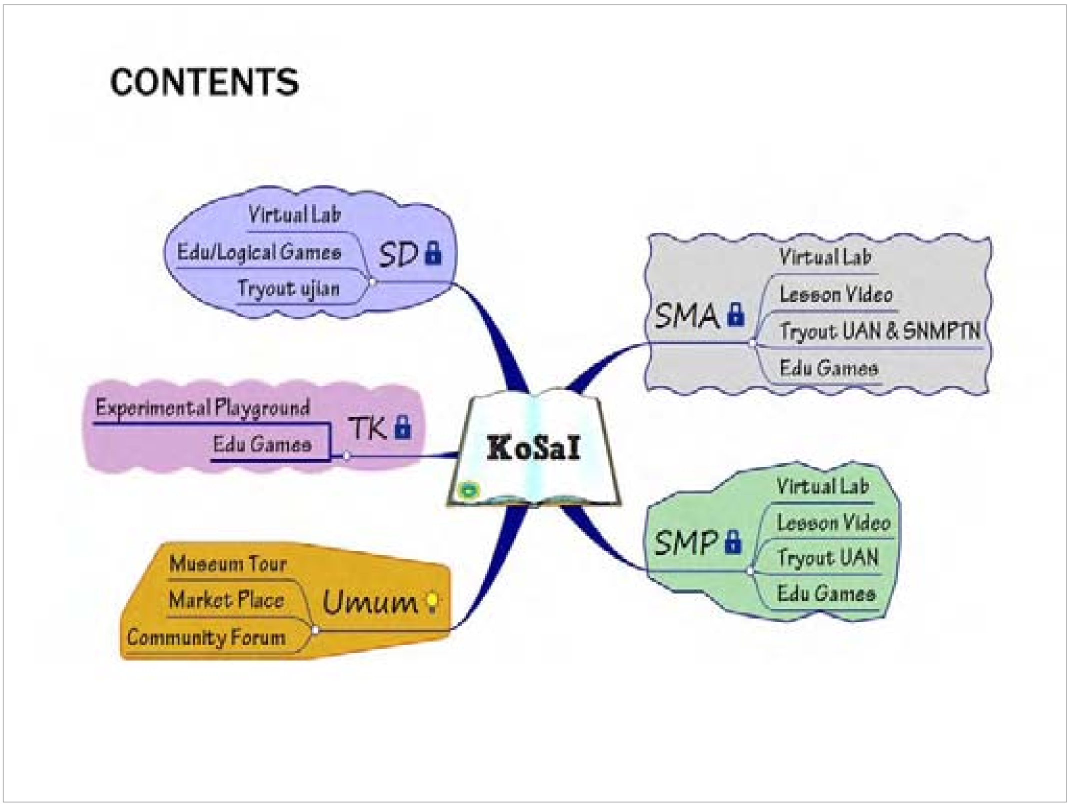
KoSaI (Kota Sains Indonesia - Indonesian Science Town) is a platform to enable education of science with fun for the students and individuals who is interested in science via Internet.

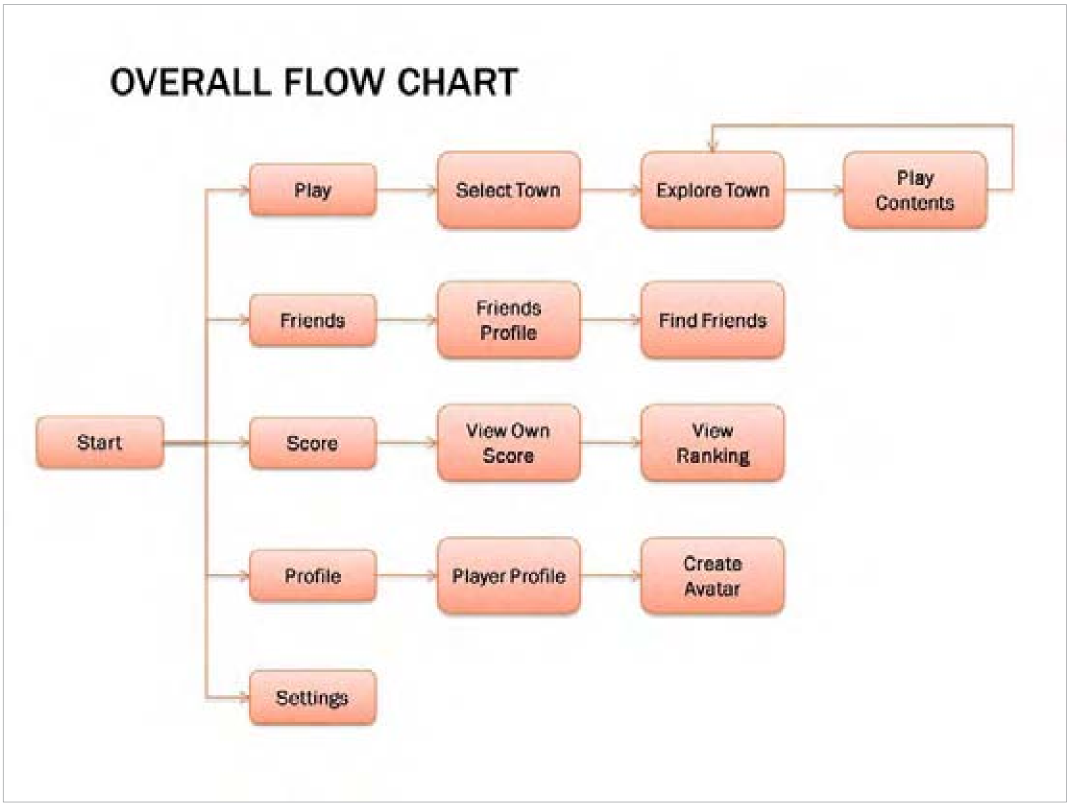
The Platform provides the access to science related content in an interactive & attractive way, to trigger the interest of the users to understand and learn more about science.

The Platform provides the teachers, researchers, individuals, content developers to create and publish science education contents, and gain revenue from the published contents.

The Platform provides an integral gamification as part of the features to attract users in using the contents.

The Platform is supported with social media feature for communication among the members, as well as for realworld gathering events among the members.


CONTENTS
KoSaI
SD
Virtual Lab
Edu/Logical Games
Tryout ujian
TK
Experimental Playground
Edu Games
Umum
Museum Tour
Market Place
Community Forum
SMA
Virtual Lab
Lesson Video
Tryout UAN & SNMPTN
Edu Games
SMP
Virtual Lab
Lesson Video
Tryout UAN
Edu Games


OVERALL FLOW CHART
Start
Play
Select Town
Explore Town
Play Contents
Friends
Friends Profile
Find Friends
Score
View Own Score
View Ranking
Profile
Player Profile
Create Avatar
Settings

KEY FEATURES

Real-Time simulation game by exploring the virtual cities for playing games in various form, like problem solving, challenges, simulation, etc.

Avatar, as the virtual figure of the player, that can be customized according to the profile defined by the player.

Navigation across the town with real-time control on the avatar. During the navigation, the player can perform real-time chatting with other online players.

KoSal mascots to provide guide to the player in playing the games provided in the town. Mascots are different according to the player's age, topics, etc.

Playing various kind of scientific game by visiting sites in the town. Game can be free-to-play, pay-to-play (need premium membership), or sponsored game.

Gamification to reward player in achieving certain challenges provided in the games. Rewards are in virtual items, that can be redeems as actual items in the real world (pins, certificates, etc.)

Media for classified advertisement that is provided as part of the game playing.

TARGET VISITORS

TARGETS

Schools

Total number of schools in Indonesia:
- Elementary schools: 145.000
- Junior High Schools: 27.000
- Senior High Schools: 10.500
- Special Schools: 1.500

Individual Students

Total number of students in Indonesia:
- Elementary school: 25 mil
- Junior High School: 8 mil
- High School : 5 mil

PRODUCT ROADMAP

Category	Pre-K + ES	JHS	HS
Exam Tryout	Phase I	Phase II	
Education Games	Phase III		
Virtual Lab			
Lesson Video	Phase IV		
Virtual Museum	Phase V		
Market Place	Phase VI		
Community Forum	Phase I	Phase II	

PRODUCT ROADMAP

Phases	Q2-14	Q3-14	Q4-14	Q1-15	Q2-15	Q3-15	Q4-15
Phase I	Basic	Upgrade					
Phase II		Basic		Enhancement			
Phase III			Basic		Enhancement		
Phase IV					Basic		
Phase V						Basic	
Phase VI							Basic

THANK YOU

DoctoRabbit
Science Inc.

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Website: http://www.doctorabbit.net
Facebook:

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SESSION 2

Presider : ***Sung Kyum Cho*** *(Member, Organizing Committee / Professor, Chungnam National University, Korea)*

Science Literacy for Popularization of Science

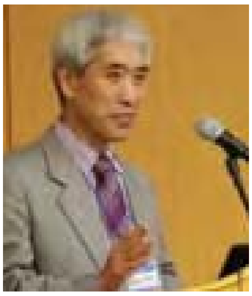
- ***Pratap Singh*** *(Chief, Statutory Affairs Division, Nepal Academy of Science and Technology (NAST))*

Exploration of On-service Science Teachers' Professional Development for Science Literacy and Pedagogical Content Knowledge

- ***Zhaoning Ye*** *(Associate professor, Key Laboratory of Child Development and Learning Science (Southeast University), Ministry of Education, China)*

Employing Scientific Research to Solve Societal Problems by Increasing Public Awareness and Science Literacy (Egypt as case study)

- ***Amal Amin*** *(Associate Professor, National Research Center, Egypt)*



Presider

Sung Kyum Cho

Dean & Professor, College of Social Sciences, Chungnam National University
President, Asian Network for Public Opinion Research
skcho99@gmail.com

EDUCATION

1991	Ph. D., Communication, Seoul National University, Korea
1983	M.A., Communication, Seoul National University, Korea
1981	B.A., Communication, Seoul National University, Korea

MAJOR ACTIVITIES

1991 - present	Professor (since 2003), Department of Communication, Chungnam National University: Associate Professor (1998-2003); Assistant Professor (1994-1998); Fulltime Lecturer (1991-1994)
2014 - present	Dean, College of Social Sciences, Chungnam National University
2013 - present	Vice Chair of the Local Press Chair, Ministry of Culture, Sports and Tourism
2012 - present	Director, Institute of Social Sciences, Chungnam National University
2012 - present	President, Asian Network for Public Opinion Research (ANPOR)
2012 - 2013	Member of Policy Advisory Committee, Daejeon Metropolitan City Hall
2010 - present	Member, Self-evaluation Committee, Military Manpower Administration
2010 - 2013	Chairman, Committee on the Impact of Media Concentration, Ministry of Culture, Sports and Tourism.
2009 - 2012	Member of Advisory committee, CNU Center for Biomedial Human Resources
2008 - present	Director, Center for Survey Research, Chungnam National University
2008 - present	Chair of Science, Health, Environment and Risk Communication Division, Korean Society for Journalism & Communication Studies
2007 - present	Member of Editorial Board, Indian Journal of Science Communication
2005 - present	Member of IRB, Seoul National Hospital
2003 - present	Member, Subcommittee Chair (since 2011), KOSTAT Self-evaluation Committee
1997 - 2010	Member of Advisory Committee on Election Polling, Korean Broadcasting Network

AWARDS

2004	Gallup Korea Award
2006	Deputy Prime Minister Commendation

SELECTED PUBLICATIONS

Books (in Korean):

Jeongro Yoon, Kyuwon Jeong, Sung Kyum Cho. **Understanding of Biotechnology and Human Life.** Daejeon: Kung Media. 2012.

Haksoo Kim, Sung Kyum Cho, Hong-gyun Kim, Yongsung Park, Jun Kim, Jongtae Lee, Byungmoo Min. **An Interdisciplinary Approach to Climate Change.** Jeesaem. 2010.

Choonryul Ryu and Sung Kyum Cho. **Communication Skills for Scientist and Engineers.** Seoul: Nanam. 2007.

Jeong-ro Yoon, Heyran Hwang, Sung Kyum Cho, Kwonjung Cho. **The Institutionalization of Science and Technology Practice and Policy Formulation: Toward a New Research Culture.** Science & Technology Policy Institute. 2000.

Recent Papers Published in Korean Journals:

Eunhee Cho and Sung Kyum Cho. **"Public's wishful thinking toward the risky industrial facilities."** Journal of Social Science. 2010. 1(2). 225-242.

Sung Kyum Cho. **"Social Awareness of the Use of Genetic Information."** Journal of ELSI Studies. 2(2). 99-118. 2004. October.

Sung Kyum Cho. **"Communication Plans for the Protection of Genetic Information."** Journal of ELSI Studies. 2(1). 2004.

Sung Kyum Cho and Jeong-ro Yoon. **"Social Perception on Biotechnology in Korea."** Journal of Science & Technology Studies 2. 2001. 343-369.

Presentations:

Sung Kyum Cho. **"Public perception of bioethics and life science".** Spring conference, the Korean Bioethics Association. 2008. May. 31.

Sung Kyum Cho. **"A new communication model for Radiation Research Institute".** Spring Conference. KCJCS. 2007. May.

Pratap Singh

Chief, Statutory Affairs Division, Nepal Academy of Science and Technology (NAST)
pratapsingh80@hotmail.com

EDUCATION

1981	Master Degree in Business Administration and Commerce Specialization: Marketing/Management, Tribhuvan University, Nepal

JOB EXPERIENCE

2013	Project Manager: Empowering Secondary Level Science Teachers Training Program
2010 - present	Chief: Infrastructural Development Program
1998 - present	Division Chief, Statutory Affairs Division - Rules, Regulation and policy preparation, overall management of Academic Assembly, Management Council and Executive Affairs.
1998 - 1999	Division Chief, Planning and Evaluation and Statutory Affairs Division - Planning Evaluation of NAST activities - Ev-K2-CNR Project activities - Rules, regulation and policy matters
1995 - 1998	Senior Officer : Statutory Affairs Division - Rules, Regulation and Policy matters
1988 - 1994	Officer: Statutory Affairs, NAST - Rules, regulation and policy preparation overall management of Academic Assembly, Management Council and Executive Affairs.
1987 - 1988	Officer: Planning and Evaluation, NAST - Planning programming and evaluation of NAST activities
1986 - 1987	P.A.to Member Secretary, NAST - Personal advice and assistance to Member Secretary
1985 - 1986	Accounts Officer: NAST - Financial Administration activities
1984 - 1985	Assistant Program Officer, NAST

SEMINAR / WORKSHOP / TRAINING

- Participation in Seminars held in Philippines and India etc.
- CNR/Ev-K2-CNR Office and its affiliated Laboratories visit in Italy for study and observation.
- IDRC sponsored Seminar in Pune, India
- Ev-K2-CNR sponsored High Summit 2013, Italy

PUBLICATION

Publication of Book titled NAST Award, Felicitation and Appreciation, Few articles.

MEMBERSHIP

- Previous National Focal Point Co-ordinator STEPAN.
- Past President (2011/12) ROTARY Club of Nagarjun (First 100% IVth Level PHF Club of Nepal).
- Club No. 64357 Membership ID No. 6062020

ABSTRACT

Science Literacy for Popularization of Science

Pratap Singh
Chief, Statutory Affairs Division
Nepal Academy of Science and Technology (NAST)
e-mail : externalaffairs@nast.org.np

The fact of reliance on science in tackling global problems cannot be negated but at the same time in many countries large parts of the population are quite critical of the impacts of the application of science and technology on society and the environment. This may also be one of the reasons why in many countries science fails to attract the younger generation. Academies of Sciences can do much to improve negative public perceptions of science and bridge a gap between the scientists and the public through science literacy. It is true that science literacy in a broad sense results from Science Communication, Science Outreach and Science Advice. Further, the impact of science and scientists in the political arena would be greatly enhanced if science and scientists succeed in speaking with a coherent voice. In this respect Academies have a crucial role to play at the national level.
Nepal Academy of Science and Technology (NAST), since its inception in 1982 has been endeavoring for the promotion and popularization of S&T among the general mass. Under the umbrella of S&T promotion and popularization Program NAST has been conducting scientific learning by doing demonstrative training program in secondary school level encompassing competitive science fair, science quiz for and science walk. Besides, NAST has been quenching the curiosity of general mass on S&T through publications and radio and television programs. In this regard scientific awareness program conducted by NAST in April 1986 during Chernobil radiation hazard and the incident of "drinking milk" by the Hindu elephant god Ganesh during September 1995 are some of the prominent examples.
NAST successfully accomplished a project on "Empowering Secondary Level Science Teachers for Demonstrative Teaching Practices and communication, in Nepal" in 2013 accounting participants from 12 districts, supported by IAP-Global Network of Science Academies. The impact of the program was encouraging and NAST tends to organize the replica of the program in other remaining districts of Nepal.
Similarly NAST provides grants and fellowships for scientific higher studies to check brain drain. Further, it has outreached all seventy five districts of Nepal to familiarize the non-scientific community with S&T, through various communications means and programs. Now, it is the need of the time for the establishment of science learning centers, science education training centers and improved advance demonstrative programs on science literacy in every district of the developing countries including Nepal. This requires additional investment in S&T sector and support from the respected governments, national as well as international donor agencies, for the betterment of S&T and ultimately for the development of the nation.

ENGLISH TEXT

Science Literacy for Popularization of Science

Pratap Singh
Chief, Statutory Affairs Division
Nepal Academy of Science and Technology (NAST)
e-mail : externalaffairs@nast.org.np

Introduction

Science and technology are the most powerful agents that could bring social changes in the history of mankind. The fact of reliance on science in tackling global problems cannot be negated but at the same time in many countries large parts of the population are quite critical of the impacts of the application of science and technology on society and the environment. Science today seems caught in a cross-fire between two opposing views. Rapid advancement in Science and Technology on the one hand is bestowing an easy and comfortable life to the mankind but at the same time we must also concede that it is posing tremendous threat by generating global challenges like climate change, soil gradation, resource depletion and infectious diseases. This may also be one of the reasons why science fails to attract the appreciation of general public and younger generation.

The significance of science and technology cannot be realized unless the public in general comes to understand S&T and without a science-literate population, the outlook for a better world is not promising. Hence, science literacy and science education play key roles in bridging gaps between the scientists and the public and promote public awareness. The goal of science education should be to prepare scientifically literate students who can use science to improve their own lives and understand science and cope with complex technological world.

In this regard, the school science curriculum plays a vital role in developing science literacy and cultivating interest in science at an early age. Science is essentially experimental and science education should relate to inquiry-based approach. Science Education needs to be based on the four pillars the 4Cs- curiosity, creativity, competence and compassion. No science is possible without curiosity, no technology without creativity, no production without competence but without compassion they may all be used to destroy the environment and lives on earth. Science education based on these 4Cs should be introduced in the school level science curriculums.

Science Education Program in NAST : Experience Sharing

Nepal, a developing nation located in Asia, covers the total land area of 147,181 km2. The total population of Nepal is 26.6 million (CBS, 2011) with an annual growth rate of 1.35 per cent. The population density is 180 per square km and the literacy rate is 65.9 percent.

Formal development of S&T started with the initiation of science faculty in Tri Chandra

College in 1918. At present, School Education Section under Ministry of Education, Nepal Government is responsible for the development and implementation of policies, rules and directives regarding primary and secondary education. Till late science education adopted in most of the schools in Nepal was based on the curriculum prescribed by the Government and was exam oriented. With the establishment of private schools and colleges the teaching approach slowly took a positive turn. Extra curriculum such as visits to museum, nature walk, field trips was incorporated in the annual school program of the private schools to make learning more interesting. With the introduction of Montessori Method of teaching in the pre-primary and primary levels in some of the schools science teaching became more demonstrative and amusing. But the drawback of this method is the cost associated with it. Only the elite groups and some higher middle classes were able to afford to admit their children in these schools. This type of learning by doing techniques are sophisticated and luxury for the population of Nepal, having GNP and GDP estimated as 8 and 32.31 percent respectively and the per capita income estimated as 473 USD. (CBS, 2009)

Though teaching practices have improved with the advancement of science and technology in the cities of Nepal, the schools of rural areas still uses the traditional method of teaching, exclusively based on theoretical knowhow on the prescribed curriculum. Science is based on the basic principles we use in our day to day life without us being aware. Scientifically literate public is very limited in Nepal. To make science learning more amusing and affordable to all, demonstrative teaching method should be adopted from the school level and science awareness programs should be launched to make science popular among the public. For this, the science teachers should first be empowered and trained on the demonstrative teaching practices and at the same time, taught to fabricate low cost demonstrative equipment from the locally available materials.

Viewing the significance of science, Nepal Academy of Science and Technology (NAST), since its inception has been endeavoring for the promotion and popularization of S&T among the general mass.

Nepal Academy of Science and Technology (NAST)

NAST is established by a Royal Ordinance as an autonomous apex body in December 5, 1982. NAST is mandated to advice government in the formation of S&T related policy and programs. The main objective of the Academy is the advancement of science and technology for overall development of the nation. NAST has been conducting collaborative research and promotional programs and has developed national and international academic linkages.

Under the umbrella of S&T promotion and popularization Program NAST has been conducting scientific learning by doing demonstrative training program in secondary school level encompassing competitive science fair, science quiz and science walk. Besides, NAST has been quenching the curiosity of general mass on S&T through publications and radio and television programs. In this regard scientific awareness program conducted by NAST in April 1986 during Chernobil radiation hazard and the incident of "drinking milk" by the Hindu elephant god Ganesh during September 1995 are some of the prominent examples.

NAST participated in the competitive call for proposals in 2012 and succeeded to enter into an agreement with the United Nations Educational Scientific and Cultural Organization (UNESCO) to conduct "empowering Secondary Level Science Teachers for Demonstrative Teaching Practices in Nepal" during 2013. The project was designed for the secondary level science teachers to be familiar with the demonstrative teaching of the basic scientific principles, technological applications and social implications integrating informal and vivacious pedagogical method. The main objective of the project was to develop the skills of secondary level science teachers to design and fabricate low cost science teaching equipment for effective teaching by utilizing local materials.

Two schools which were appropriate to conduct the training program were selected. One the Orchid Academy, Battar, Nuwakot district as the district is one of the largest districts and comprises of large deprived and superstitious communities. Another, Gauri Shankar Secondary School in Hemja, Kaski district which adjoins about 10 districts comprising of variation of topography, socio-economic status, bio and ethnic diversity. It was the best site to be selected to gather and empower science teachers from different districts and make the event a western regional training program.

The Program comprised of :

Science procession participated actively by the school children, reciting science slogans, organized in the morning, a day before the program. The objective of the activity was to promote science and at the same time inform the local community about the organization of the program. The procession was attended by about 250/300 students at each site.

SESSION 2

Inauguration Ceremony of the training program at both the schools commenced with inauguration ceremony addressed by the chief guest, principals, science teachers, resource persons and local authorities.

Science Teachers Training started during August 30 - September 3, 2013 at Nuwakot and during 13-15 December, 2013 at Kaski. Altogether 53 secondary level teachers from the schools located within the periphery of the two districts sites participated in the training program with great enthusiasm. Some even walked for two hours down the hill to participate as there was no transport access to the school situated on the hills.

The training was divided into two parts : Fabrication and Demonstration The participants were divided into five groups and the activities were carried out in a team spirit. Instructions on demonstration and fabrication of the models to depict the basic principles of science using local materials were conducted by different resource persons from NAST and other districts covering the arena of physics, astronomy, chemistry, and environment. Materials designed and fabricated during the training workshop were kept for display during the exhibition. Later they were handed over to needy schools.

The trainings were successfully organized at both the sites and had managed to achieve its objectives. It was conducted in a participatory and interactive method and all the teachers in both the sites participated in the class with interest and zeal. All the participants were grateful and requested NAST to conduct similar type of program in other districts also.

Science Fair was organized on the last day of the program at both the sites. The fair consisted of the following components.

Science Exhibition was held in the space of the schools where the training program was conducted. Different scientific models using local materials and depicting the basic principles of science were displayed by the students of 10 schools in each site. About 20 models were displayed A judge committee was formed for fair judgment based on the following criteria: models displayed; briefing on the principle and method of the model operated by students; local indigenous materials used and intensity of its utilization.Three best models were awarded with prizes during the closing ceremony.

Oratory Contest was organized at both the sites to build up the confidence and understanding of students in science on the theme "Science and Technology for Prosperous Nepal. Marks were provided based on expression and emotion portrayed during deliberation; voice modulation and confidence while delivering the matter; in-depth and the horizon covered about the subject matter; consistency and flow of the subject. At the end of the program prizes were conferred to three best competitors securing the highest score.

Quiz Contest was also organized for the secondary level school children. Three winning schools were awarded with prizes during the valedictory session.

Press Meet and Interaction was organized during the training program. Journalists associated to different medias participated. Vigorous interaction and question answer session on science education was performed. The news of the training program was covered intensively by various papers. Similarly, Interaction program with the science teachers participating in the training program was held, during which the participants put forth the problems/shortcomings in science teachings, suggestions and recommendations for the development of science education in the country.

Valedictory Session concluded by distribution of certificates to all the participants, token of appreciation to the local coordinators and others who have contributed in organizing and making the program a success.

Impacts of the Training Program

TISTA: After participating actively in three days vigorous training the participants of Battar, Nuwakot were so impressed that they on the spot formed a group and created an association with a name Technological Innovation Science Teachers Association (TISTA). The teachers are still in constant touch with NAST and the formalities of registering TISTA with Nepal Government is in process.

Resolution: All the participants of the teachers training program at Kaski, sat together to develop a resolution. The resolution incorporated and addressed the following points. Formation of national level science teachers association; need of establishment of NAST branches in all five development regions of Nepal; establishment of district level laboratory, library and museum; organization of national level science fair annually; organization of district level gathering and interaction among the science teachers, science community, principals, scientists, local authorities to exchange ideas and views for the development of science education, every six months.

Science Education Centre (SEC): Viewing the effectiveness of the training program and the response of the participants NAST is exploring the possibilities of establishing Science Education Centre. This SEC would consist of science museum, science park, miniature of planetarium, demonstration and lecture classes. The concept of establishing SEC is to impart knowledge on the basic principles of science initially targeting the school children.

Conclusion

NAST has outreached nearly all the districts of Nepal to familiarize the non-scientific community with S&T, through various communications means and programs. Now, it is the need of the time for the establishment of science learning centers, science education training centers and improved advance demonstrative programs on science literacy in every district of the developing countries, including Nepal. This requires additional investment in S&T sector and support from the respected governments, national as well as international donor agencies, for the betterment of S&T and ultimately for the development of the nation. Further, the Asian science academies can join hands to conduct collaborative program and trainings such as empowering science teachers and science literacy to create a forum and develop a multiplier effect for transfer of knowledge and reformation of the present science education system in Asia.

KAST-ASM-IAP INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

SESSION 2

Science Literacy for Popularization of Science

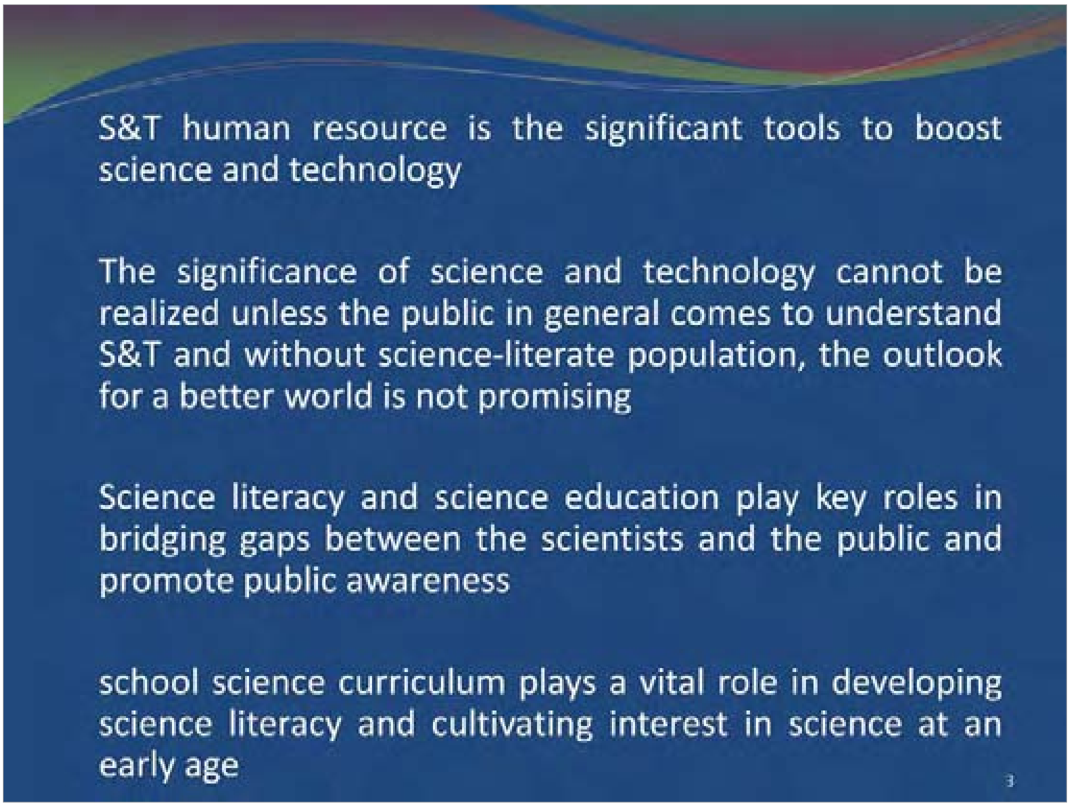
Pratap Singh
Chief, Statutory Affairs Division
Nepal Academy of Science and Technology (NAST)
e-mail : externalaffairs@nast.org.np

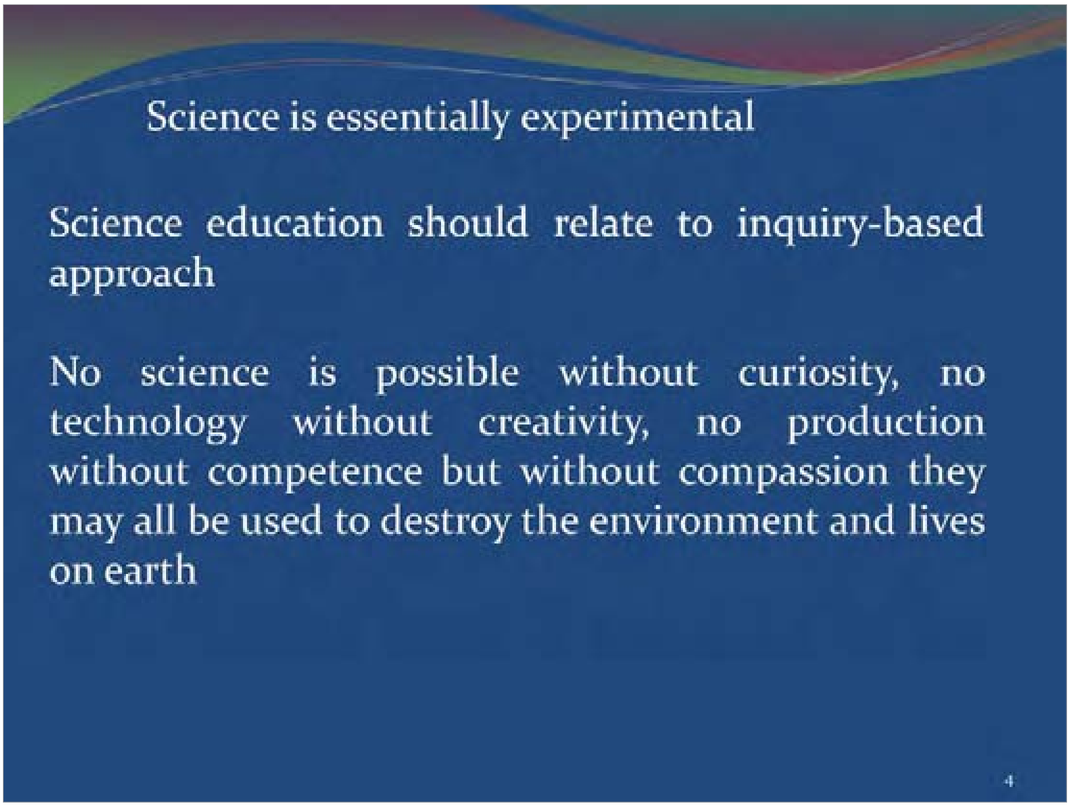
1

Introduction

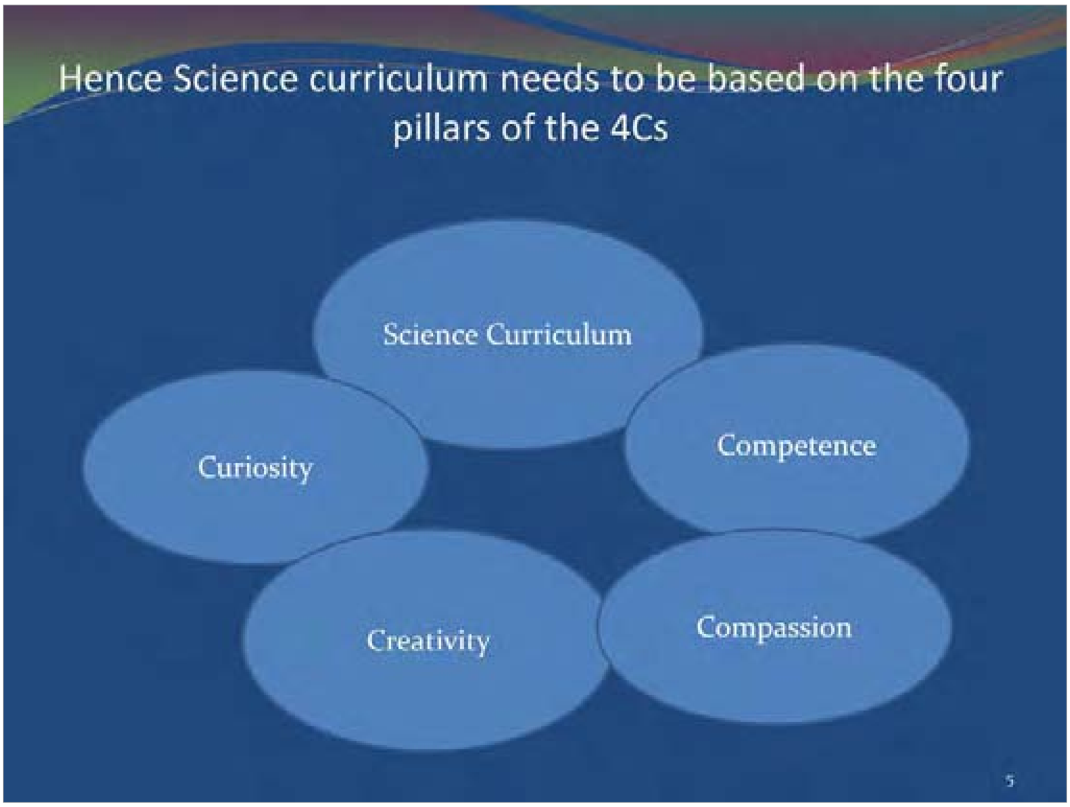
- Science and technology are the most powerful agents that could bring social changes in the history of mankind
- Science today seems caught in a cross-fire between two opposing views
- one of the reasons why in many countries science fails to attract the appreciation of general public and younger generation

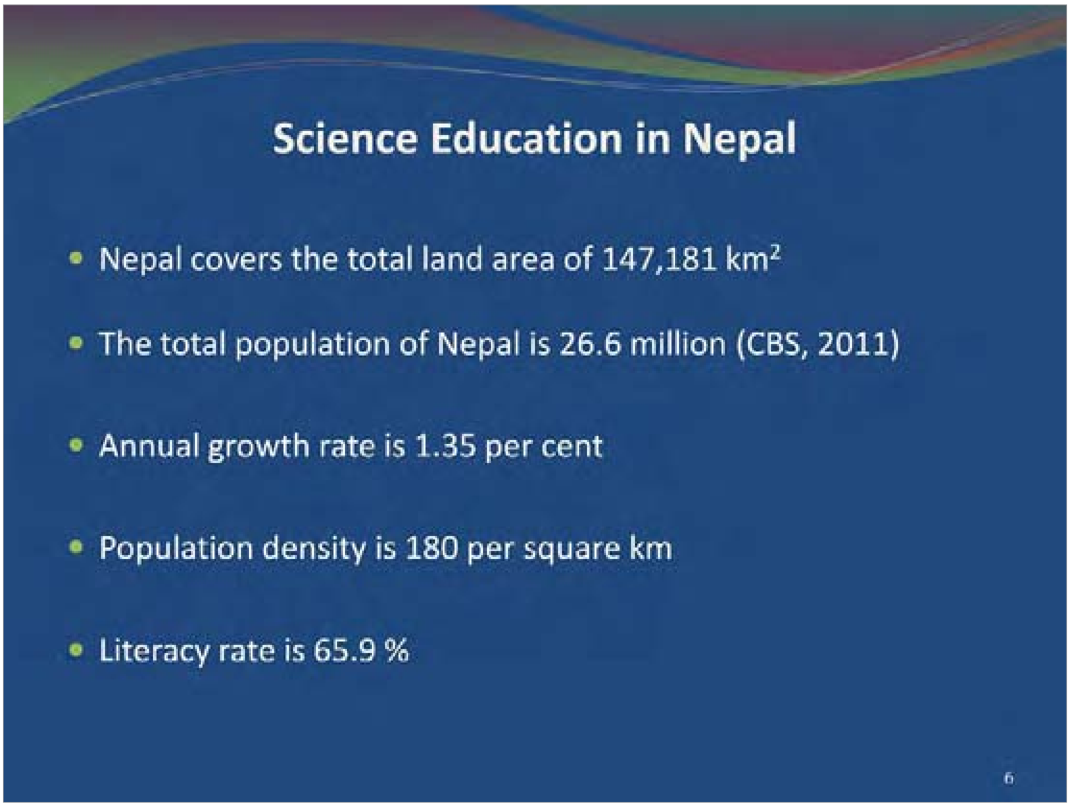
2


S&T human resource is the significant tools to boost science and technology
The significance of science and technology cannot be realized unless the public in general comes to understand S&T and without science-literate population, the outlook for a better world is not promising
Science literacy and science education play key roles in bridging gaps between the scientists and the public and promote public awareness
school science curriculum plays a vital role in developing science literacy and cultivating interest in science at an early age
3


Science is essentially experimental
Science education should relate to inquiry-based approach
No science is possible without curiosity, no technology without creativity, no production without competence but without compassion they may all be used to destroy the environment and lives on earth
4

SESSION 2


Hence Science curriculum needs to be based on the four pillars of the 4Cs
Science Curriculum
Curiosity
Competence
Creativity
Compassion
5


Science Education in Nepal
Nepal covers the total land area of 147,181 km2
The total population of Nepal is 26.6 million (CBS, 2011)
Annual growth rate is 1.35 per cent
Population density is 180 per square km
Literacy rate is 65.9 %
6

Formal development of S&T started with the initiation of science faculty in Tri Chandra College in 1918

School Education Section under Ministry of Education, Nepal Government is responsible of policies, rules and directives regarding primary and secondary education

Till late science education in most schools in Nepal was based on the curriculum prescribed by the Government and was exam oriented

With the establishment of private schools and colleges the teaching approach slowly took a positive turn

7

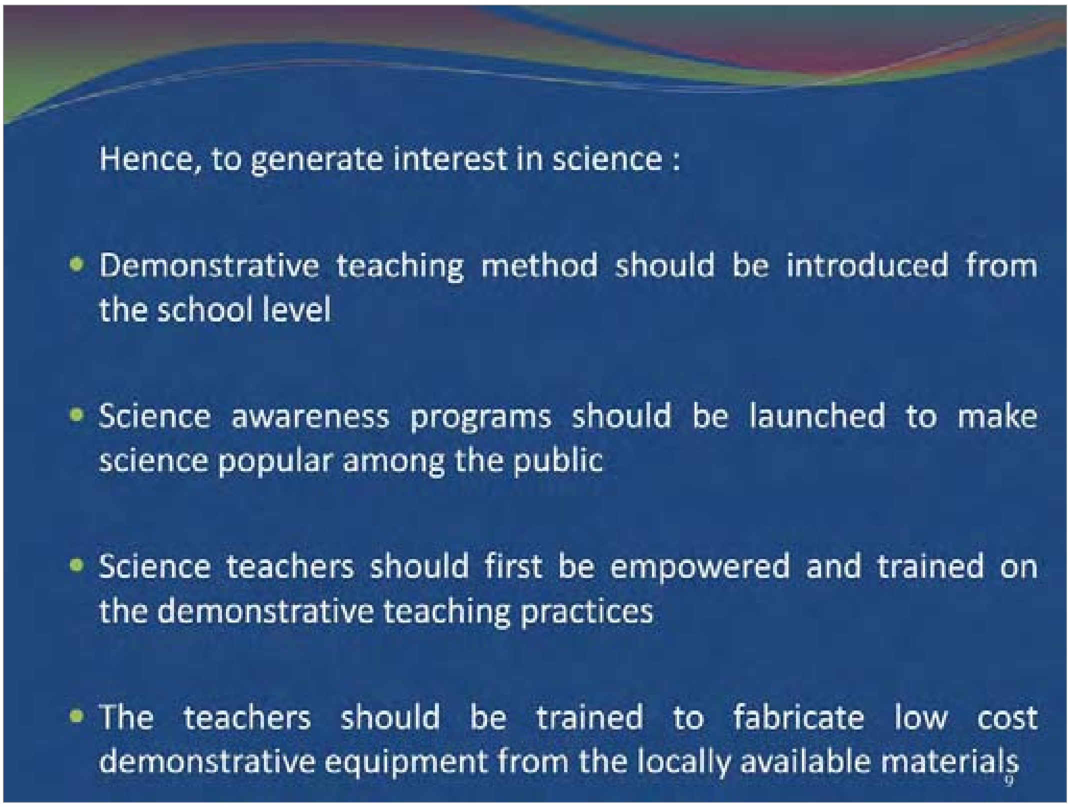
With the introduction of Montessori Method of teaching in the pre-primary and primary levels in some of the schools science teaching became more demonstrative and amusing

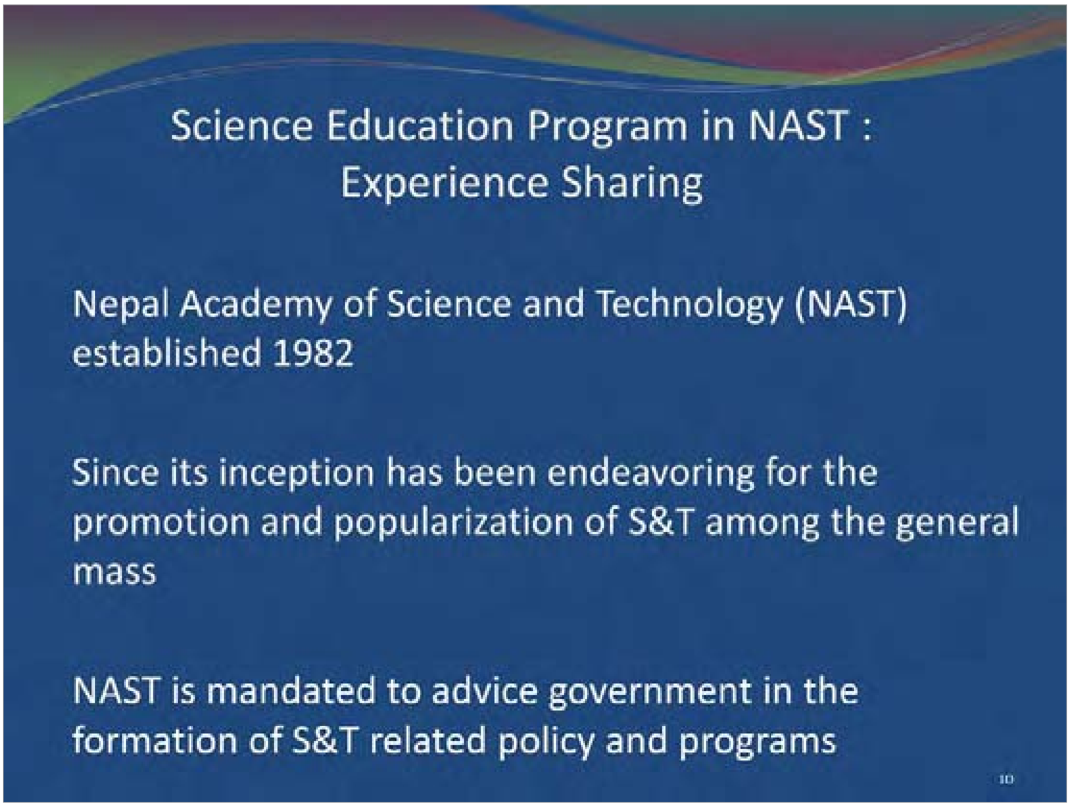
This type of learning by doing techniques are sophisticated and luxury for the population of Nepal, having GNP and GDP estimated as 8 and 32.31 percent respectively and per capita income estimated as 473 USD

Schools of rural areas still uses traditional method of teaching based on the prescribed curriculum

Scientifically literate public is very limited in Nepal

8


Hence, to generate interest in science :
Demonstrative teaching method should be introduced from the school level
Science awareness programs should be launched to make science popular among the public
Science teachers should first be empowered and trained on the demonstrative teaching practices
The teachers should be trained to fabricate low cost demonstrative equipment from the locally available materials
9


Science Education Program in NAST :
Experience Sharing
Nepal Academy of Science and Technology (NAST) established 1982
Since its inception has been endeavoring for the promotion and popularization of S&T among the general mass
NAST is mandated to advice government in the formation of S&T related policy and programs
10


Main objective of the Academy is the advancement of science and technology for overall development of the nation
Under S&T promotional activities NAST has been conducting :
Teachers workshop on demonstrative training program in secondary school level
competitive science fair
science quiz
science walk and
S&T related radio and television programs
11


IAP - NAST Project
NAST participated in the competitive call for proposals in 2012
Agreement signed with the United Nations Educational Scientific and Cultural Organization (UNESCO) to conduct "Empowering Secondary Level Science Teachers for Demonstrative Teaching Practices in Nepal" during 2013
Project designed for the secondary level science teachers to be familiar with the demonstrative teaching of the basic scientific principles, technological applications and social implications
12

The main objective of the project was to develop the skills of secondary level science teachers to design and fabricate low cost science teaching equipment for effective teaching by utilizing local materials

Program Conducted in two schools :

- Orchid Academy, Battar, Nuwakot district ; one of the largest districts comprising large deprived and superstitious communities; August 30 - September 3, 2013
- Gauri Shankar Secondary School in Hemja, Kaski district which adjoins about 10 districts comprising variation in topography, socio-economic status, bio and ethnic diversity; 13-15 December, 2013 at Kaski

13

The Program comprised of:

Science rally

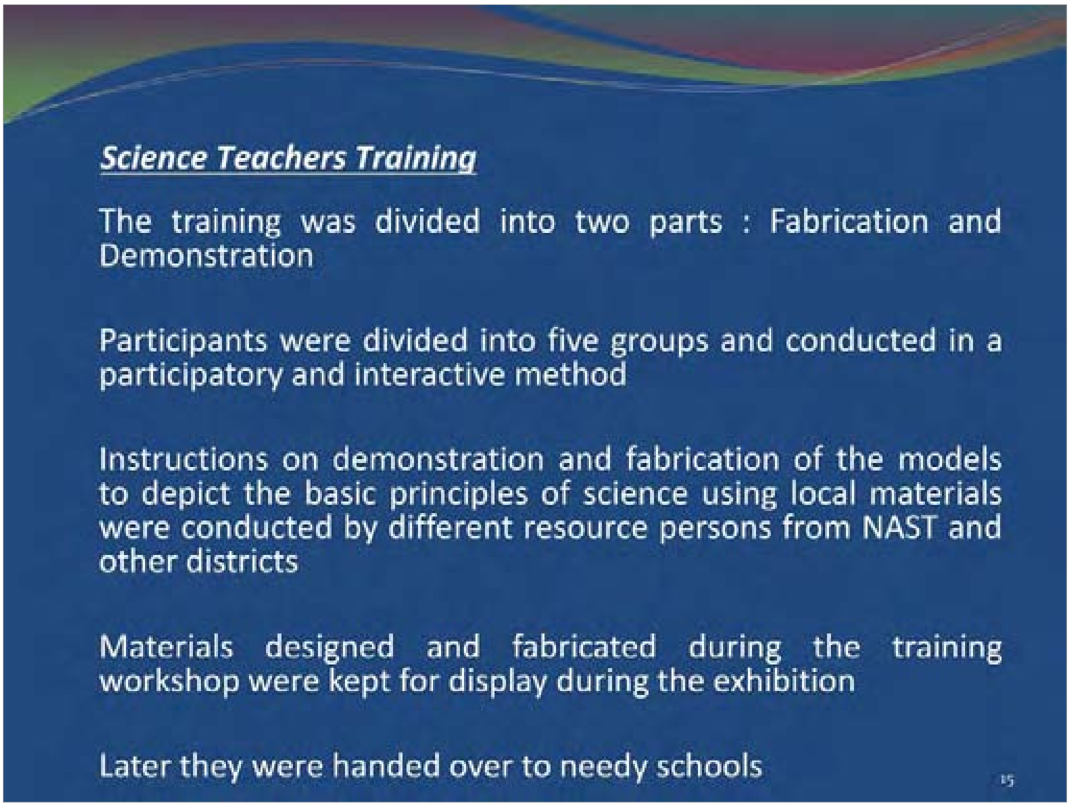
Participated actively by the school children

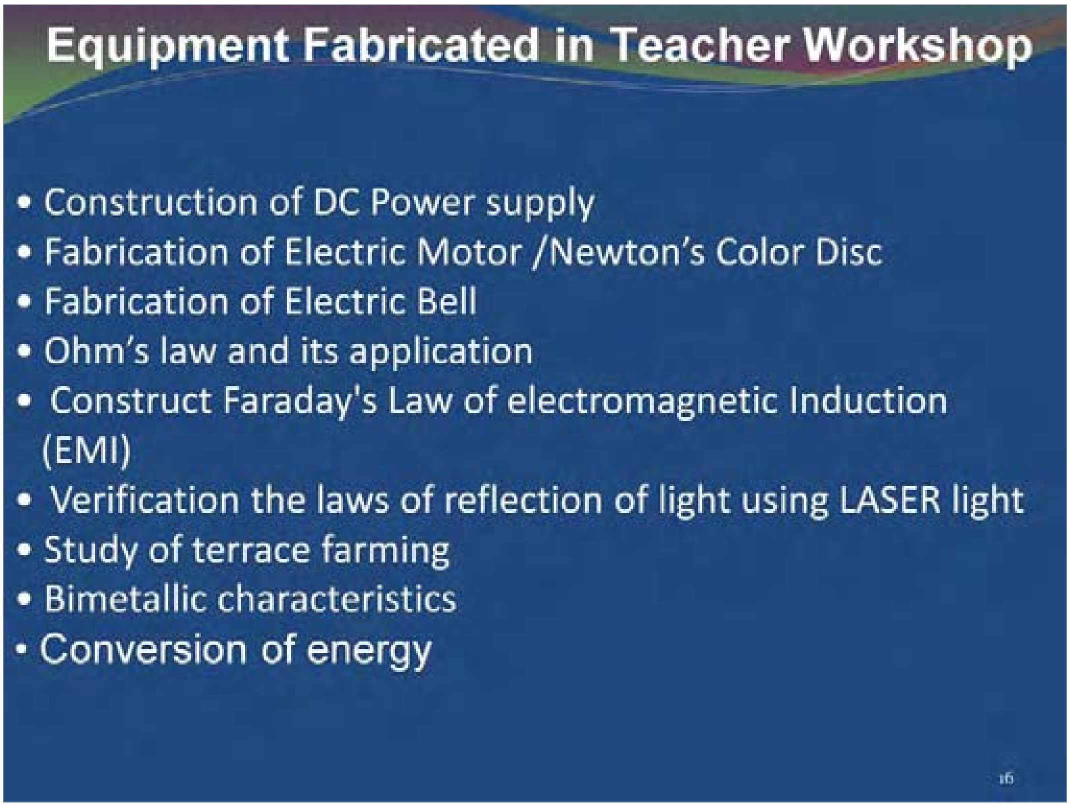
Objective was to promote science and at the same time inform the local community about the organization of the program

Inauguration Ceremony

The ceremony was addressed by the chief guest, principals, science teachers, resource persons and local authorities

14


Science Teachers Training
The training was divided into two parts : Fabrication and Demonstration
Participants were divided into five groups and conducted in a participatory and interactive method
Instructions on demonstration and fabrication of the models to depict the basic principles of science using local materials were conducted by different resource persons from NAST and other districts
Materials designed and fabricated during the training workshop were kept for display during the exhibition
Later they were handed over to needy schools
15


Equipment Fabricated in Teacher Workshop
• Construction of DC Power supply
• Fabrication of Electric Motor /Newton's Color Disc
• Fabrication of Electric Bell
• Ohm's law and its application
• Construct Faraday's Law of electromagnetic Induction (EMI)
• Verification the laws of reflection of light using LASER light
• Study of terrace farming
• Bimetallic characteristics
• Conversion of energy
16

SESSION 2

Experiments on Demonstration

- Conduction of diode
- Action of Bridge Rectifier
- Behavior of Resistor
- Electroscope
- Telescope
- Magnetic Lines of Forces
- Refraction of light and Lateral Shift using LASER Light
- Solar Battery Charger and its application
- Faraday's laws of electromagnetic induction (EMI) and its application
- Atmospheric pressure
- Periscope
- Kaleidoscope
- Flying mirror
- Concept of pressure
- Persistence of vision
- Illusion
- Determination of Acid value
- Acid base chemistry

17

Science Fair

Consisted following components

Science Exhibition

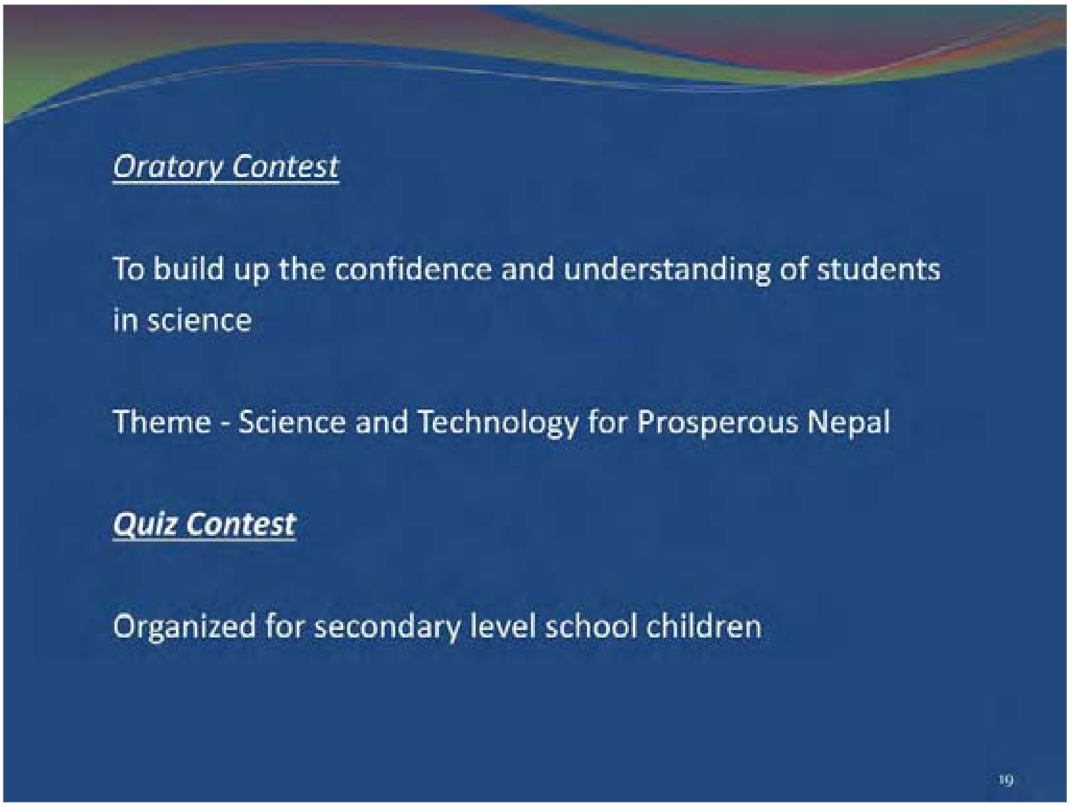
Scientific models using local materials and depicting the basic principles of science were displayed

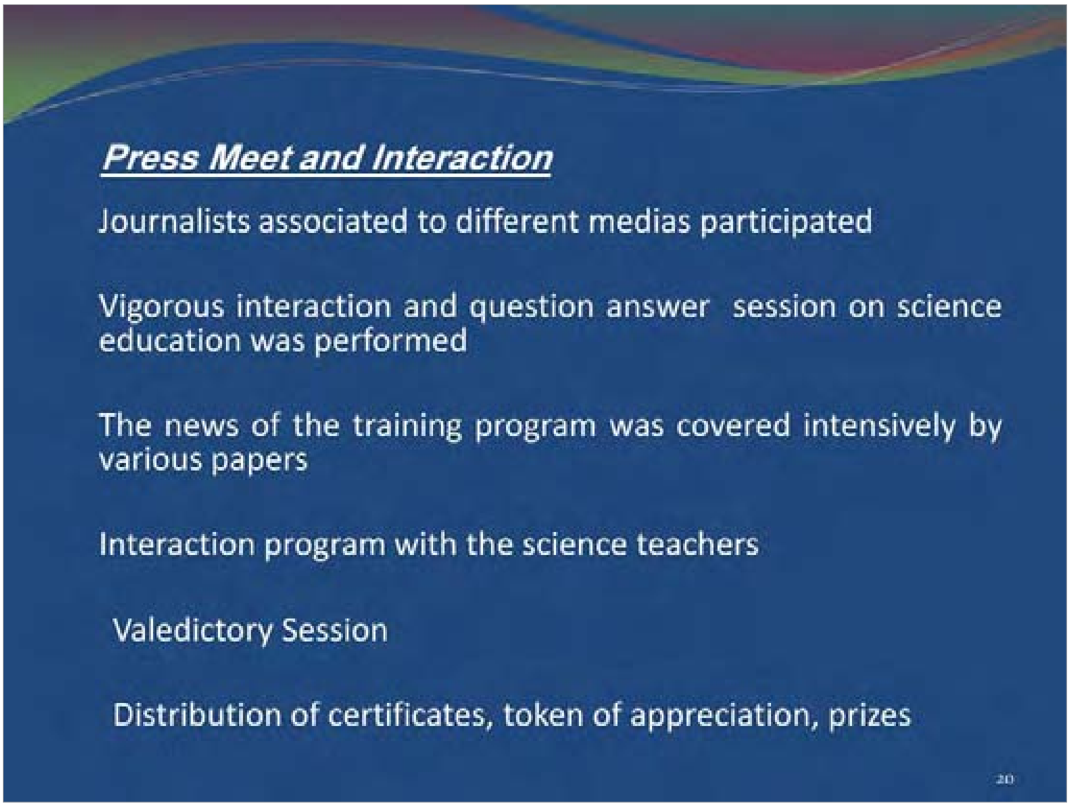
Students of 10 schools participated in each site

About 20 models were displayed

Three best models were awarded

18


Oratory Contest
To build up the confidence and understanding of students in science
Theme - Science and Technology for Prosperous Nepal
Quiz Contest
Organized for secondary level school children
19


Press Meet and Interaction
Journalists associated to different medias participated
Vigorous interaction and question answer session on science education was performed
The news of the training program was covered intensively by various papers
Interaction program with the science teachers
Valedictory Session
Distribution of certificates, token of appreciation, prizes
20

Impacts of the Training Program

Resolution

The resolution incorporated and addressed the following points

- Formation of national level science teachers association
- Need of establishment of NAST branches in all five development regions of Nepal
- Establishment of district level laboratory, library and museum

21

Organization of national level science fair annually

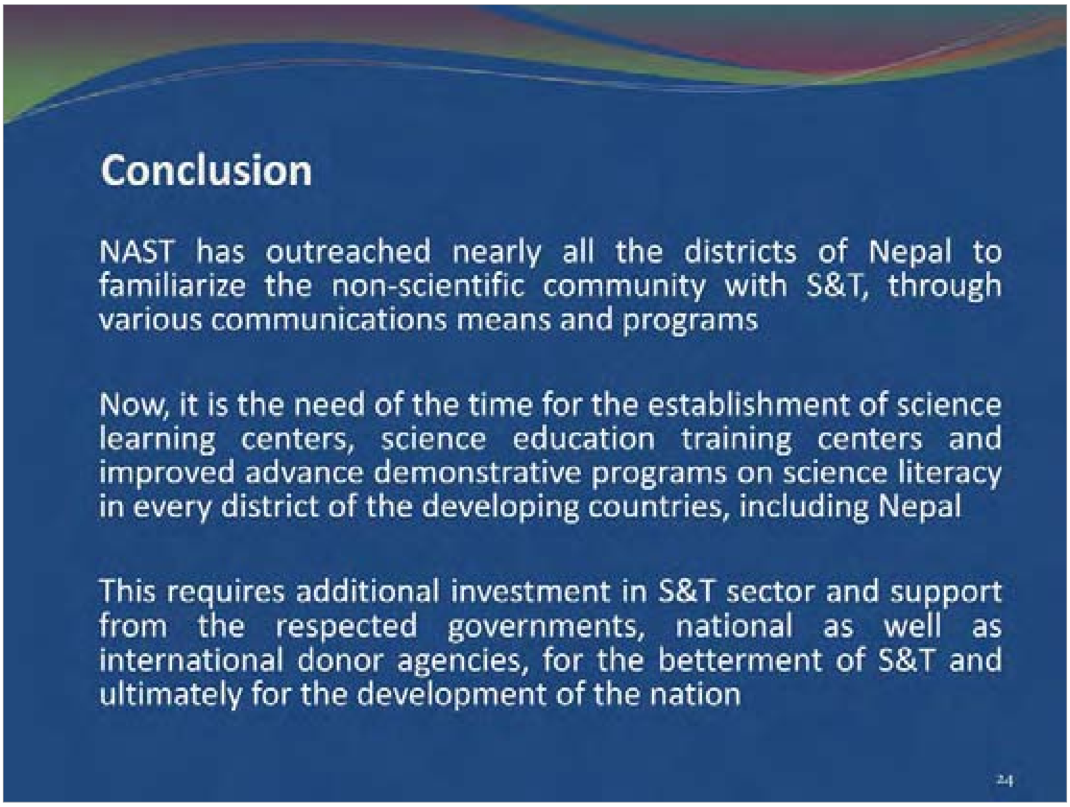
Organization of district level gathering and interaction among the science teachers science community, principals, scientists, local authorities to exchange ideas and views for the development of science education, every six months

TISTA

Created an association with a name Technological Innovation Science Teachers Association (TISTA)

22


Science Education Centre (SEC)
Viewing effectiveness of the training program and the response of the participants NAST is exploring the possibilities of establishing Science Education Centre
This SEC would consist of science museum, science park, miniature of planetarium, demonstration and lecture classes
The concept of establishing SEC is to impart knowledge on the basic principles of science initially targeting the school children
23

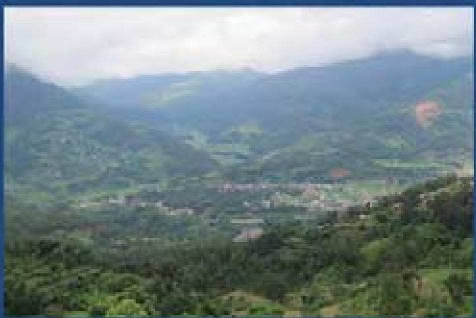

Conclusion
NAST has outreached nearly all the districts of Nepal to familiarize the non-scientific community with S&T, through various communications means and programs
Now, it is the need of the time for the establishment of science learning centers, science education training centers and improved advance demonstrative programs on science literacy in every district of the developing countries, including Nepal
This requires additional investment in S&T sector and support from the respected governments, national as well as international donor agencies, for the betterment of S&T and ultimately for the development of the nation
24

Further, the Asian science academies can join hands to conduct collaborative program and trainings such as empowering science teachers and science literacy to create a forum and develop a multiplier effect for transfer of knowledge and reformation of the present science education system in Asia

25

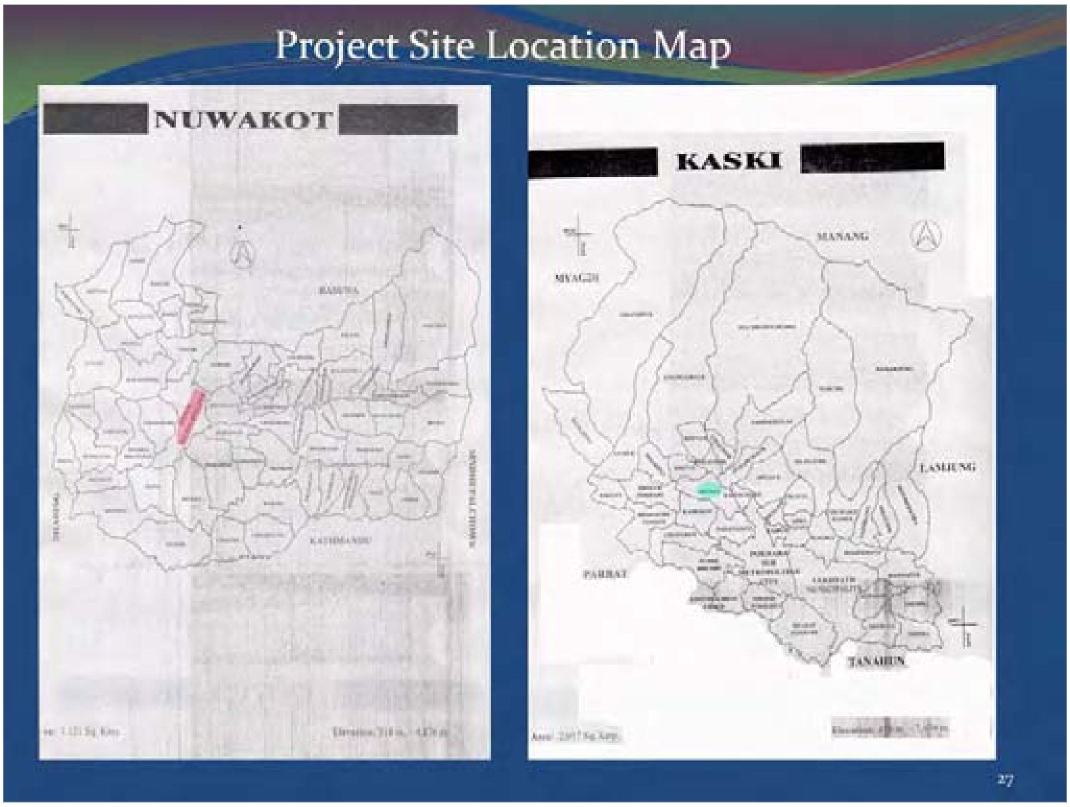
Glimpses of the IAP-NAST Project Activities

NAST Administration & Research lab Building



Project Site: Battar, Nuwakot and Hemja, Kaski (Pokhara)

26

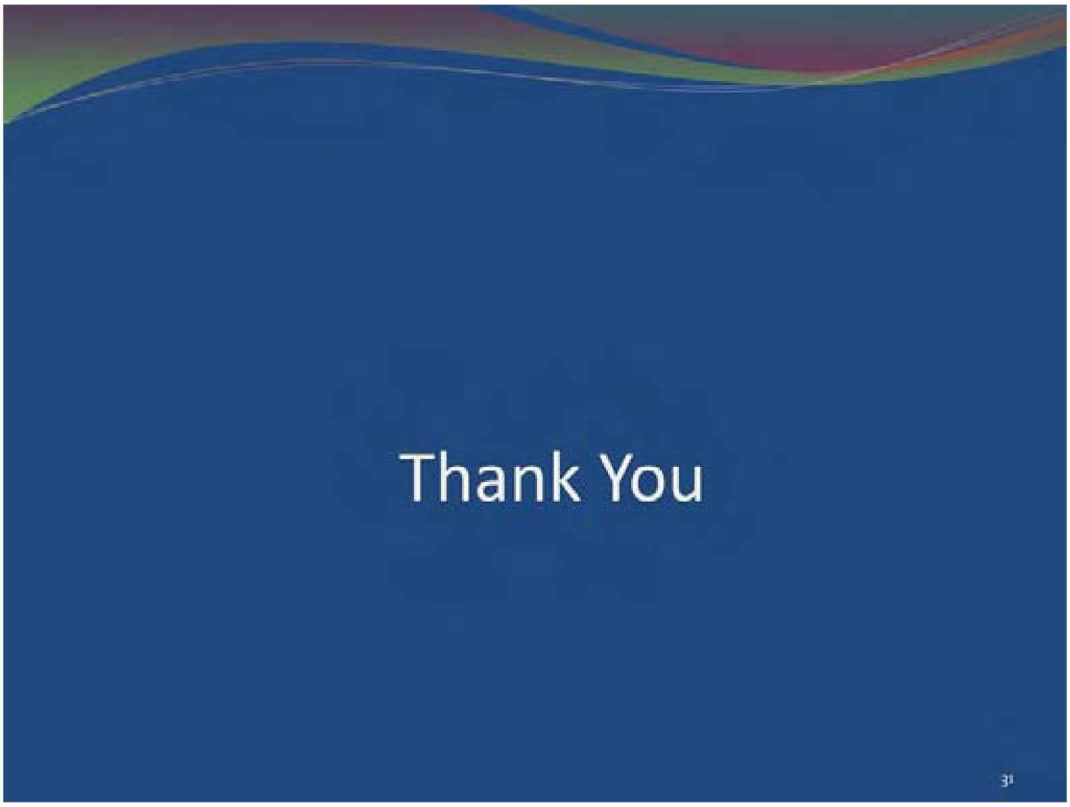

Project Site Location Map
NUWAKOT
RASUWA
KATHMANDU
KASKI
MANANG
MYAGDI
LAMJUNG
PARBAT
TANAHUN
27


हार्दिक स्वागत
Science Rally
Inaugural Ceremony
Cultural Program
Attendee of the program
28

SESSION 2


THE CHILD IS A BOOK WHICH
Fabrication of electric motor
Demonstration of Soil erosion
Principle of Reflection of light
Demonstration of Periscope
29


Interaction Program
Oratory Competition)
Certificate distribution
Prize distribution
30


Thank You
31

Zhaoning Ye

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yezhaoning@seu.edu.cn

EDUCATION

2005	M.S., Curriculum and Instruction, Southeast University, China
1995	B.S., Physics Education, in Nanjing Normal University, China

MAJOR ACTIVITIES

2012 - present	Distinguished Expert of National Teacher Training Program, Ministry of Education
2010 - present	Leader of National Science Teacher Training Program (Demonstration Project), Ministry of Education
2009 - present	Deputy Director of Education Center for "Learning by Doing" Science Education Reform Pilot Program (Southeast University), China Association for Science and Technology
2007 - present	Member of council of Science Education in The Chinese Society of Education
2006 - present	Director of Thinktank: Handsbrain Education, Jiangsu
2006 - present	Member of Key Laboratory of Child Development and Learning Science, Ministry of Education
2006 - present	Member of Research Centre for Learning Science, Southeast University
1995 - 2005	Member of Department of Physics, Southeast University

PUBLICATION

- Zhaoning Ye, et al. Teaching Guide of "Learning by Doing" Science Education Reform Program [M]. ten books. The People's Education Press. 2008-2013
- Zhaoning Ye, Teaching Guide for Inquiry-based science education curriculum in kindergarten [M]. three books. Southeast University Press. 2008
- Shanzhuan Ye, Zhaoning Ye. Teaching Material Database of College Physical [E]. Higher Education Press. 2008

ABSTRACT

Exploration of On-service Science Teachers' Professional Development for Science Literacy and Pedagogical Content Knowledge

Zhaoning Ye[1] **Jianzhong Zhou**[2]
[1]Associate professor, Key Laboratory of Child Development and Learning Science (Southeast University), Ministry of Education
[2]Vice Director, Education Center for "Learning by Doing" Science Education Reform Pilot Program (Southeast University), China Association for Science and Technology
yezhaoning@seu.edu.cn / zjzhou0001@aliyun.com

This paper described the exploration and practice of on-service science teachers' professional development in compulsory education of China.

According to the important principle of science education that the initial training and professional development of teachers should be consistent with the teaching and learning methods required to achieve the education goals, training activities designed for science teachers should focus on the key features of inquiry-based science teaching pedagogy, and be consistent with them. Since 2010, with the practice and experience in "Learning by Doing" science education reform pilot program, a new training mode was developed during the planning and implementing the national science teachers' training activities in the National Training Program organized by the Ministry of Education. It focused on teachers' science literacy and pedagogy of inquiry-based learning and teaching, such as big ideas in science, inquiry practice, pedagogical content knowledge and so on. Meanwhile, three effective strategies for designing training activities in science teachers' professional development were suggested as following:

1. Creating training contexts and investigable questions connected with Big Ideas and scientific literacy.
2. Focusing on participating, thinking and discoursing to improve individual and social construction on pedagogical content knowledge
3. Using formative assessment in training activities to develop teachers' meta-cognition

The mode and strategies have been used in National Training Program for four years. Nearly 600 core teachers and trainers all around China selected by MOE took part in the program. Over 90% of them were satisfied with it and considered it was efficient to improve their understanding of science practice and the knowledge of how to teach science with inquiry-based science teaching method.

Keywords: teachers' professional development, science literacy, pedagogical content knowledge

ENGLISH TEXT

Exploration of On-service Science Teachers' Professional Development for Science Literacy and Pedagogical Content Knowledge

Zhaoning Ye[1] **Jianzhong Zhou**[2]

[1]Associate professor, Key Laboratory of Child Development and Learning Science (Southeast University), Ministry of Education

[2]Vice Director, Education Center for "Learning by Doing" Science Education Reform Pilot Program (Southeast University), China Association for Science and Technology

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Introduction

In the report of IAP science education project (2006)[1], the meaning of Inquiry-based Science Education (IBSE) was established. IBSE is not a single pedagogical method, but an approach having key features that can be implemented in various ways. One of key distinguishing characteristics of IBSE on teachers' view was list in the report[1]:

Teachers are leading students to develop the skills of inquiry and the understanding of science concepts through the students' own activity and reasoning. This involves facilitating group work, argumentation, dialogue and debate, as well as providing for direct exploration of and experimentation with materials.

Therefore, it is the teacher who guides the students to learn science effectively. In classroom, teacher is the guider, facilitator, and supporter of students. In order to implement IBSE successfully, teachers should have high level science literacy and teaching skills[2]. Recently, some science education reform projects emphasize the importance of professional development as a means of improving student science achievement.

IAP project also focuses on teachers' professional development. According to the important principle of science education in Wynne's book (2011) that the initial training and professional development of teachers should be consistent with the teaching and learning methods required to achieve the education goals[3].

That means both pre and on service teacher education courses should recognize that teachers as learners also need to experience scientific activity and discourse at their own level. Courses should include conducting different kinds of scientific inquiry followed by reflection on the conditions and the role of the teacher that supports understanding both in science and about science.

Science Inquiry has been advocated since 2002 in the educational reform movement in China. The national primary science education standard shows that inquiry is the core element in teaching and learning[4]. But teachers' education for both pre and on service, the educational method wasn't changed from teacher-centered to student-centered. And most of teachers have no experience on scientific research. So that their inquiry skills are too limited to help students solve problems they met in investigations.

Teachers' incomplete science knowledge is another huge problem. In general, on-service teacher education always is another kind of degree education, or short-time training program. Its main tasks are to improve teachers' understanding on science content knowledge, based on textbook and curriculum. This kind of compensatory education cannot match the needs of teachers on pedagogical context knowledge. Those entire situations make more difficulties on science teachers' professional development[5].

New Training Mode

Since 2010, with the practice and experience in "Learning by Doing" science education reform pilot program, a new training mode was developed during the planning and implementing the national science teachers' training activities in the National Training Program organized by the Ministry of Education. It focused on teachers' science literacy and pedagogy of inquiry-based learning and teaching, such as big ideas in science, inquiry practice, pedagogical content knowledge (PCK) and so on. See Fig. 1.

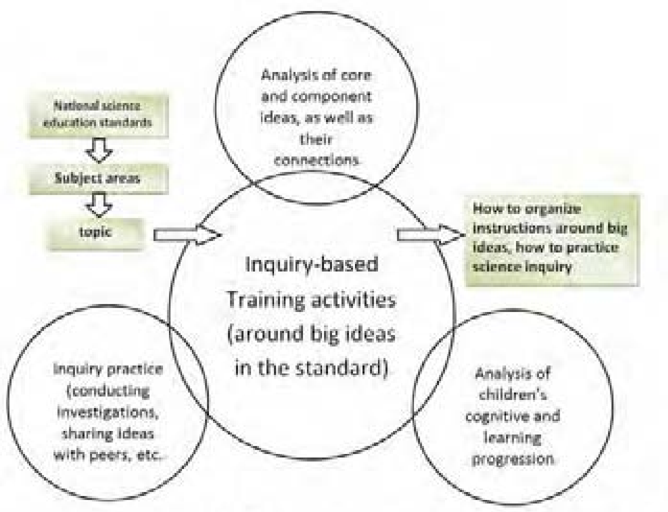

Fig1. Inquiry-based training mode for on-service science teachers' professional development.

First, around the big ideas in National Science Education Standard, some topics are selected such as material, energy, diversity, etc. trainers list the core and component ideas, and confirm the connections between them in each topic. Then, according to the teachers' understanding, Inquiry-based training activities are developed to help teachers improving their understanding and inquiry skills, involving hands-on investigations, recording and communication. At last, trainers promote participates connect their experience from activities with the lesson plans in classroom by investigations and discussion, such as analysis concepts, children's misconception and learning progressions, teaching strategies and so on.

Meanwhile, three effective strategies for designing training activities in science teachers' professional development were suggested as following:

1. Creating training contexts and investigable questions connected with Big Ideas and scientific literacy

Practice is necessary for teacher to transform understanding of science inquiry to behavior. Only reading books or listening lectures may help them understand concepts, but cannot help them know how to use it in different context. Therefore, inquiry contexts and investigable questions, selected and designed elaborately, are essential in teacher training activities. When it was developed, some questions will be considered as following:

- What are the big ideas of the standard in the topic?
- What is the teacher's misconception around those ideas?
- What contexts and investigable questions teachers are interested in?
- What are the key questions that can facilitate thinking?

2. Focusing on participating, thinking and discoursing to improve individual and social construction on pedagogical content knowledge

Shulman (1987) suggested that effective teachers need pedagogical content knowledge rather than only knowledge of a particular subject matter[6]. PCK is different from knowledge of general teaching methods. Expert teachers know the structure of their disciplines, and this knowledge provides them with cognitive roadmaps that guide the assignments they give students, the assessments they use to gauge students' progress, and the questions they ask in the give and take of classroom life. In short, their knowledge of the discipline and their knowledge of pedagogy interact. But knowledge of the discipline structure does not in itself guide the teacher[7]. This means that new teachers must develop the ability to "understand in a pedagogically reflective way; they must not only know their own way around a discipline, but must know the 'conceptual barriers' likely to hinder others"[8].

According to Bazerman (1988), the central activity of scientists is argumentation in communities of practice for the purpose of persuading colleagues of the validity of one's own ideas and the ideas of others[9].A prominent feature of the language of scientific inquiry is debate and argumentation around competing theories, methodologies, and aims. Thus, developing an understanding of science and appropriating the syntactic, semantic, and pragmatic components of its language require students to engage in practicing and using its discourse[10].

In China, influenced by traditional teacher-centered education, most of science teachers are used to accept theories or others opinions. Their abilities of critical thinking are very weak. And their capacities of finding and solving problem are not enough to assist students' inquiry process. It was found that more discussing and communication can improve teachers' thinking, expression, and thinking flexibility.

Constructivism is one of aspects of effective pedagogies in science[3]. It refers to the conscious revealing of students' existing ideas, skills and attitudes in relation to an event or phenomenon being studied and the use of this information in helping further learning. Further it acknowledges that an important source of alternative ideas is the discussion of others' ideas. Therefore rather than expecting students to develop their ideas individually, it is more fruitful to encourage discussion and argumentation in which ideas are developed socially[3]. So, embedded discourse into teacher training activities, the process of communicating and defending ideas helps teachers to reformulate their own ideas taking account of those of others.

3. Using formative assessment in training activities to develop teachers' metacognition

The term metacognition literally means cognition about cognition, or more informally, thinking about thinking. Flavell defined metacognition as knowledge about cognition and control of cognition[11]. One characteristic of experts is an ability to monitor and regulate their own understanding allowing them to keep learning adaptive expertise[7]. This kind of ability is also considered as metacognition. It is an important difference between experts and novice teachers.

Accomplished teachers can assess their own effectiveness. They reflect on what goes on in the classroom and modify their teaching plans accordingly[7]. Using formative assessment is an effective strategy to get the feedback of learning and teaching. Wiliam suggested the main features of formative assessment in classroom in 2009 -- practice in a classroom is formative to the extent that evidence about student achievement is elicited, interpreted and used by teachers, learners, or their peers, to make decisions about the next steps in instruction[12].

In inquiry-based teacher training activities, the key component practices of formative assessment are consistent with the situation in participates' activities. According to Wynne's book[3], the strategies of formative assessment in training activities are:

- Participates being engaged in expressing and communicating their understandings and skills through classroom dialogue, initiated by open and person-centered questions
- Participates understanding the goals of their work and having a grasp of what is good quality work
- Feedback to participates that provides advice on how to improve or move forward and avoids making comparisons with others
- Participates being involved in self-assessment so that they take part in identifying what they need to do to improve or move forward
- Dialogue between trainers and participates that encourage reflection on their learning and thinking
- Trainers using information about on-going learning to adjust teaching so that all participates have opportunity to learn.

Teachers' professional development practice

Recent five years, the inquiry-based training model was implemented in National Teacher Training Program. Over 900 teachers and trainers took part in the inquiry-based training activities. Each activity focuses on a big idea and a specific pedagogical content knowledge.

In the National Teacher Training Program, over 90% of the participates in science training projects were satisfied with the inquiry-based activities and considered it was efficient to improve their understanding of science practice and the knowledge of how to teach science with inquiry-based science teaching method. For example, in the anonymously evaluation for a 10-days science teacher training project of National Teacher Training Program in 2012, the degree of satisfaction of inquiry-based activities was between 85-95%, meanwhile the degree of listening lectures activities was between 60-95%. Most of teachers were interested in inquiry. One young teacher concluded in his final report that "the problems we met in those inquiry-based activities are also the problems students faced in their investigation; it gives us deeply feelings and let us thinking about teaching in classroom".

Conclusion

Though as an adult, science teachers' learning style is different with students', teachers are the bridges between discipline and education. Both science literacy and PCK of science curriculum are essential for science teachers. With the experience and practice in National Teacher Training Program, the principle of science education on teachers' professional development in IAP report was proved. Training activities designed for science teacher should focus on the key features of inquiry-based teaching pedagogy, and be consistent with them.

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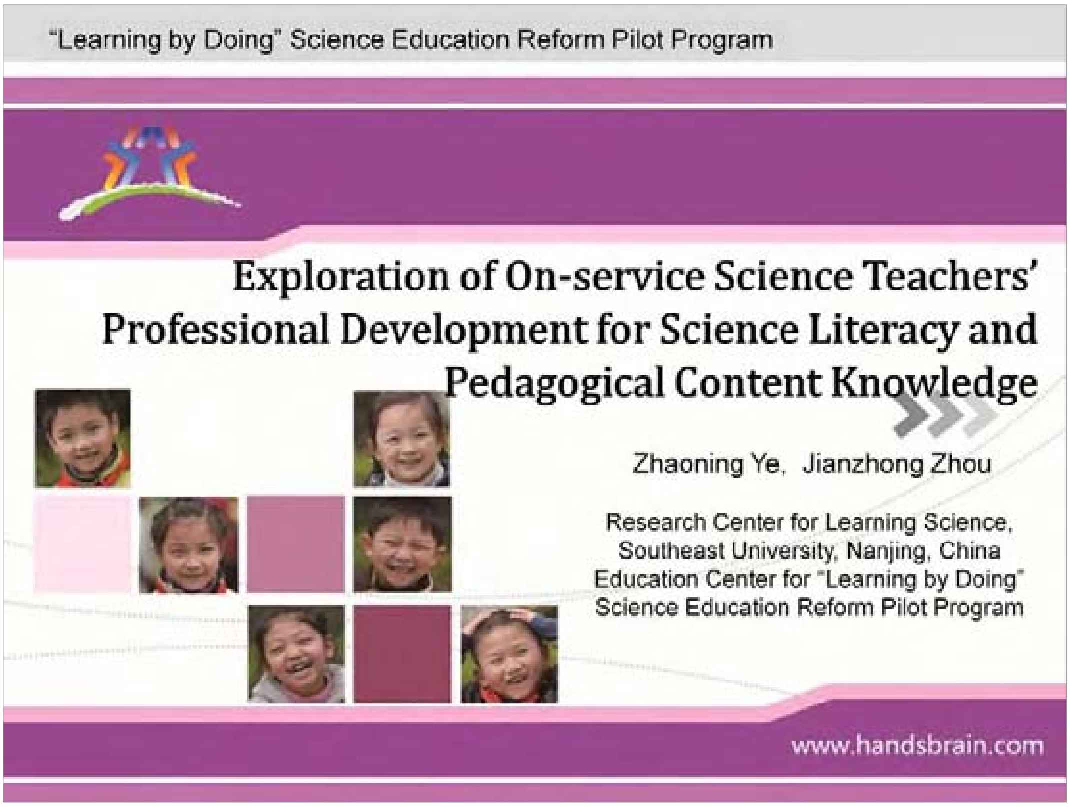
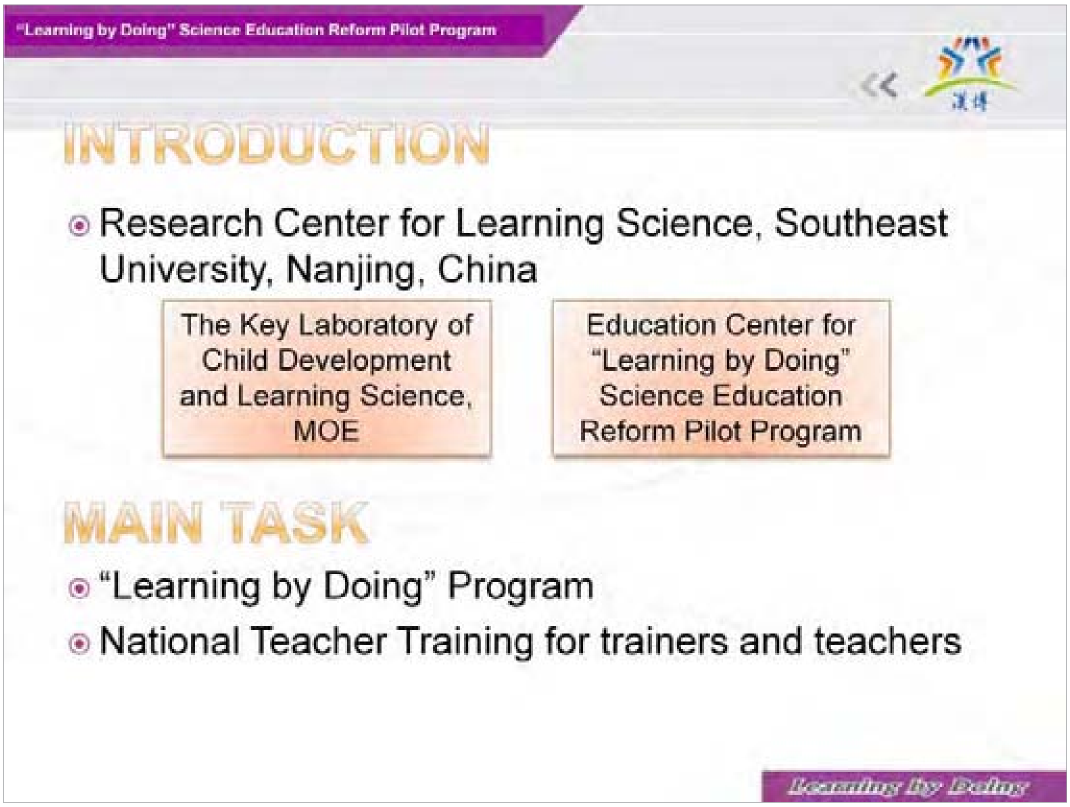
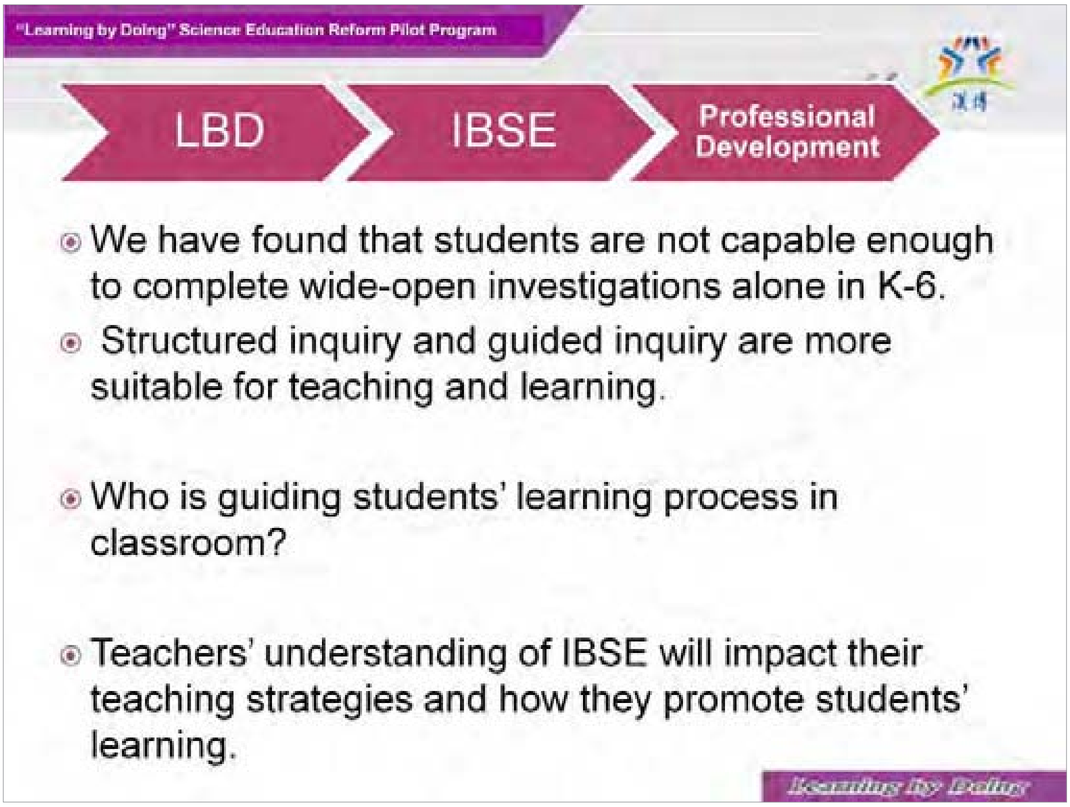
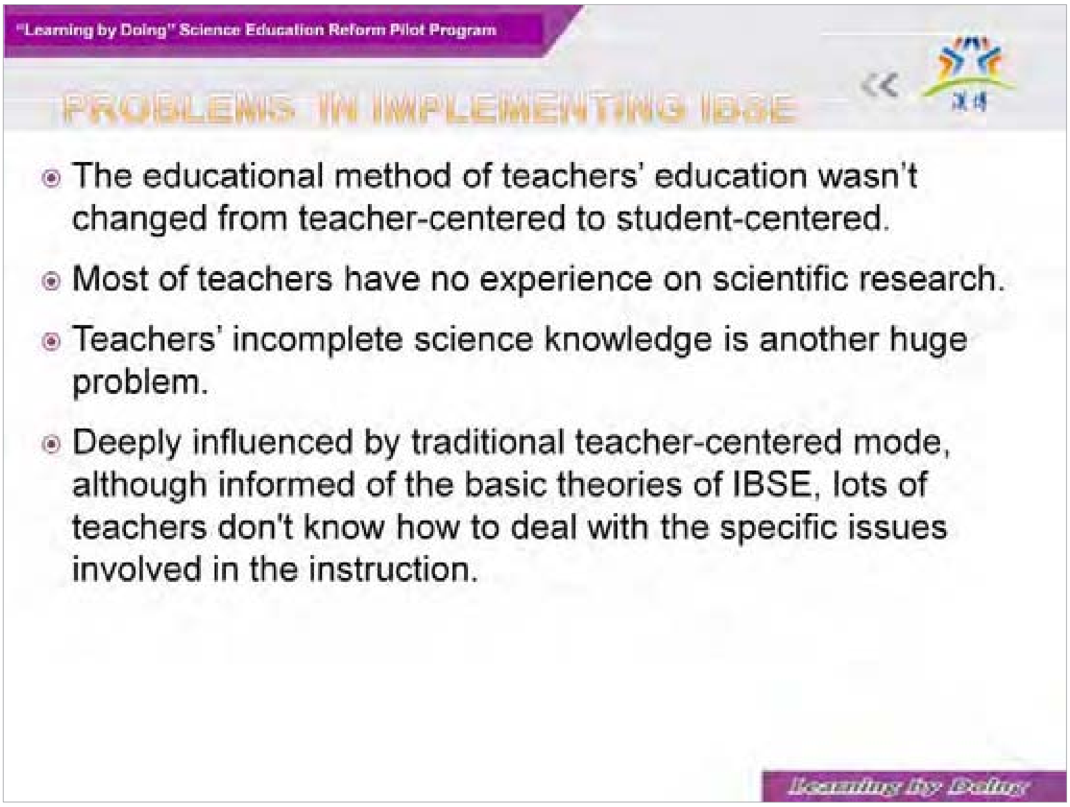

"Learning by Doing" Science Education Reform Pilot Program
Exploration of On-service Science Teachers' Professional Development for Science Literacy and Pedagogical Content Knowledge
Zhaoning Ye, Jianzhong Zhou
Research Center for Learning Science, Southeast University, Nanjing, China
Education Center for "Learning by Doing" Science Education Reform Pilot Program
www.handsbrain.com


"Learning by Doing" Science Education Reform Pilot Program
INTRODUCTION
Research Center for Learning Science, Southeast University, Nanjing, China
The Key Laboratory of Child Development and Learning Science, MOE
Education Center for "Learning by Doing" Science Education Reform Pilot Program
MAIN TASK
"Learning by Doing" Program
National Teacher Training for trainers and teachers
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
LBD
IBSE
Professional Development
We have found that students are not capable enough to complete wide-open investigations alone in K-6.
Structured inquiry and guided inquiry are more suitable for teaching and learning.
Who is guiding students' learning process in classroom?
Teachers' understanding of IBSE will impact their teaching strategies and how they promote students' learning.
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
PROBLEMS IN IMPLEMENTING IBSE
The educational method of teachers' education wasn't changed from teacher-centered to student-centered.
Most of teachers have no experience on scientific research.
Teachers' incomplete science knowledge is another huge problem.
Deeply influenced by traditional teacher-centered mode, although informed of the basic theories of IBSE, lots of teachers don't know how to deal with the specific issues involved in the instruction.
Learning by Doing

"Learning by Doing" Science Education Reform Pilot Program

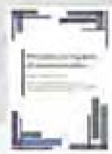
THE PROGRESS OF SCIENCE EDUCATION

- Wynne Harlen. *Principles and big ideas of science education*, IAP, 2010
- Pedagogy consistent with the principles includes the features currently endorsed as central to effective practice:
  - inquiry
  - individual and social constructivism
  - the formative use of assessment

Learning by Doing

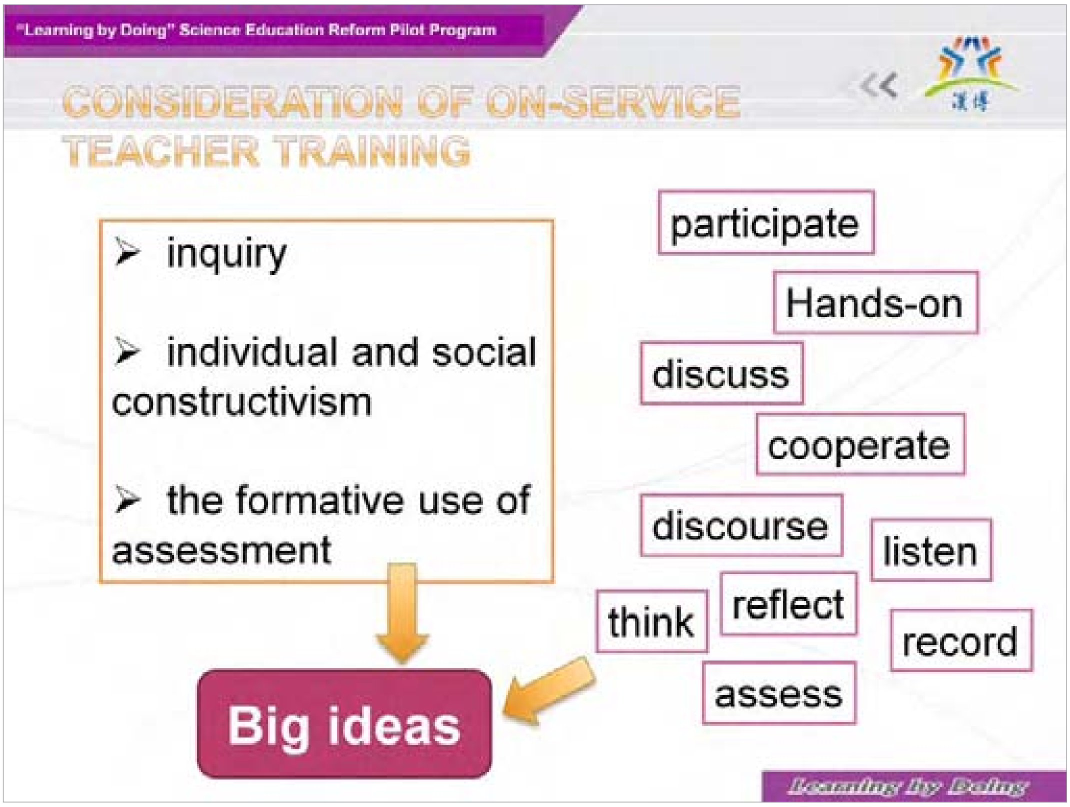
"Learning by Doing" Science Education Reform Pilot Program

THE PROGRESS OF SCIENCE EDUCATION



- Principle 8: Programmes for students, and the initial training and professional development of teachers, should be consistent with the teaching and learning methods required to achieve the goals set out in principles 3.
- Principle 3: science education has multiple goals. It should aim to develop:
  - Understanding of a set of big ideas in science which include ideas of science and ideas about science and its role in society
  - Scientific capabilities concerned with gathering and using evidence
  - Scientific attitudes

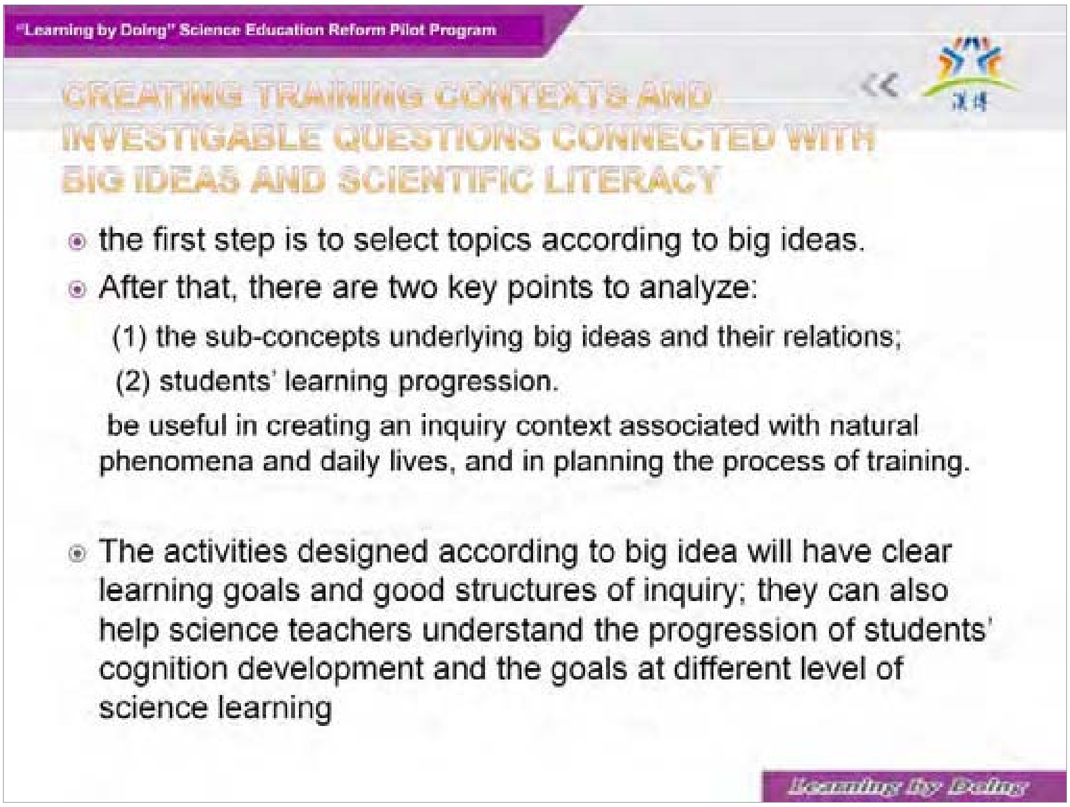
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
CONSIDERATION OF ON-SERVICE TEACHER TRAINING
inquiry
individual and social constructivism
the formative use of assessment
Big ideas
participate
Hands-on
discuss
cooperate
discourse
listen
think
reflect
record
assess
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
Inquiry-based training Mode for in-service teachers' professional development
National science education standards
Scientific field
Topic
Analysis of core and component ideas, as well as their connections
Inquiry-based Training activities (Around big ideas in the standards)
How to organize instructions around big ideas, how to practice science inquiry
Science practices (conducting investigations, sharing ideas with peers, etc.
Analysis of children's cognitive process and learning progressions
Learning by Doing

SESSION 2


"Learning by Doing" Science Education Reform Pilot Program
THREE STRATEGIES OF DESIGNING TRAINING ACTIVITIES
Creating training contexts and investigable questions connected with Big Ideas and scientific literacy
Focusing on participating, thinking and discoursing to improve individual and social construction on pedagogical content knowledge
Using formative assessment in training activities to develop teachers' meta-cognition
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
CREATING TRAINING CONTEXTS AND INVESTIGABLE QUESTIONS CONNECTED WITH BIG IDEAS AND SCIENTIFIC LITERACY
the first step is to select topics according to big ideas.
After that, there are two key points to analyze:
(1) the sub-concepts underlying big ideas and their relations;
(2) students' learning progression.
be useful in creating an inquiry context associated with natural phenomena and daily lives, and in planning the process of training.
The activities designed according to big idea will have clear learning goals and good structures of inquiry; they can also help science teachers understand the progression of students' cognition development and the goals at different level of science learning
Learning by Doing

"Learning by Doing" Science Education Reform Pilot Program

EXAMPLE1: MYSTERIOUS POWDER

- Context: mixed powder in kitchen
- Big idea: All material in the Universe is made of very small particles
- Sub-concept: All the 'stuff' encountered in everyday life, including air, water and different kinds of solid substances, is called material because it has mass and takes up space. Different materials are recognisable by their properties, some of which are used to classify them.

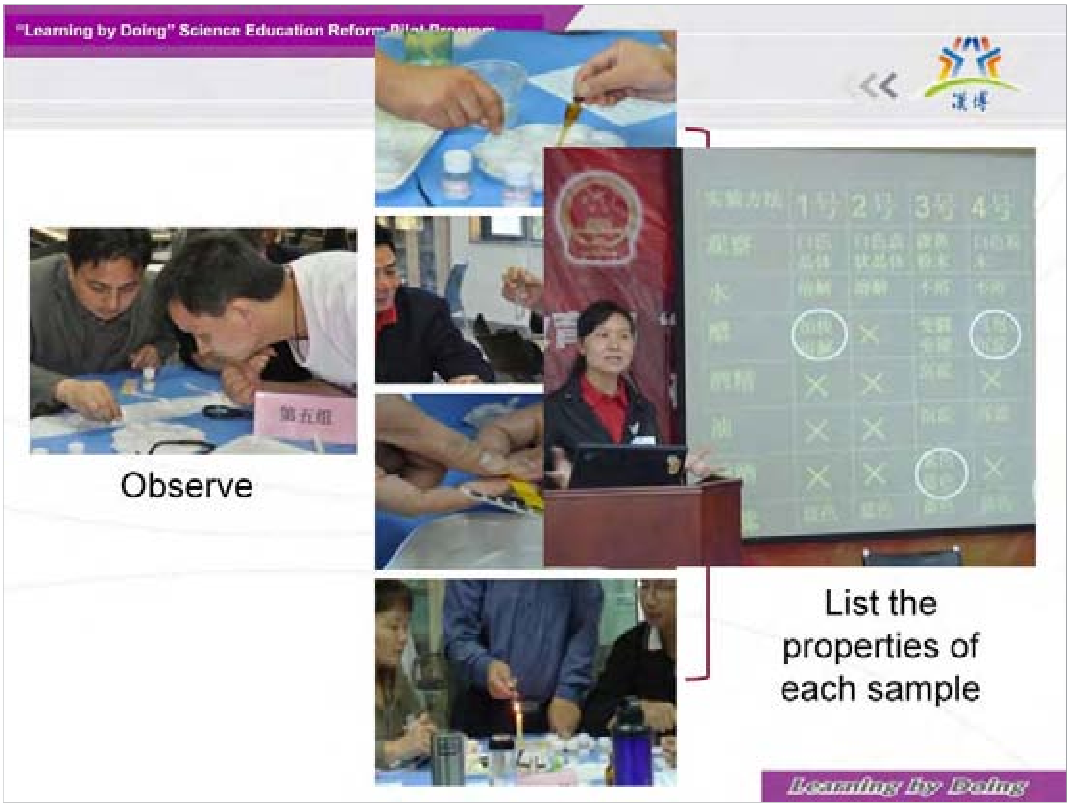
Learning by Doing

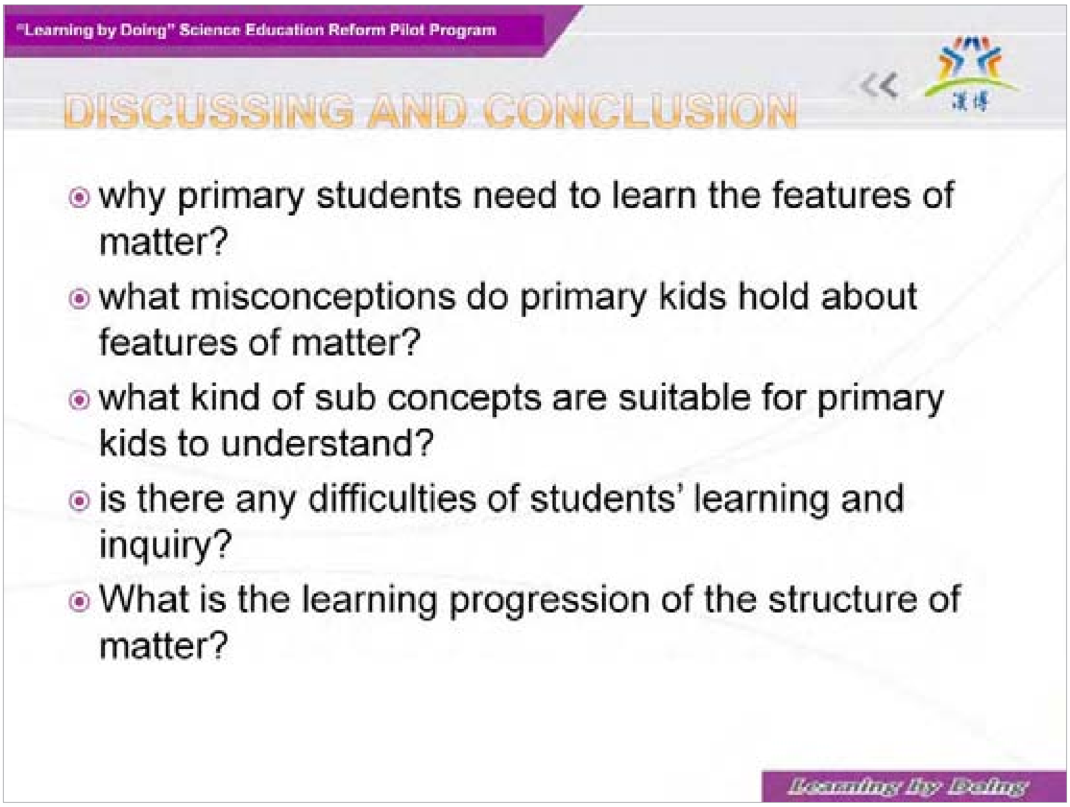
"Learning by Doing" Science Education Reform Pilot Program

INQUIRY-BASED TRAINING ACTIVITITY

- Inquiry question: how to find what is in the mixture?
- Teachers have to think about how to use the properties of the powder to investigate.

Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
Observe
List the properties of each sample
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
DISCUSSING AND CONCLUSION
why primary students need to learn the features of matter?
what misconceptions do primary kids hold about features of matter?
what kind of sub concepts are suitable for primary kids to understand?
is there any difficulties of students' learning and inquiry?
What is the learning progression of the structure of matter?
Learning by Doing

"Learning by Doing" Science Education Reform Pilot Program

EXAMPLE2: FORCE AND MOTION

- Context: moveable toys
- Big ideas: changing the movement of an object requires a net force to be acting on it
- Sub-concepts: objects in nature are always moving, we can use position, speed and direction to describe it; how quickly an object's motion is changed depends on the force acting and the object's mass; The greater the mass of an object, the longer it takes to speed it up or slow it down.

Learning by Doing

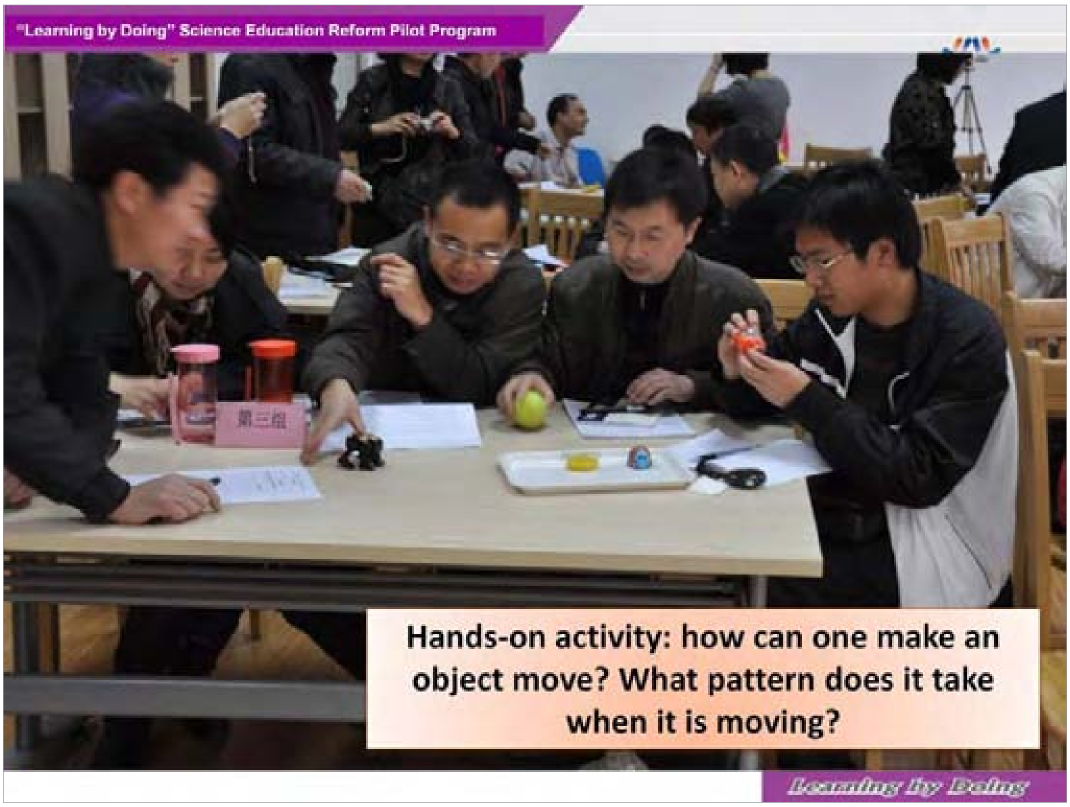
"Learning by Doing" Science Education Reform Pilot Program

INQUIRY ACTIVITY: MOVEABLE TOYS

Questions	training methods and contents	
How to describe objects' movement	hands-on activity	How can one make an object move? What pattern does it take when it is moving?
	discussion	What are the scientific concepts about movement?
What are the states of movement?	hands-on activity	Who is faster?
		How to classify the objects by the states of motion?
	discussion	What are the features of stats of motion?
What misconceptions about movement do primary kids hold?	discussion	Analysis of primary kids' preconceptions and misconceptions about movement
How to design the inquiry activities about movement?	discussion	Analysis of some lesson plans, and discussion on how to design and implement inquiry.

Learning by Doing

SESSION 2



"Learning by Doing" Science Education Reform Pilot Program
第三组
Hands-on activity: how can one make an object move? What pattern does it take when it is moving?
Learning by Doing

Hands-on activity: how can one make an object move? What pattern does it take when it is moving?
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
"国培计划(2010
科学概念解读
一个物体在运动……
Discussion: what are the scientific concepts about movement?
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
Hands-on activity: who is faster?
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
Lesson plan case study: the moveable toys (grade 2)
Learning by Doing


"Learning by Doing" Science Education Reform Pilot Program
FOCUSING ON PARTICIPATING, THINKING AND DISCOURSING TO IMPROVE INDIVIDUAL AND SOCIAL CONSTRUCTION ON PCK
Providing challenges and inspiring question to encourage learning and reflecting.
Group discussing and communication
Salon and circus to show and share teachers work
Learning by Doing

"Learning by Doing" Science Education Reform Pilot Program

USING FORMATIVE ASSESSMENT IN TRAINING ACTIVITIES TO DEVELOP TEACHERS' METACOGNITION

- Multiuser on-line assessment and record system

Teachers use the system to respond to the trainer's questions at the same time. The system can record their answers and reaction time, and calculate the accuracy rate and the average reaction time.

Learning by Doing

"Learning by Doing" Science Education Reform Pilot Program

THE STRATEGIES OF FORMATIVE ASSESSMENT IN TRAINING ACTIVITIES

- Participates being engaged in expressing and communicating
- Participates understanding the goals of their work and having a grasp of what is good quality work
- Feedback to participates that provides advice on how to improve or move forward
- Participates being involved in self-assessment so that they take part in identifying what they need to do to improve or move forward
- Dialogue between trainers and participates that encourage reflection on their learning and thinking
- Trainers using information about on-going learning to adjust teaching so that all participates have opportunity to learn

Learning by Doing

"Learning by Doing" Science Education Reform Pilot Program

TEACHER TRAINING ACTIVITIES SHOULD……

- Be a source of enjoyment and wonder but at the same time develop understanding of learning and teaching
- Relate to children's lives and teacher's works
- Also develop ideas about science, inquiry skills and willingness to find and take note of evidence
- Build upon existing ideas, skills and dispositions and stimulate further development
- Enable teacher to experience scientific activity as currently understood
- Promote understanding and responsibility for their learning through formative use of assessment

Learning by Doing

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

SESSION 2

Amal Amin

Associate professor, National Research Center
aamin 07@yahoo.com / aamin 2011@yahoo.com

SHORT BIOGRAPHY

Dr. Amal Amin is Associate Professor at the Polymers & Pigments Department of the National Research Center (NRC) in Egypt and Leader of the Nanostructured Polymers Research Group at the NRC centre of excellence. She earned her B.Sc. at the Chemistry Department of Ain Shams University in Cairo and her M.Sc. in Organic Chemistry "preparation and studying of the physical and chemical properties of some polymers obtained from some aromatic amine derivatives" at the Faculty of Science of Cairo University. With a DAAD scholarship at the Inorganic Chemistry Department II of Ulm University in Germany, she earned her Ph.D. in Polymer Technology & Catalysis with "Studies on novel multinuclear catalysts for atom transfer radical polymerization". Since then, she has occupied different positions. Research stays brought her to France, USA and again to Germany for several times. She supervised and headed several international, national projects, postgraduate students and has several activities. She organized several national and international events and carried out two memorandums of understanding between Egypt, Georgia and MTU-USA. She attended lots of reputable events and conferences.

She has several publications in peer-reviewed journals.

Amal Amin is founder and president of the Egyptian Society of Advanced Materials and Nanotechnology. She is the founder and coordinator of the Arab Materials Science and Nanotechnology Network (AMSN). She was also selected as TWAS Young Affiliate in 2010 till 2014. Additionally, she is a member of the Arab-German Young Scientists Forum. She has several scientific publications in reputable journals.

Dr. Amal was the first Egyptian young scientist who attended Summer DAVOS 2009-China based on the initiative of IAP to empower the young scientists worldwide, and hence she was one of the few active founders of Global young academy (GYA) where she attended the founding workshop of GYA in Berlin at 2010. Also, she was selected as young mentor to attend summer DAVOS-2010-China. Hence, she is one of steering committee for founding the Egyptian young academy/ 2012.

Dr. Amal has served as the executive committee member of (GYA) for the past consecutive three years till now from the date of its founding. She is the group leader of women in science and member in the selection committee of GYA. She is one of the steering committee in founding the Egyptian Young Academy of Sciences (EYAS).

ABSTRACT

Employing scientific research to solve societal problems by increasing public awareness and science literacy Egypt as case study

Amal Amin
Group leader of women in science working group in Global Young Academy (GYA)
Group leader of Nanostructured Polymers
Nanotechnology and advanced materials research group
Center of excellence, National Research Center-Cairo-Egypt
aamin_07@yahoo.com, aamin_2011@yahoo.com

Nowadays, the science is considered as the main pillar of development and has to be mainly dedicated to solve the human emerging problems irrespective of the passion of the political leaders to control or prevail. However, one of the main barriers to create scientific society is the lack of public awareness or scientific illiteracy which can be enhanced by developing new innovative strategies for science communication and outreach programs. Science communication may be via all means of media including newspapers, TV shows, radio talks, programs, competitions, etc.

Science communication can be urged and pushed by outreach programs via direct contact with recipients by arranging mutual collaborations and visits of scientists and students, may be with their families, to schools and laboratories, respectively because convincing families with science and its` education plays main role in encouraging science education. Establishing science museums can attract school pupils by clarifying the main scientific concepts.

Egypt is one of the developing countries, which suffers from lots of main problems which if solved in scientific way; stabilization, welfare and progress in the region will be guaranteed. However, at the same time, Egypt suffers from high percent of illiteracy (40 %) and accordingly science illiteracy. Also, science education sometimes looks not attractive enough or boring where the number of students who want to study science is decreasing which threatens the future with lack of experts in some fields specifically the technological ones. Therefore, it seems that it is the right time to depend on and to encourage the private sector and NGOs which should have national motives to play vital role together with the government to support science literacy and encourage science education. On that way, big efforts are given. Several experiments are done by establishing new initiatives and centers such as Children's Civilization and Creativity Center (Child Museum), Cairo science festival (in March) and science festival of Bibliotheca Alexandrina (in April). Also, national program entitled (scientists for next generation) was launched by senior academy (ASRT) to encourage innovation and science education. Egyptian young academy (EYAS) was established as well to enhance science literacy and support science education as the main activities. All these projects are dedicated to enhance science literacy among youth in addition to several other programs.

KAST-ASM-IAP Workshop on
'Science Literacy: Science Communication and Science Outreach'
June 12 – 13, 2014

Employing Scientific Research to Solve Societal Problems by Increasing Public Awareness and Science Literacy (Egypt as case study)

Amal Amin
Nanotechnology and advanced materials group
Center of excellence-National research center
Cairo-Egypt

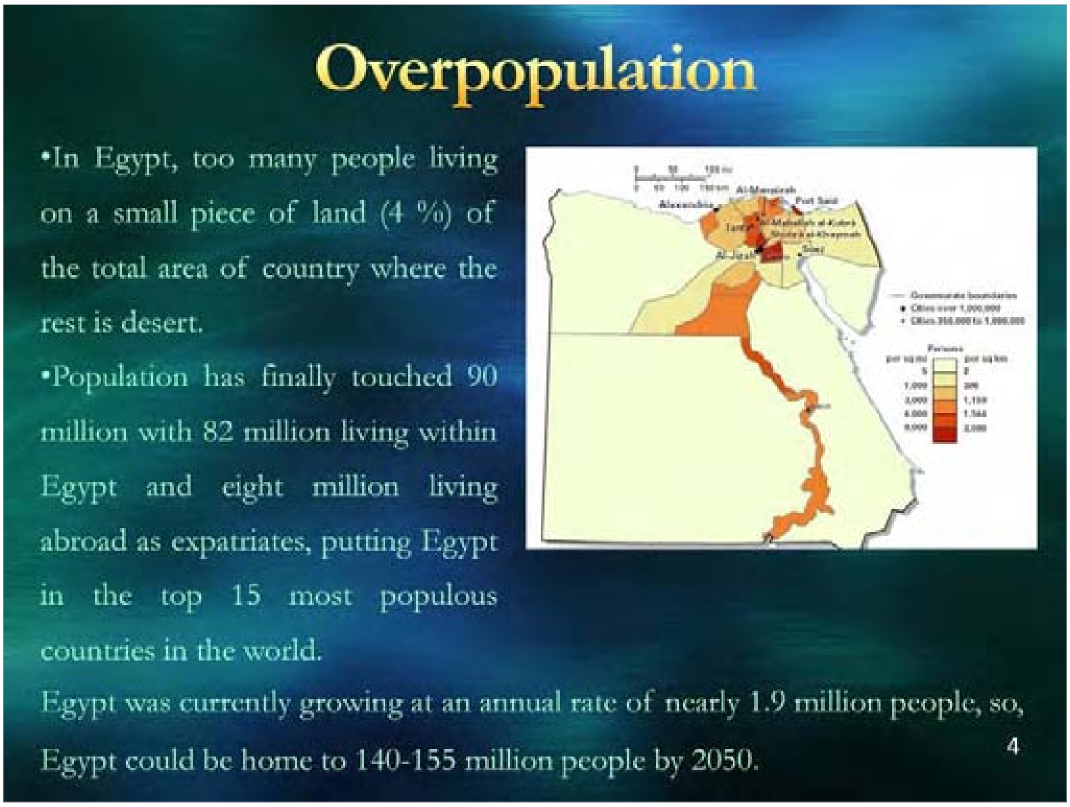
1

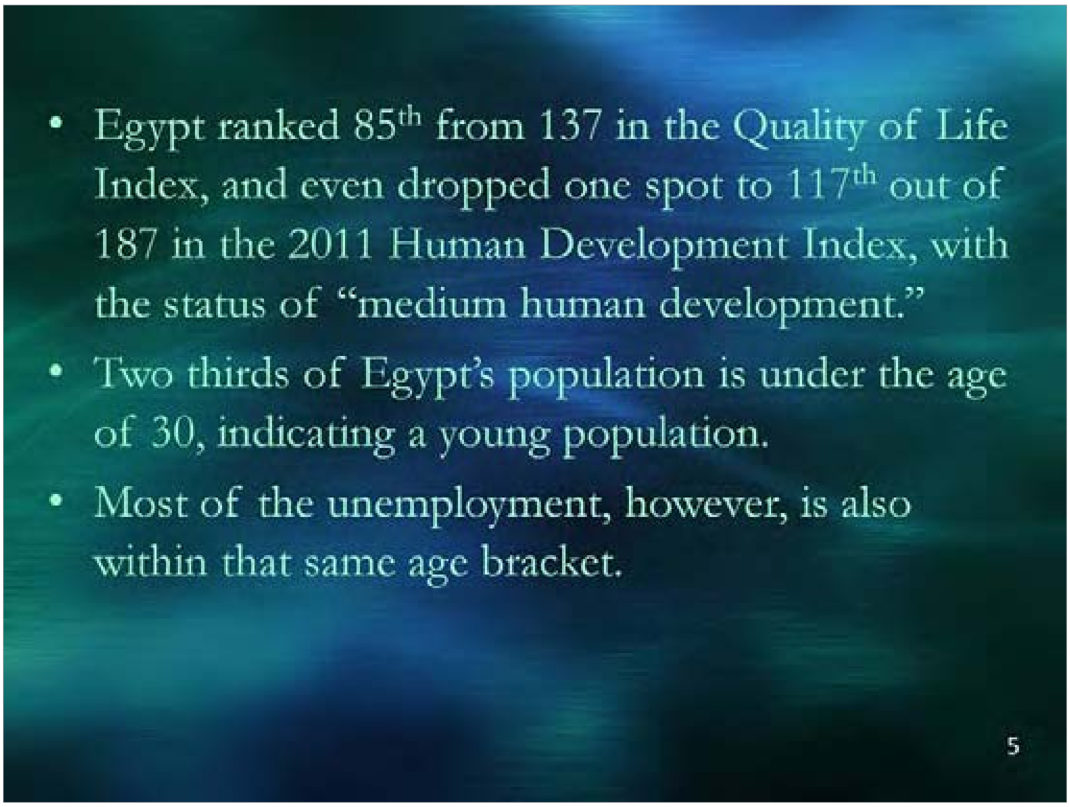
Outline

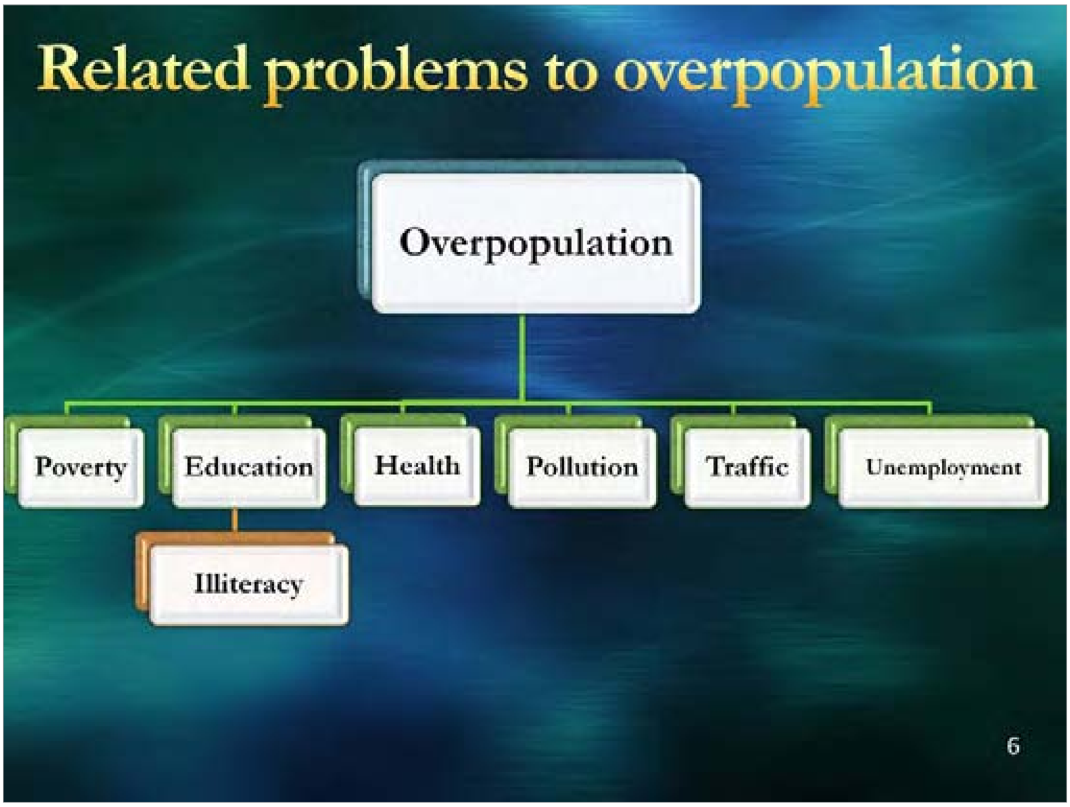
- The developing countries have similar problems
- It is the due time to identify and solve these problems in scientific ways.
- It is time for fruitful global scientific cooperation between developed and developing countries to solve these problems to support the nations at developing countries not the political regimes.
- Political considerations and politicians not always with the sake of nations

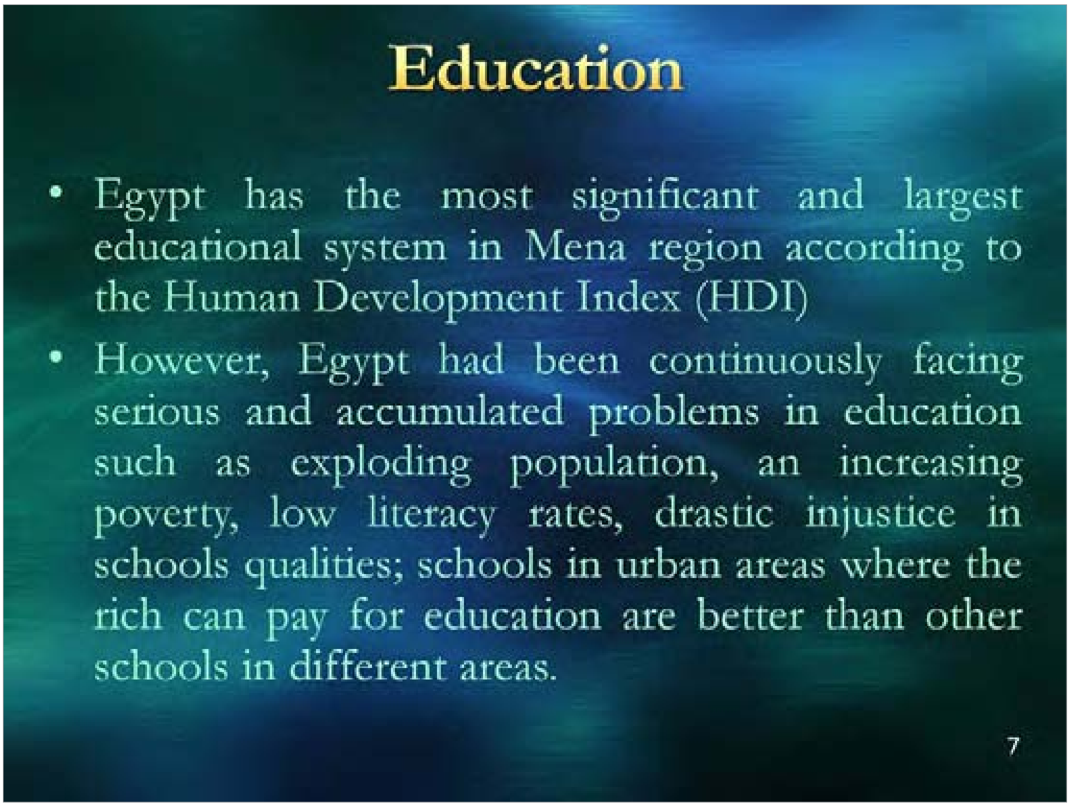
2

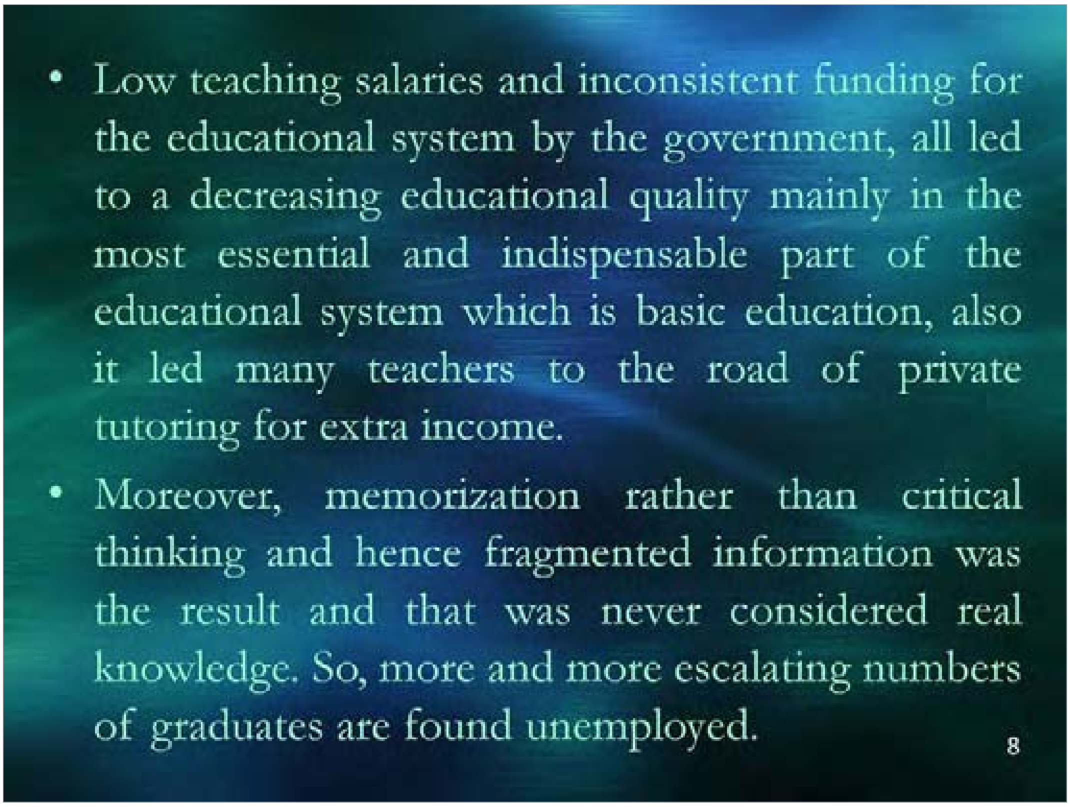

Main Problems
Traffic
Pollution
Illiteracy
Water
Over population
Energy
Health
Poverty
3

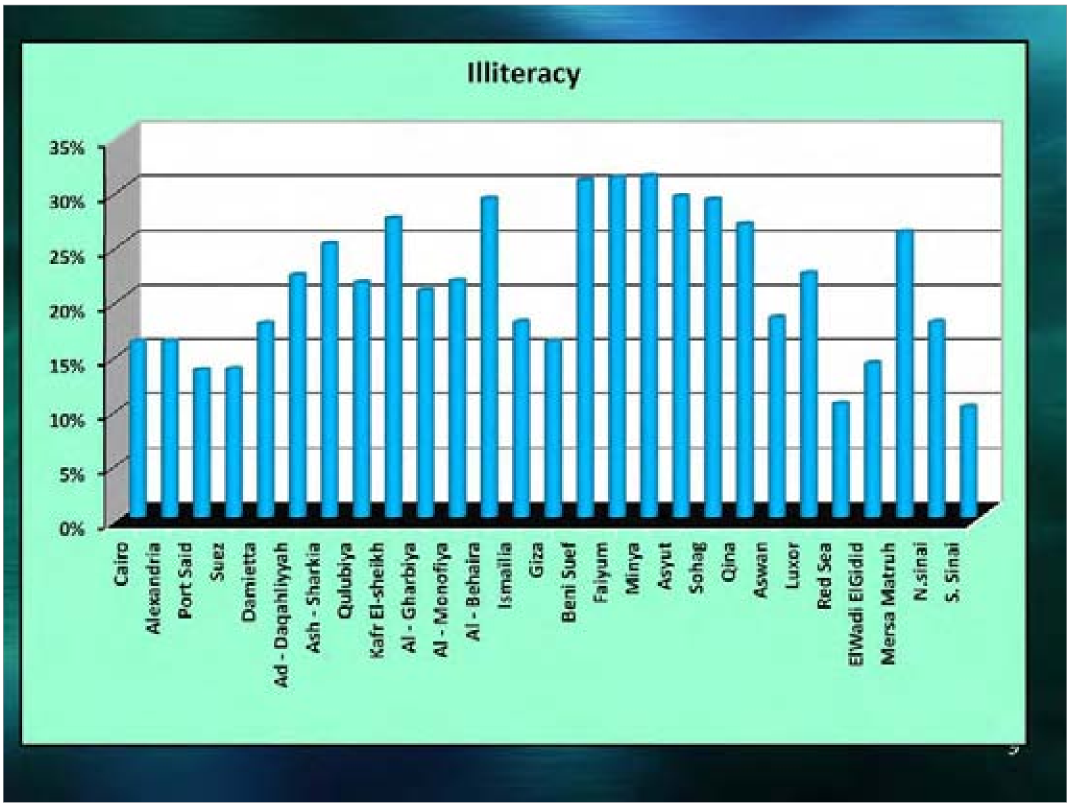

Overpopulation
•In Egypt, too many people living on a small piece of land (4 %) of the total area of country where the rest is desert.
•Population has finally touched 90 million with 82 million living within Egypt and eight million living abroad as expatriates, putting Egypt in the top 15 most populous countries in the world.
Egypt was currently growing at an annual rate of nearly 1.9 million people, so, Egypt could be home to 140-155 million people by 2050.
4


• Egypt ranked 85th from 137 in the Quality of Life Index, and even dropped one spot to 117th out of 187 in the 2011 Human Development Index, with the status of "medium human development."
• Two thirds of Egypt's population is under the age of 30, indicating a young population.
• Most of the unemployment, however, is also within that same age bracket.
5


Related problems to overpopulation
Overpopulation
Poverty
Education
Health
Pollution
Traffic
Unemployment
Illiteracy
6


Education
• Egypt has the most significant and largest educational system in Mena region according to the Human Development Index (HDI)
• However, Egypt had been continuously facing serious and accumulated problems in education such as exploding population, an increasing poverty, low literacy rates, drastic injustice in schools qualities; schools in urban areas where the rich can pay for education are better than other schools in different areas.
7


• Low teaching salaries and inconsistent funding for the educational system by the government, all led to a decreasing educational quality mainly in the most essential and indispensable part of the educational system which is basic education, also it led many teachers to the road of private tutoring for extra income.
• Moreover, memorization rather than critical thinking and hence fragmented information was the result and that was never considered real knowledge. So, more and more escalating numbers of graduates are found unemployed.
8


Illiteracy
35%
30%
25%
20%
15%
10%
5%
0%
Cairo
Alexandria
Port Said
Suez
Damietta
Ad - Daqahliyyah
Ash - Sharkia
Qulubiya
Kafr El-sheikh
Al - Gharbiya
Al - Monofiya
Al - Behaira
Ismailia
Giza
Beni Suef
Faiyum
Minya
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Qina
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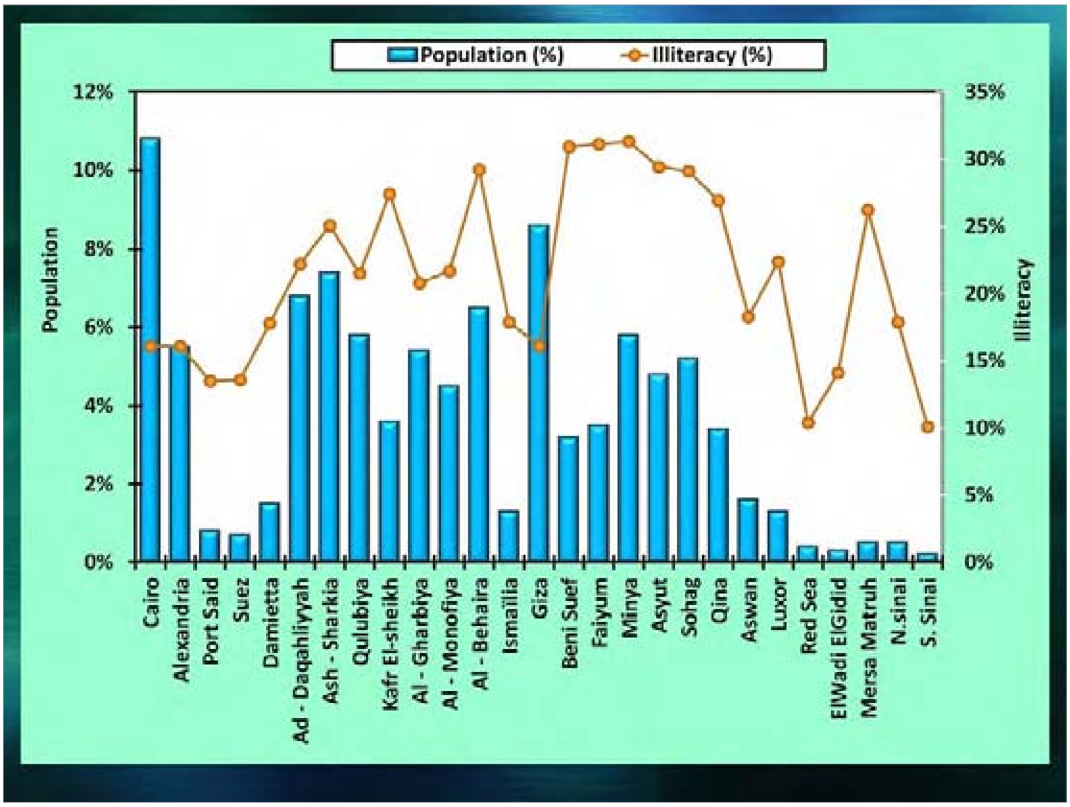
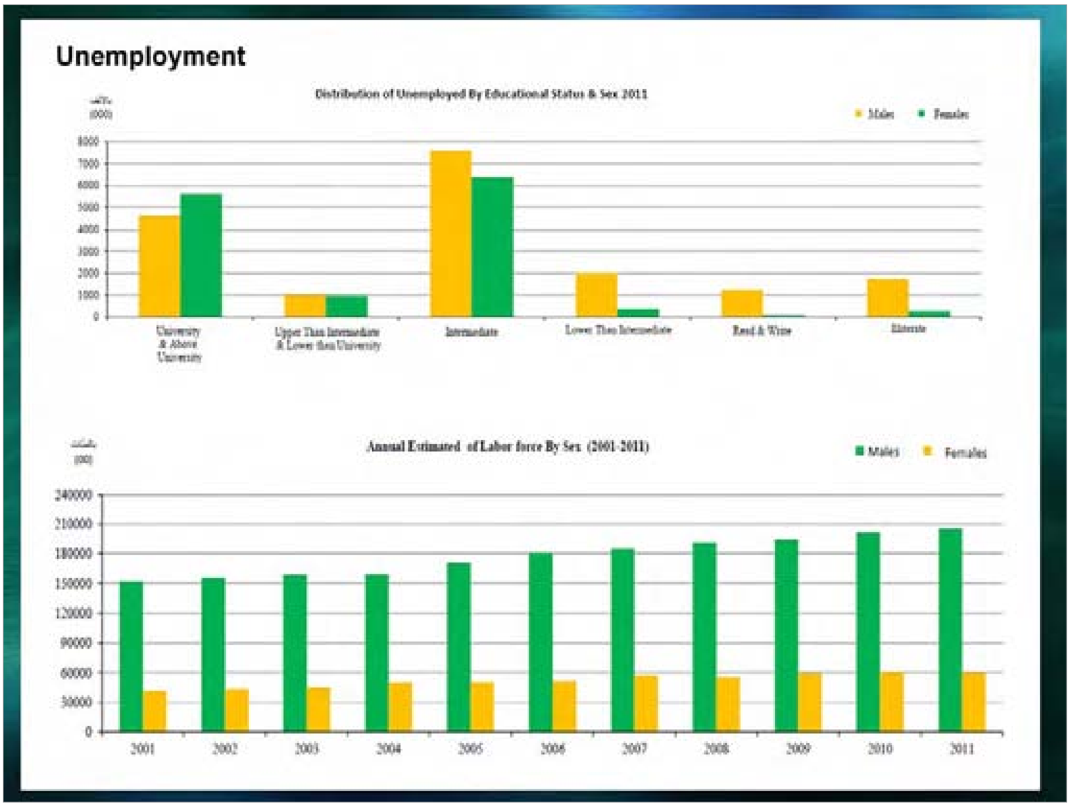
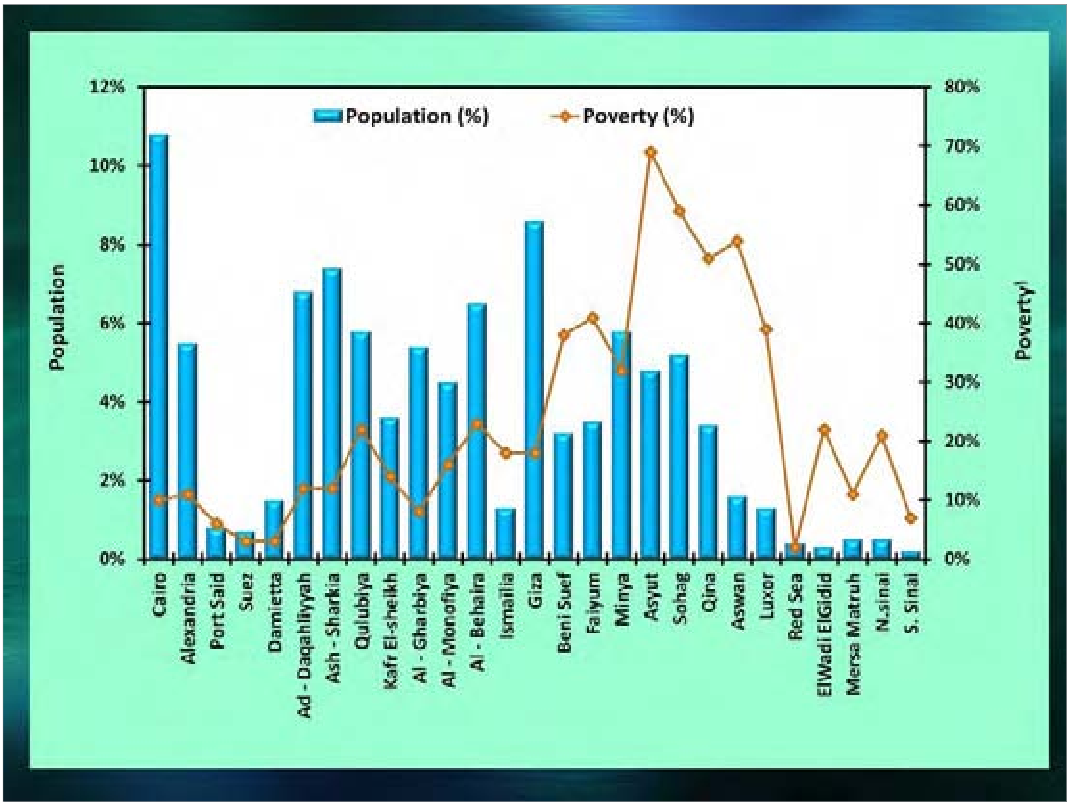
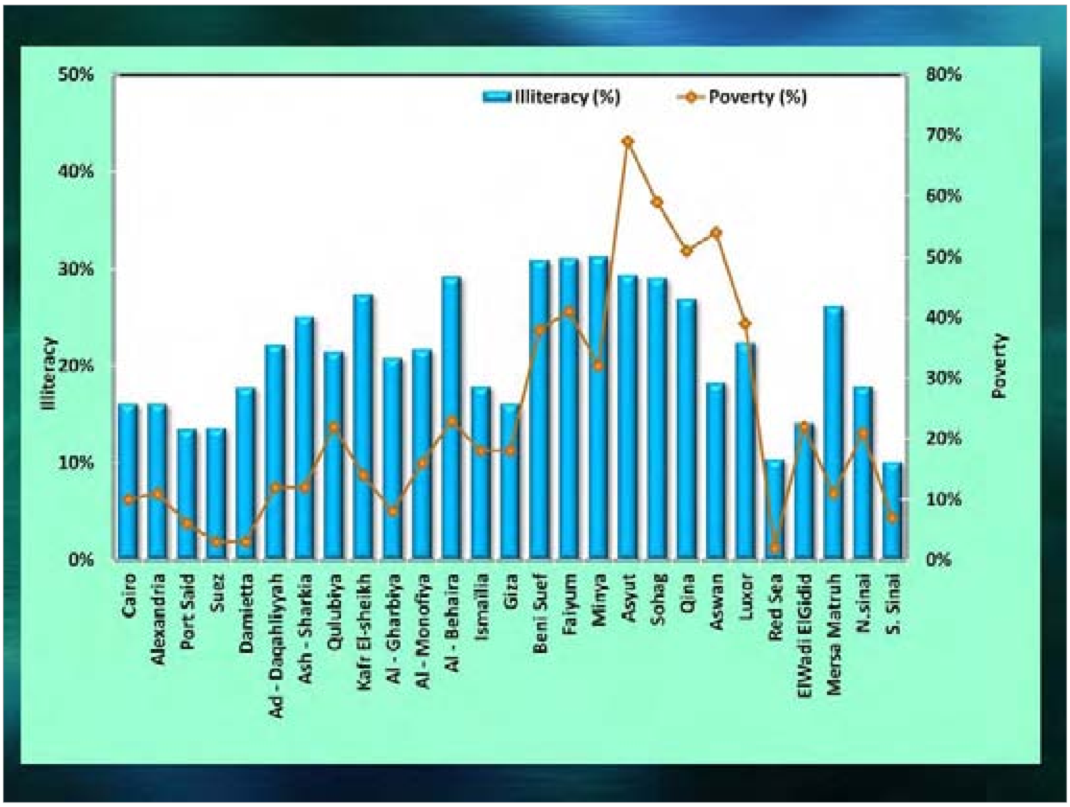
Red Sea
ElWadi ElGidid
Mersa Matruh
N.sinai
S. Sinai


Population (%)
Illiteracy (%)
Population
Illiteracy
12%
10%
8%
6%
4%
2%
0%
35%
30%
25%
20%
15%
10%
5%
0%
Cairo
Alexandria
Port Said
Suez
Damietta
Ad - Daqahliyyah
Ash - Sharkia
Qulubiya
Kafr El-sheikh
Al - Gharbiya
Al - Monofiya
Al - Behaira
Ismailia
Giza
Beni Suef
Faiyum
Minya
Asyut
Sohag
Qina
Aswan
Luxor
Red Sea
ElWadi ElGidid
Mersa Matruh
N.sinai
S. Sinai


Unemployment
Distribution of Unemployed By Educational Status & Sex 2011
(000)
Males
Females
8000
7000
6000
5000
4000
3000
2000
1000
0
University & Above University
Upper Than Intermediate & Lower than University
Intermediate
Lower Than Intermediate
Read & Write
Illiterate
Annual Estimated of Labor force By Sex (2001-2011)
(00)
Males
Females
240000
210000
180000
150000
120000
90000
60000
30000
0
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011


Population (%)
Poverty (%)
12%
10%
8%
6%
4%
2%
0%
Population
80%
70%
60%
50%
40%
30%
20%
10%
0%
Poverty
Cairo
Alexandria
Port Said
Suez
Damietta
Ad - Daqahliyyah
Ash - Sharkia
Qulubiya
Kafr El-sheikh
Al - Gharbiya
Al - Monofiya
Al - Behaira
Ismailia
Giza
Beni Suef
Faiyum
Minya
Asyut
Sohag
Qina
Aswan
Luxor
Red Sea
ElWadi ElGidid
Mersa Matruh
N.sinai
S. Sinai



Urgent solutions

- Increase public awareness by the help of media, NGO`s, scientists and private sectors.
- Adopting national project to fix the education and specifically (science education)
- Training and raising the qualifications of the already present population to transform them to productive power can be invested in developments plans.

14

Efforts to enhance science Literacy

- Bibliotheca Alexandrina
- AUC science and society initiative
- Children`s Civilization and Creativity Center
- EYAS- Egyptian young academy of sciences

15

One of the most prominent activities conducted throughout the year was the "Biodiversity: Play and Learn!" exhibition, which was on display from 9 to 24 November 2010. The first interactive exhibition to be entirely developed and manufactured within the PSC, it showcases and celebrates the outstanding biodiversity of our planet, especially, in Egypt, in a playful manner that has intrigued the public of all age groups. The exhibition is divided into five zones that explore the Animal World, a Greenhouse, the Insect World, the Food World, and the Marine World, in addition to Activity and Movie Corners.

17

Fun With Science

A major theme of the program is the introduction of "systems thinking"; children learn that everything is interconnected. The first part of the program is based on storytelling, while the second part focuses on hands-on scientific activities.

As example, a series of fables containing valuable messages that aim to provide children with a scientific basis, enabling them to make use of scientific facts as creative tools. There are three interesting fables: The King of Hearts, where students will gain information about the human heart and the heart of whales; The Strongest Tree, where they will discover the role of sunrays, ants, mushrooms and bacteria in growing trees; and Cold Feet, through which they will discover facts about humidity, as well as strawberries and radish

18

Super Science Show

The Super Science Show is a dynamic and highly motivational activity that gets children involved in exciting hands-on experiments, in the fields of physics, biology, and chemistry, that stimulate infectious enthusiasm.

This ever-intriguing show allows children to use a variety of materials, such as balloons, bouncing balls, balance board, water, liquid Nitrogen, dry ice and soda cans. Prior reservation is required.

19

Public lectures

- Nanoscience and Nanotechnology: Discovering the Magic in Tiny Particles
- A Journey to the Fascinating World of Chemistry
- The Homo sapiens Report: The Future of Humanity
- Eclipses of the Sun and the Moon
- How Our Health Depends on Nature.
- Influenza A (H1N1), from Prevention to Treatment
- Nanotechnology. A Look into the Future!

20

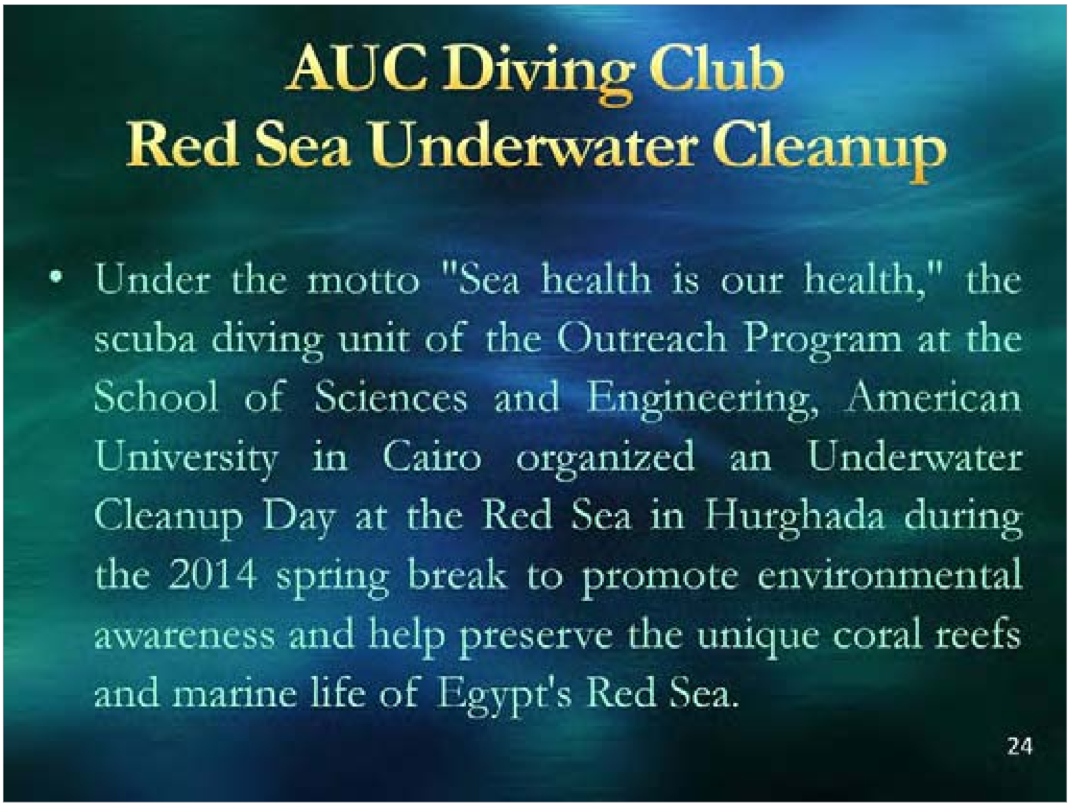
Robotheca Alexandrina Olympiad 2013

The first local robotics competition was held in November 2013, The Robotheca Alexandrina Olympiad (RAO). The competition comprises two categories: the Diver Robot and the Robo-fight.

The competition will stimulate and engage students in exploring their potential in engineering, IT, science, and math, as well as project management. Participants must possess basic knowledge of electronics and programming.

Cairo Science Festival Promotes Better Citizenship

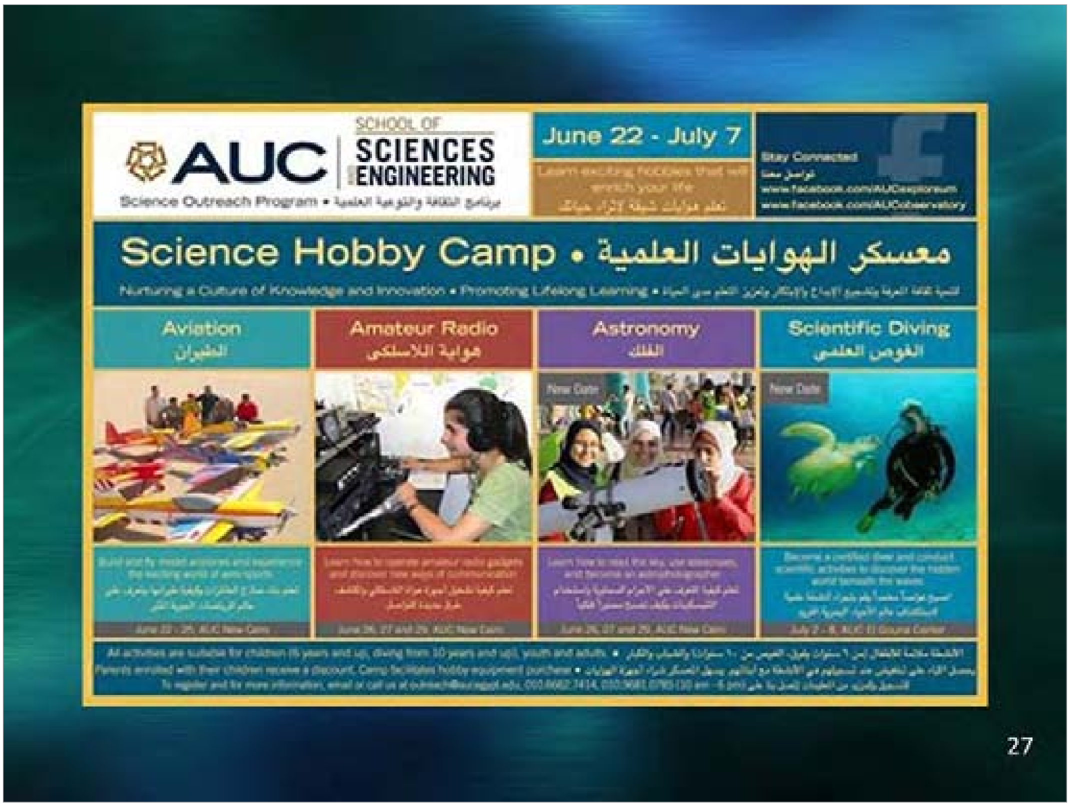

Cairo Science Festival
It began at 2009 – March or April, the program includes
Pluto on Trial" Play"
Final Round of Science Idol
Science Poetry
Storytelling performance on the life on Ibn-Al-Haytham
Space Kids Team Audition
Science Comedy and a live performance
23


AUC Diving Club
Red Sea Underwater Cleanup
Under the motto "Sea health is our health," the scuba diving unit of the Outreach Program at the School of Sciences and Engineering, American University in Cairo organized an Underwater Cleanup Day at the Red Sea in Hurghada during the 2014 spring break to promote environmental awareness and help preserve the unique coral reefs and marine life of Egypt's Red Sea.
24

- The clean up day blended recreational and sustainability activities with lifelong learning and citizen science to raise awareness and appreciation of the marine ecosystems of planet Earth and underscore their importance to the economic, social, and ecological well-being of our society.
- Twenty AUC students, faculty, and staff participated in the cleanup. As an eye-opening experience and an exciting adventure that gave all involved a great sense of fulfillment and civic activism.

25

26


AUC
SCHOOL OF SCIENCES AND ENGINEERING
Science Outreach Program • برنامج الثقافة والتوعية العلمية
June 22 - July 7
Stay Connected
تواصل معنا
www.facebook.com/AUCexploreum
www.facebook.com/AUCobservatory
Science Hobby Camp • معسكر الهوايات العلمية
Aviation
الطيران
Amateur Radio
هواية اللاسلكي
Astronomy
الفلك
Scientific Diving
الغوص العلمي
New Date
New Date
27


AUC Aviation club
28

AUC Observatory

29

Children`s Civilization and Creativity Center

- Integration of the Egyptian greatness civilization with the challenges of the present and fly on the horizon of the future
- Adventure entering through the corridors of history to discover the pyramids and ancient arts and treasures of kings.

30

- The kids will live diary ancestors year round beginning of the flood and use their tools to bring water to planting and sailing to fishing in boats from papyrus and enter the house of life to learn writing and arithmetic and then sow grain and build and applaud even reaping crops and emerge into the market to exchange goods and rest in the Storytelling before we go home and wear celebrations clothes and vote music to celebrate the end of this year

31

- The kids try to find solutions to the problems of the age, know who share the Nile water with them, and energy sources in their country and discover the largest and oldest fossil whale in the world.
- Play with and dive between fish in the Red Sea
- Make adventure in the Egyptian desert and entering the caves. Special Labs to desert science and Red Sea Research

32

- The kids will be guided in astronomy to navigate with stars to reach the tools and maps that direct them to the oldest place to monitor the stars giant telescope and then fly with the first aircraft flying in Egypt sky over the Nile River
- The kids are treated as astronauts among the members of the space shuttle taking off on an exploratory mission outside the hemisphere.

33

Garden

- The kids will live together as a drop of water in the Nile River since the rain fell on the hills in Africa that arrived in the Mediterranean and know the beginning of life in their country.
- Go into the forest where lion, the elephant and giraffe and their families can be recognized.
- Simulation of pharaonic garden, Egyptian countryside and Bedouin tent.
- Beautiful butterflies, birds and parrots inside bird house
- The Roman theater in the Alexandria area

34


Scientists of next generation "SNG"
The Academy of Scientific Research and Technology (ASRT) together with the Ministry of Scientific Research have brought forward an action plan to invest in Early-Stage Researchers.
Training is a key factor in the global competition for Human Resources "HR" in Science and Technology.
Countries worldwide are moving towards knowledge-based economies, and the need for competent researchers is growing.
Capacity building of young researchers is the basic ground for developing Economic Growth in Egypt.
35


Movement of young academies (Global young academy-GYA)
One of the main aims upon founding GYA (Iam cofounder) was to increase public awareness with science and enhancing science literacy
36


Egyptian young academy of sciences (EYAS)
Egyptian Youth Academy of Science
E Y A S
EYAS aims at empowering Egyptian young scientists in science and technology and at encouraging them to play a vital role in planning and management of the national science, technology and innovation strategy.
As the first young academy to comprise school students as EYAS affiliated members.
37


Festival of Reading for All
Reading for All Festival
مهرجان القراءة للجميع
38


Thank you
39

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

SESSION 3

Presider : ***Aphiya Hathayaham*** *(Member, Organizing Committee / Director, Information Technology Museum, NSM Thailand)*

Promoting Science Literacy at School Level

- ***Sharifah Maimunah Syed Zin*** *(Associate, Academy of Sciences Malaysia)*

Challenges for Enhancing Scientific Literacy in Mongolia

- ***Badamsambuu Khishigbayar*** *(Deputy Director, National Institute of Education, Mongolia)*

Strategy of Science and Technology Communication in Vietnam – the Necessary and the Contents

- ***Nguyen Xuan Toan*** *(Director, Center for Science and Technology Communication, Ministry of Science and Technology, Vietnam)*

Presider
Aphiya Hathayatham

Director, Information Technology Museum
aphiya.h@nsm.or.th or aphiya@gmail.com

EDUCATION

- Ph.D. in Science Communication. The National Centre for the Public Awareness of Science, Faculty of Science, The Australian National University, Canberra, Australia
- M.Sc. in Seed Technology, Mississippi State University, U.S.A.
- B.Sc. in Agriculture (Horticulture), Kasetsart University, Thailand

PROFESSIONAL TRAINING

- Certificate, Knowing our neighbors: Public opinion research in Asia in a time of media revolution and aging societies. Asian Network for Public Opinion Research, Seoul National University, South Korea.
- Certificate, Museum Management Course, Deutsches Museum, Germany
- Certificate, Professional Development Program, Questacon – The National Centre of Science and Technology, Australia
- Certificate of Mastery, Science Edutainment and Science Museum Management, Questacon and The Australian National University Australia
- Certificate, The Group Training Course in Vegetable Seed Production จาก Tsukuba International Agricultural Training Centre, Tsukuba, Japan
- Certificate, 5th International Course on Seed Production and Seed Technology, International Agricultural Centre, Wageningen, The Netherlands

WORKING EXPERIENCE

- Director, Information technology Museum, National Science Museum, Thailand
- Director, Strategic Planning Division, Office of the President, National Science Museum, Thailand
- Director, Exhibition Division, Science Museum, National Science Museum
- Secretary, National Sub-Standing Committee on Public Understanding of Science.
- Director, Foreign Affairs and Public Relations Division, Office of the President, National Science Museum
- Secretary to the Foreign Affairs Standing Committee, House of Representatives
- Head of Seed Quality Control Division, Ratchaburi Seed Center, Department of Agricultural Extension, Ministry of Agriculture and Cooperative.

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SESSION 3

Sharifah Maimunah Syed Zin

Special Assistant to IAP SEP GC Chairman
Associate, Academy of Sciences Malaysia
smszin@gmail.com

Sharifah Maimunah Syed Zin (B.A. Hons, Dip. Ed, University of Malaya, M. A (Education), University of Sussex, UK , Ph.D University of East Anglia, UK) is former Permanent Delegate of Malaysia to UNESCO, Paris and former director of the Curriculum Development Division of the Ministry of Education, Malaysia. She has 33 years experience in education having been a secondary school teacher, a language officer at the Negeri Sembilan State Education Department, a curriculum developer, an educational researcher, director of the Training and Support Services of the Department of Special Education, Deputy Director and later Director of the Curriculum Development Center. During her career in the Ministry of Education, she was directly involved in several major curricular innovations, research as well and in planning and organizing staff development programmes for senior executives of the Ministry of Education. She was also consultant to the Ministry of Education Brunei Darussalam on a study on science education policy of the country. Sharifah Maimunah has published papers and book chapters on science education and curriculum development. Her last position was as Professor at the Faculty of Education, University of Malaya. Currently she is coordinator of the STEM education unit of the International Science, Technology and Innovation Centre for South-South Cooperation under the auspices of UNESCO (ISTIC) and is an Associate of the Academy of Sciences Malaysia. She was very much involved in the IBSE pilot schools under the Academy of Sciences, Malaysia (2012-2013) and has conducted workshops to help familiarise teachers with the approach. She is also a member of the Board of Governors, Sri Bestari School, and the International School @ Park City and sits on the Advisory Board of Brighton Education Group.

ABSTRACT

Promoting Science Literacy at School Level

Dato' Dr. Sharifah Maimunah Syed Zin
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Associate, Academy of Sciences Malaysia
smszin@gmail.com

The presentation focuses on how the Malaysian science curriculum both in the formal and informal settings promotes the development of science literacy as the nation prepares itself towards achieving a fully developed and high income status. The transmission of knowledge in science and development of scientific skills at the school level must be complemented by activities that can help pupils apply what is learned with real life situations. The position of science as a subject in the school curriculum, its content, how it is taught, supporting resources and activities all contribute towards promoting science literacy. By making science as core subject to be learned by all, encouraging inquiry-based science education (IBSE) and contextual learning in its pedagogy, giving emphasis on higher order thinking skills, it is the aim that pupils who leave school would have the requisites such as the ability to use the necessary skills and knowledge, be aware of science related issues and make informed decisions and choices about what affect them and the environment. The presentation concludes with some of the challenges faced.

AKADEMI SAINS MALAYSIA

PROMOTING SCIENCE LITERACY IN SCHOOL – MALAYSIAN CONTEXT

Sharifah Maimunah Syed Zin

National Context

- Developed nation by 2020
  - It must be a nation that is fully developed along all the dimensions: economically, politically, socially, spiritually, psychologically and culturally.
  - The sixth is the challenge of establishing a scientific and progressive society, a society that is innovative and forward-looking, one that is not only a consumer of technology but also a contributor to the scientific and technological civilisation of the future.
- High income nation
- Government Transformation Plan (GTP)
- Science to Action (S2A)
  - Science for Wellbeing – improving quality of life through mastery and application of science, technology and innovation by strengthening STEM education

AKADEMI SAINS

Educational Context

Number of Schools

Level	Number of schools
Primary	7,752
Secondary	2,367
total	10,119



Educational Context

Number of Students (enrolment)

Level	Total
Preschool	196,609
Primary	2,207,988
Secondary	2,234,085
Overall total	5,138,682



Educational Context

Number of Teachers

Level	Total
Primary	198,094
Secondary	223,299
Total	421,393

SCIENCE LITERACY – OECD

- ***"the capacity to use scientific knowledge, to identify questions and to draw evidence-based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity" .***
- ***defines scientific literacy as including skills, knowledge of science and about science, attitudes and values. (PISA)***

SCIENTIFIC LITERACY - OECD

- Scientific literacy also requires not just knowledge of the concepts and theories of science but also a knowledge of the common procedures and practices associated with scientific enquiry and how these 4 enable science to advance. Therefore, individuals who are scientifically literate have a knowledge of the major conceptions and ideas that form the foundation of scientific and technological thought; how such knowledge has been derived; and the degree to which such knowledge is justified by evidence or theoretical explanations. (OECD)

Scientific Literacy – OECD cont….

- ***Students who are scientifically literate:***
- Know and understand the scientific concepts and processes required for participation in society
- Ask, find, or determine answers to questions derived from curiosity about their world
- Describe, explain, and predict natural phenomena
- Read with understanding science articles in the popular press and engage in social conversation about the validity of the conclusions
- Identify scientific issues underlying national and local decisions
- Express positions that are scientifically and technologically informed
- Evaluate the quality of scientific information on the basis of its source and the methods used to generate it
- Pose and evaluate arguments based on evidence and apply conclusions from such arguments appropriately

SESSION 3

Scientific Literacy – PISA

- For the purpose of PISA 2006, scientific literacy refers to an individual's:
  - <u>scientific knowledge and use of that knowledge</u> to identify questions, acquire new knowledge, explain scientific phenomena and draw evidence-based conclusions about science-related issues;
  - <u>understanding</u> of the characteristic features of science as a form of human knowledge and enquiry;
  - <u>awareness</u> of how science and technology shape our material, intellectual and cultural environments;
  - <u>willingness</u> to engage in science-related issues and with the ideas of science, as a reflective citizen

AKADEMI SAINS MALAYSIA

SCIENCE LITERACY AND THE SCIENCE CURRICULUM

SCHOOL SCIENCE - MALAYSIA

- Core and compulsory for all
- All pupils study science
- Examined at National Assessments at end of primary, lower secondary and upper secondary
- Primary Level
  - Year 1 -3 - Integrated under The World of S & T (60 minutes per week)
  - Year 4-6 - Core Science (single subject, 120 minutes per week)
- Lower Secondary
  - Year 7 – 9 – Core Science - Integration of Biology, Chemistry and Physics (200 minutes per week)
- Upper Secondary
  - Year 10 – 11 –
    - Core Science (Integration of Biology, Chemistry and Physics (200 minutes per week)
    - Single science subjects – Biology, Chemistry, Physics, Additional science- integration of biology, chemistry and physics but of advanced level to Core Science)
    - Those studying 2 or more single subject science need not study Core Science (integrated)
    - Those who study 1 single subject science must study Core Science)
- Teacher Training
  - Compulsory credit pass for entry into pr-eservice teacher training

AKADEMI SAINS MALAYSIA

SCIENCE LITERACY AND THE SCIENCE CURRICULUM –
WHY SECONDARY SCIENCE ?

- Programme is for all
- The emphasis is not in on producing individuals who will be science specialists
- Rather, it is on educating young people to become informed critical users of scientific knowledge – a competency that all individuals are expected to need during their lifetimes
- Also last stage of learning science for the majority of students before entering job market

SCIENCE LITERACY AND THE SCIENCE CURRICULUM)

- SYLLABUS FOR SECONDARY SCIENCE (CORE SCIENCE)
- Objectives
  - Acquisition of knowledge in S&T phenomena
  - Understanding developments in S&T
  - Acquisition of scientific and thinking skills
  - Application of knowledge and skills in creative and critical manner in problem solving and decision making
  - Willingness to contribute towards development of S&T
  - Evaluate S&T Information
  - Practise and internalise scientific attitudes and moral values

SCIENCE LITERACY AND THE SCIENCE CURRICULUM

SYLLABUS FOR SECONDARY SCIENCE – OBJECTIVES con't..

- Realise importance of inter- dependence among living things and management of nature
- Appreciate contribution of S&T in national development and well-being of mankind
- Realise that scientific discoveries result from human endeavour
- Create awareness on need to love and care environment

Syllabus for Secondary Science

- Scope
  - Scientific skills (science process skills, manipulative skills, thinking skills – creative and critical)
  - Scientific attitude and noble values
  - Knowledge content
    - Introducing science
    - Man and the variety of living things
    - Matter in nature
    - Maintenance and quality of life
    - Force and Motion
    - Energy in life
    - Balance and management of the environment
    - Technological and Industrial Development in Society
    - Astronomy and the Exploration of Outer Space

TEACHING APPROACH FOR SCIENCE LITERACY

Science, Technology and Society

- Meaningful learning occurs if students can relate their learning with their daily experiences. Meaningful learning occurs in learning approaches such as <u>contextual learning</u> and Science, Technology and Society (STS).
- Learning themes and learning objectives that carry elements of STS are incorporated into the curriculum. STS approach suggests that science learning takes place through <u>investigation and discussion based on science and technology issues in society</u>. In the STS approach, knowledge in science and technology is to be learned with the application of the principles of science and technology and their impact on society.

Teaching Approach for Science Literacy

- <u>Contextual Learning</u>
  - contextual learning is an approach that associates learning with daily experiences of students. In this way, students are able to appreciate the relevance of science learning to their lives. In contextual learning, students learn through investigations as in the inquiry-discovery approach



SESSION 3

Scientific literacy and science curriculum

Key words	Science literacy	Science syllabus s
Use	Use scientific knowledge	Application of knowledge and skills
Identify	Identify questions, ask questions, find answers, scientific issues underlying national / international decisions	
Draw	Draw evidence based conclusions	
Decisions	Make decisions	
Read	Read with understanding	
Understand	Understand and make conclusions about the world	Understand developments in science and technology
Describe, explain and predict	Describe and predict natural phenomena	
Willingness	To engage in science related issues	Willing to contribute to development in S&T
evaluate	Evaluate quality of scientific information Evaluation	Evaluate information on S&T
Realise		Realise importance of interdependence among living things and management of nature
Appreciate		Appreciate contribution of S&T
Awareness	Awareness of how S&T shape the environment	Create awareness on need to care and love for environment
Skills	skills	Scientific and thinking skills
Knowledge	Knowledge on science (concepts and theories) and about sciences, procedures	Knowledge about science and technology, scientific phenomena
Values and Attitudes	Values and attitudes	Scientific values and noble attitudes

Science Literacy in Co-curriculum

Co-curriculum : Any planned activity based on teaching and learning processes and outside the formal school learning that provides opportunities for pupils to enhance, consolidate and apply the skills and values learned in the formal classroom.

Science co-curricular activities:

School Science Clubs / Societies

Public – Private Sector / NGO Partnerships

School Science Clubs

School Science Club

SCIENCE LITERACY AND CO – CURRICULAR ACTIVTIES: Public – NGO Partnership

WWF-Malaysia's Environmental Conservation Learning Inspires Students to Love and Care for Mother Earth

The programme, a collaboration between World Wide Fund for Nature – Malaysia (WWF-Malaysia) and the Curriculum Development Division, Ministry of Education, was aimed at building an effective environmental education model to bring about positive behavioural change among school students.

Hands-On

MOE – TNB (National Energy Ltd)

TNB Safety Awareness Project


Partners in National Eco Schools- Malaysia
Coordinated by:
Eco-Schools
WWF
Supported by:
Ministry of Education, Malaysia
Ministry of Natural Resources and Environment, Malaysia
Natural Resources and Environment Board Sarawak
PERHILITAN
Department of Wildlife and National Parks, Peninsular Malaysia
Department of Environment Malaysia
UNIVERSITI MALAYA
University of Malaya
USM
Universiti Sains Malaysia
Universiti Kebangsaan Malaysia
Global Environment Centre
Sabah Environmental Education Network
Friends of Kota Damansara
Grout for Nature
Yayasan Anak Warisan Alam Malaysia
Malaysian Nature Society
AKADEMI SAINS MALAYSIA


SCIENCE LITERACY: PUBLIC – PRIVATE PARTNERSHIP
On track to becoming an eco-school
1st INTERNATIONAL ECO-SCHOOLS MALAYSIA CONFERENCE 2012
AKADEMI SAINS MALAYSIA

SESSION 3

SCIENCE LITERACY – NATIONAL SCIENCE CENTRE

SCIENCE LITERACY – PETROSAINS


SCIENCE LITERACY: ACADEMY OF SCIENCES MALAYSIA
Science
Ghostly images in movies ;
Science behind it
Mouth on fire when
eating chili- Why?
High Sugar Kids – What's the story?


SCIENCE LITERACY – RUBBER RESEARCH INSTITUTE
AKADEMI
SAINS
MALAYSIA

Science Literacy - Outreach Programmes

Science Outreach – Petrosains

Science on wheels– National Science Centre

Science Outreach - ASM

Science Literacy _ Forest Research Institute of Malaysia

Science Literacy and Media

Documentaries

Media articles on science literacy

- Every Malaysian must be science literate (Dr. Ghazaly Ismail NST Columnist 20 Feb 2012
- IMPROVING SCIENCE LITERACY THROUGH A CONDUCIVE LABORATORY LEARNING ENVIRONMENT: A PROPOSED MODEL *Lilia Halim, Faculty of Education, Universiti Kebangsaan Malaysia*
- Driving the Agenda of Learning by Design in Science Literacy in Malaysia (AMBIGAPATHY PANDIAN , School of Languages, Literacies & Translation, Universiti Sains Malaysia, Penang, Malaysia, SHANTHI BALRAJ School of Arts Universiti Sains Malaysia, Penang, Malaysia

SESSION 3

SCIENCE LITERACY in SCHOOLS

ISSUES

- Science literacy vs science knowledge
- Science literacy for all vs science literacy for some

Inquiry Based Science Education (IBSE) – La main a la pate

A framework for science inquiry

A unit or part of a unit may include several investigations before reaching the Draw Final Conclusions stage.

SCIENCE LITERACY in SCHOOLS

CONCLUSION

- Implicit in current science school curriculum
- Present in co-curricular activities
- Science-literacy strategies
  - Inquiry based science education (IBSE)
  - Contextual learning
  - Public – private sector partnership
  - Science outreach programmes
  - Local Science learning centres for science literacy
  - Role of Media

Thank You

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SESSION 3

Badamsambuu Khishigbayar

Deputy Director, The National Institute of Education, Mongolia
khishigbayar@mier.mn, hishig@hotmail.com

EDUCATION

- Ph.D., Educational policy, Hiroshima University, Japan
- M.A., Higher education, Hiroshima University, Japan
- M.S., B.S., Mathematics and Information System, National University of Mongolia

EMPLOYMENT HISTORY

2012 - present	Deputy Director, National Institute of Education, Mongolia
2010- 2012	National Consultant, Project on Teaching method improvement, JICA
2009- 2010	National Consultant, Education Sector Master Plan Review, Ministry of Education, ADB
2008- 2009	Project Officer, Quality Basic Education Project, Save the Children, UK
2006– 2008	Safety and Security Coordinator, Peace Corps, the USA, Mongolia
1993– 2000	Lecturer, Institute of Commerce and Business, Ulaanbaatar, Mongolia
1992– 1993	Researcher, Marketing Research Center, College of Commerce and Business
2009	Researcher, Impacts of Crisis on Education, UNESCO
2009	National Expert, Millennium Challenge Account – Mongolia
2003-2005	Project Assistant, International Student Center, Hiroshima University, Japan

MAJOR PUBLICATIONS

- "Japanese Professors' Perception towards the Qua ity of Internationa Students" (in Eng ish)
- "Externa Inf uences on the Deve opment of Mongo ian Higher Education System" (in Eng ish)
- "Chi d deve opment" (in Mongo ian)

AWARDS

- The best student of Soro-optimist Association in Japan, the USA, 2001
- Japanese government scholarship, Hiroshima University (2002-2006)

MEMBERSHIP

- General Secretary of SERVAS International, Mongolia
- Board member of Mongolian Lesson Study Association

ABSTRACT

Challenges for Enhancing Scientific Literacy in Mongolia

Badamsambuu Khishigbayar
Deputy Director, The National Institute of Education, Mongolia
khishigbayar@mier.mn, hishig@hotmail.com

This presentation aims to describe a situation of science education considering the changes that happens during the transition period from a planned to a market economy since 1990"s in Mongolia. It consists of 3 parts; challenges in education reform considering the rapid changes during the transtion, lesson-study based approach to achieve effective education, and lesson learned from applying this approach.

First part introduced educational challenges considering the changes from 'teacher centered method' to 'child centered method', from 'knowledge transferring' to 'creative thinking', from 'listeners' to 'learners'. Two main challenges introduced in this part; rapid changes during short period including transferring process from 10 years to 12 years schooling and their influences to establishing sustainable development. Curriculum has been changed inaccordance to the changes.

Second part introduced the 'lesson study' approach which was introduced through the project, undertaken by the government of Mongolia and Japanese International Cooperation Agency (JICA). It suggests that lesson study could be an effective approach for enhancing scientific literacy based on experiences in Mongolia. Team work, collaboration between primary and secondary teachers, school their skills of inquiry and discovery is increased in relevance to teachers' teaching method improvement. Also, this approach encourages teacher's research ability considering students' misconception.

Third part shares the lesson learned from implementing the project on child centered teaching method through introducing lesson study. School aim, purpose and management to develop children are essential to enhance science literacy. Integrated studies, project based learning, classroom and out of classroom activities are key points to enhance science literacy. It suggests that sharing experiences is one of effective ways for any improvement, therefore, the National Institute of Education, Mongolia emphasizes on being a member of international organizations.

Keywords: transition, challenges in education reform, lesson study, curriculum, school management, cooperation

SESSION 3

ENGLISH TEXT

Challenges for Enhancing Scientific Literacy in Mongolia

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1.Background of education in Mongolia

Mongolia is located between two giants, China and Russia, with a population 2.94 mil, territory is 1.564 sq.km, and density 1.88. Mongolia has been shifting from a socialist regime to a free market economy and democratic state structure since the 1990's. The system of education in Mongolia has also been changing from a Soviet model to a free-market oriented one during the transition with rapid political, economic, and social changes. These changes have started occurring simultaneously with economic crisis in Mongolia since monetary assistance from the Soviet Union, formerly providing a third of Mongolia's GDP (Weidman & Bat-Erdene, etc., 1998), was discontinued.

Therefore, Mongolia has been facing many difficulties in the process of creating a new system of education that is oriented towards the demands of market and international education standards. In general, this shift, from 'East' to 'West' occurs having no fundamental and qualitative changes in the sphere of education which can't be accomplished without adequate foundations of economics and social characteristics. 'Rapid changes' towards international standards have asked the current education system to improve its quality swiftly, although education reform must be accomplished by integrating established educational traditions and innovations that have been made necessary by the demands of the times.

In the XIII century, Mongolia was known as one of the largest and strongest countries in the world, playing an important role in world history and flourishing with a strong and independent culture. However, by the end of the XX century, Mongolia's power had significantly dwindled and the country had come to be strongly influenced by neighboring countries, creating confusion to this day over whether a "real" Mongolia still exists.

The Soviet Union's Communist Party significantly influenced Mongolian social life by introducing its political and economic models in addition to the educational model. This influence brought considerable development in education, health, and economics under the campaign to build a socialist system, especially during the Cold War period. However, the Soviet Union's influence also increased dependence on an external nation and damaged Mongolian indigenous identity. For instance, Mongolia adopted the Soviet educational model with very little adjustment of its content according to local circumstances.

This was caused in part by a lack of a traditional foundation in modern education in Mongolia, and in part because of the great political and economic influence from the Soviet Communist Party. The result of the socialist universities in Mongolia was the production of a communist population with a belief system based on Marxist ideology. Moreover, politicians, leaders, teachers, and key people were trained in the Soviet universities. This socialist influence within education created an intellectual class rooted in Marxism and led Mongolia to lose its self-identity and self-reliance.

2. Challenges for improving quality of education

The first part discussed the background of education in Mongolia considering of 'intellectual dependence' which was created in the past, 'creating a new system' during the transition that faces difficulties in combining of traditional values and innovations that should be considered to meet the demands of a more globalized society and changing times. Therefore, the biggest challenge is to create a new system considering an intersection shift of past and future, which requires serious thinking at present of making a balanced, integrated, combined, and optimized design based on system analysis.

A shift of education system from the Soviet model to the democratic model was described as below according to R. Bat-Erdene and John Yeager (1996)

From	To
- rigid, standardized uniform curriculum	- diversified curriculum in order to meet local and community needs
- strong ideological influences	- orientation on common values of humanity
- fully supported by the state	- participatory financing
- centralized administration	- decentralization (partly)
- society need-based	- person need-based
- teacher-centered instruction	- student-centered instruction

The education reform has started from the higher education sector due to the heavy financial crisis at the beginning of the transition by shifting from public to private higher institutions. Consequently, the number of higher institutions has been increased dramatically from 10 to 120 in the past 2 decades. As a result of starting earlier, above mentioned changes have appeared in higher education sector compared to general education although many challenges remain and the education system is waiting for solutions which consider the whole structural and systematic changes. Dramatic changes in last 20 years are shown that it was necessary to take fundamental and qualitative changes in the education sector.

Reform in general education started focusing on access and school environment due to increased number of drop outs and out of date school facilities and equipment. Asian Development Bank (ADB) has been playing a key role in education reform with its provision of hard components such as school repairs, construction, and facilitators since 1990's. Then investment with its policy moved to curriculum development when a discussion on shift from 10 years to 11 years schooling started since 2005.

Due to difficulties in transition, we believe it hindered the achievement of our students. According to the "TIMSS/PERLS-2011" examination in 2010, 7 h grade students on average scored only 25.85%, while 5 h grade students averaged only 39.6%. As we can see, these results are very poor. This raises the question about the quality of our curriculum. Previously, when curriculum was developed, the question considered most often was, "What should be taught?" instead of giving more guidance to the teachers of the big picture to include who, what, where, when and why and how it should be taught.

The Government of Mongolia (hereinafter referred to as "GOM") has introduced the new education standards in September 2005 within the framework of the education sector reform. The new education standards focused on shifting from 10 to 12-year education system, lowering the school entry age from 8 to 6 years old, and introducing new subjects such as integrated study and general science. The 12-year education system will be fully implemented in 2014-2015 school year.

In accordance with the new education standards, the teaching methods have also been expected to change from conventional teacher-centered to student-centered ones. However, at the school level, it has been difficult to implement the new education standards because its contents are too academic for classroom teachers to put them into practice.

Current GOM (2012-2016) is implementing the national program of "Right Mongolian Child" which consists of three parts: 1. Social communication 2. Family development, and 3. Education reform. The Ministry of education and Science (MES) has starting to implement the program of "Primary and secondary education quality reform" under the national program. This education reform focuses on improving quality of primary and secondary curriculum seeing as essential to improve quality of education considering systematic, comprehensive and integrated changes.

Now it's time to develop a quality curriculum package considering comprehensive and integrated reform in education under the umbrella of 'child development.' This quailifed curriculum package will consist of well-developed content, teaching methods, evaluation standards, teachers, school environment, and administration with a focus on child development. If we have all of these things together, it will answer the question, "How do we improve the quality of primary and secondary education?"

Approach and experience for improving scientific literacy

After introducing the new standards in 2005, teachers faced difficulties in teaching because of inconsistent and unclear linking of too much academic content, teacher-centered instruction and knowledge-based assessment. Mostly, teacher used to transfer academic knowlegde as learners receieved information as listeners.

To address this challenges, "The Project for improving teaching methods towards children's development in Mongolia" had been implemented 2006-2009 under the cooperation of Japanese International Cooperation Agency (JICA) and MES of GOM. Through that project, 27 teacher's guidebooks for 8 subjects (mathematics, science, integrated study) were developed and distributed to schools nationwide. As a next step, it was considered necessary to disseminate the teaching methods which were developed during that Project. Then, JICA has implemented the project for "the Strengthening Systems for Improving Child-centered Teaching Methods" with the GOM, 2010-2013.

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The MES and the Departments of Education of the Project model Province/District noted that the teaching method improvement utilizing lesson study was well understood and put into practice as a result of successful implementation of the Project. In non-model Provinces as well, lesson study is conducted in some schools.

Though the child-centered teaching method is being used by most schools to some extent, inconsistency among national curriculum, textbooks, and students' learning achievement assessment exists. In other words, effective educational management framework is yet to be developed in Mongolia. Therefore, the next step to improve the capacity of professinal organizations consdidering this educational management system is being discussed and the steps to implement this system are being written.

Lesson study was recognized as an effective tool to improve teaching methods as a result of the project since significant positive changes in teaching and learning have been shown. Therefore, experiences and lessons learned are being shared and distributed from model schools to all schools nationwide. It is worth noticing that Mongolian teachers developed their own lesson plans to consider Mongolian child development. Science teachers conducted lesson studies during the project; those who are expected to train other teachers were a part of these lesson studies.

Changes in qulaity of lesson

Teachers who implemented the lesson study summarized the improvement of quality of lessons, their skills on preparing materials improved as recognising and considering:

- appropriateness to lesson aim and giving time for students to learn
- recognition of child development
- selection and utilization of 'the teaching material'
- students' motivation and their misconcpetion, etc

Teachers noted that their skills on developing questions has improved as recognising:

- enhancing student's interest
- encouranging students to think (predict, find the result, make decition, etc)
- sharing student's ideas with others and connect it to the next contents

- encouranging student’s diverse ideas
- recognisition of students misconception and experience

Teachers reported that their understanding on learning has improved as recognising:

- correspondonce to students’ reactions
- instruction on taking notes
- blackboard planning
- appropaite time allocation

Students’ skills have improved as a result of changes in teaching and attitude:

- Students’ skills to express their ideas actively
- Students’ skills to express well considered remarks
- Students’ skills to participate the activities (observation, experiment, etc.)
- Students’ skills to conclude the learning
- Students’ skills to have further inquiry

In addition to science subjetcs, integrated study is recognized as an effective method to improve students’ inguiry. Teachers of social science have expressed their strong interest to conduct lesson studies with the project team in order to get an idea about well-developed instruction from Japanese experts. However, science teachers are disseminating their acquired knowlegde and skills to other teachers.

Science teachers of Mongolia were chosen in order to begin this lesson study project. Having background in gathering information, performing studies, and understanding the importance of changing their teaching styles, these teachers were commissioned with piloting this Project. With the history of the Mongolian education system, having made several extreme changes in a short amount of time, this study to include Science teachers was of upmost importance. The science teachers, after having performed their research and data collection would thus be able to share their experiences with fellow teachers and have the ability to give advice on what did or did not work in their classroom.

Changes in implemeting Lesson study

As lesson study consists of three main parts: lesson planning, lesson observing and teaching, and lesson reflection. The changes for teachers are summarized:

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Teachers' skills in lesson planning have been improved as conducting study on:

- students' misconception (students' misconception and understanding regarding the topic what they learned from real life)
- students' mistake /tsumatsiki/ (whether the teacher predicted students' mistake in learning process, whether the teacher is flexible in accordance with students' reactions and mistakes)
- content (How the teacher conducted a study on content, whether the lesson was planned based on content study, whether the teacher use teaching materials from the previous lesson)
- teaching method and materials (what activities the teacher planned with consideration of importance of lesson preparation such as idea, method, solution, materials, etc.

Teachers' observation skills have been improved through conducting study and focusing on:

- Whether the lesson reached its aim and objectives
- Whether the observers' understood the purpose and organization of observation, and their role
- Whether observers were able to observe students' learning (changes in students' learning process)

Teachers' skill to participate in lesson reflection/discussion have been improved as considering

- Whether the purpose of discussion is determined correctly, whether the discussion reached its aim
- Whether the discussion is concluded good points by considering based on lesson plan implementation and observation of students' learning
- Whether the discussion is concluded the areas needed to be improved by considering lesson plan implementation and observation of students' learning
- Whether the discussion reached its aim by summarizing lesson implementation and

areas needed to be improved based on observation

In conclusion, introducing and implementing lesson study has been bringing significant positive changes in improving scientific literacy and further improving the quality of education in Mongolia. Therefore, current education reform on developing each child emphasizes on disseminating lesson study as an effective method to develop each child. With this change in the Education system of Mongolia, it will be a lasting change to encourage the improvement of curriculum, textbook development, teacher education and training.

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CHALLENGES FOR ENHANCING SCIENTIFIC LITERACY IN MONGOLIA
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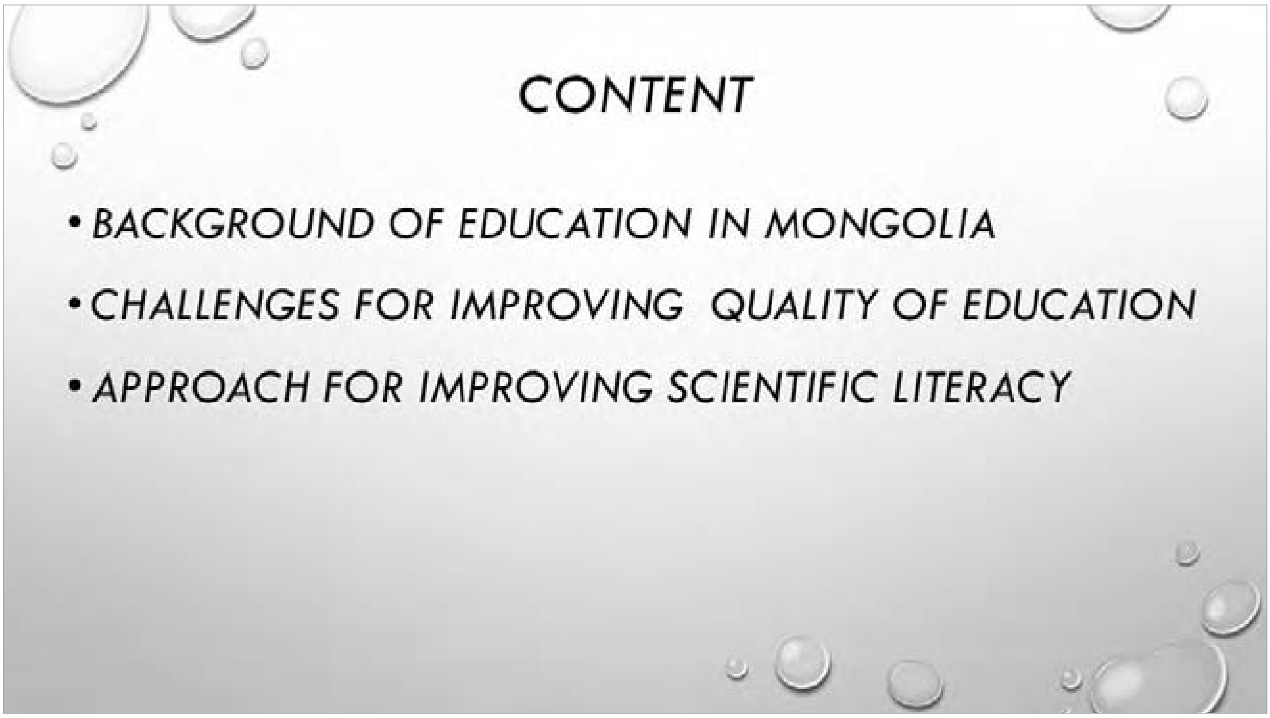
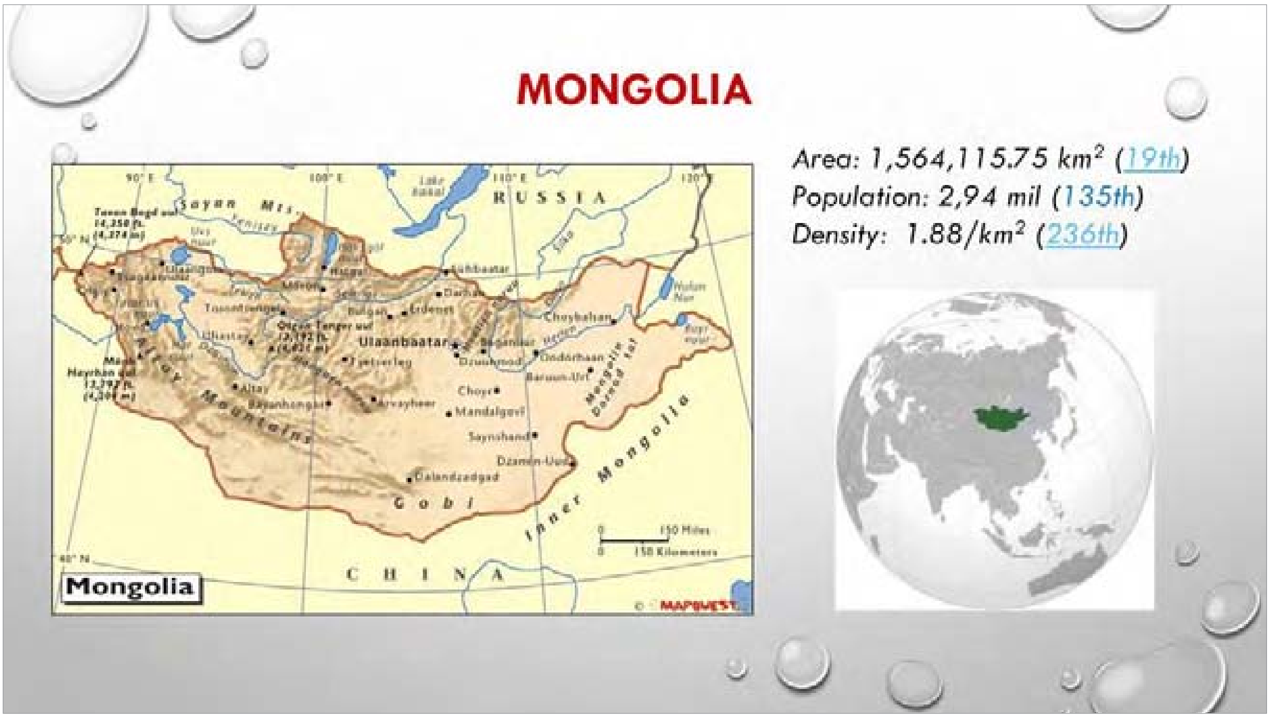
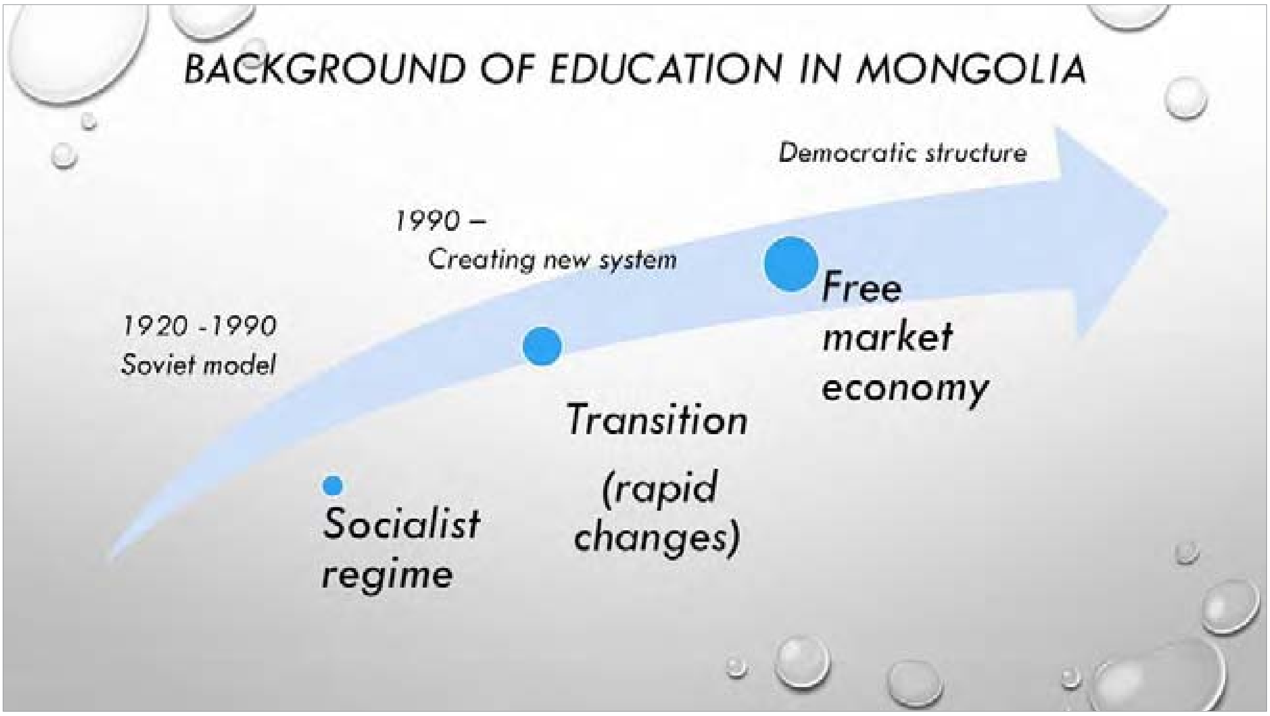
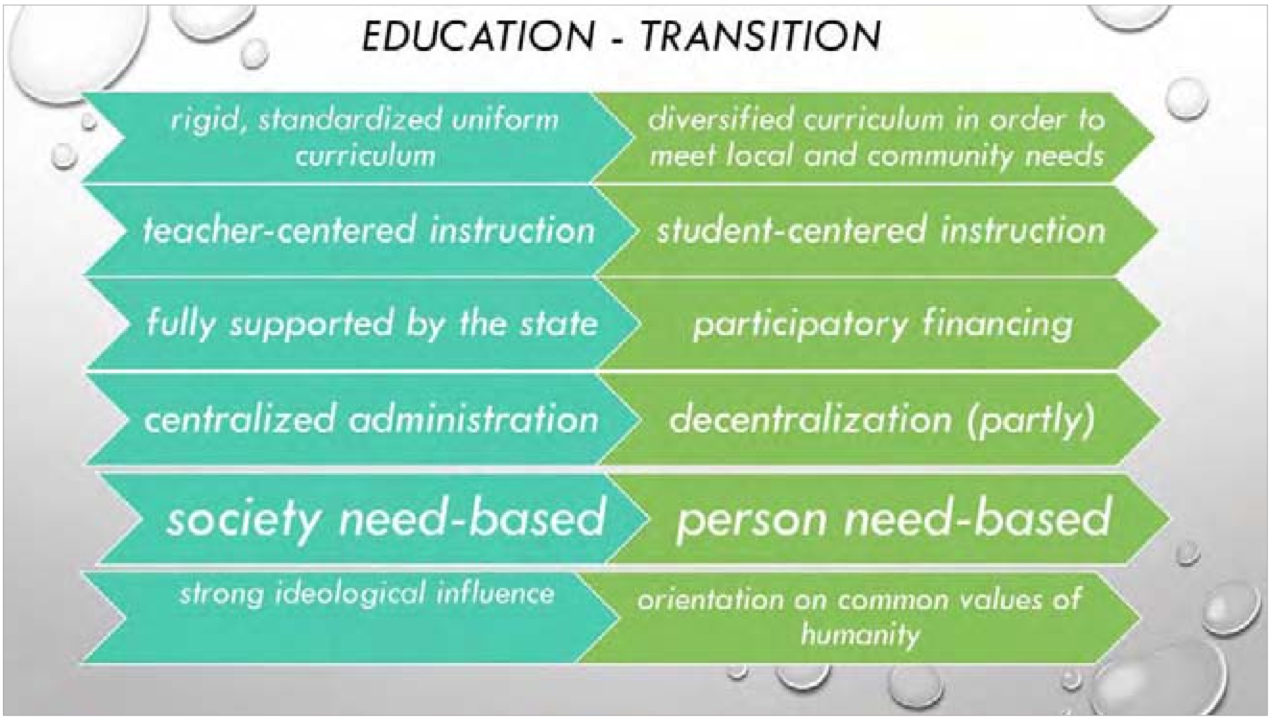
SEOUL, KOREA
12, JUNE 2014

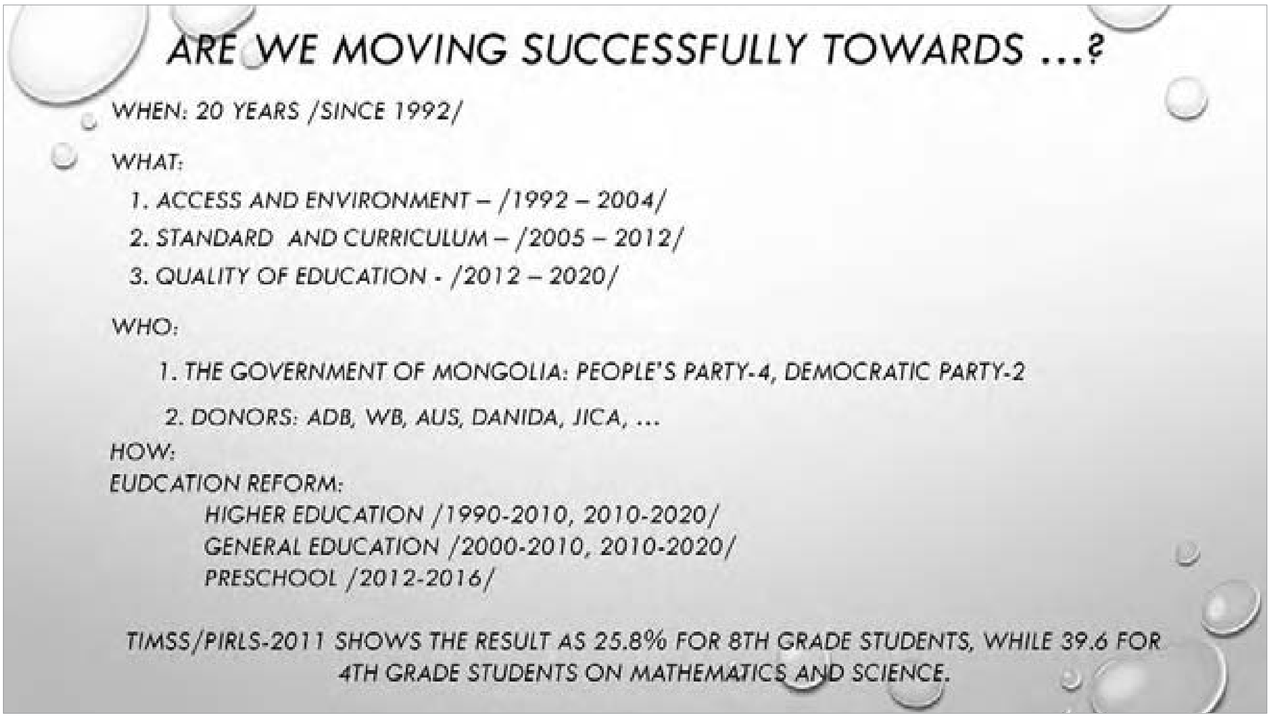

CONTENT
• BACKGROUND OF EDUCATION IN MONGOLIA
• CHALLENGES FOR IMPROVING QUALITY OF EDUCATION
• APPROACH FOR IMPROVING SCIENTIFIC LITERACY


MONGOLIA
Area: 1,564,115.75 km² (19th)
Population: 2,94 mil (135th)
Density: 1.88/km² (236th)
RUSSIA
CHINA
Gobi
Ulaanbaatar
Mongolia

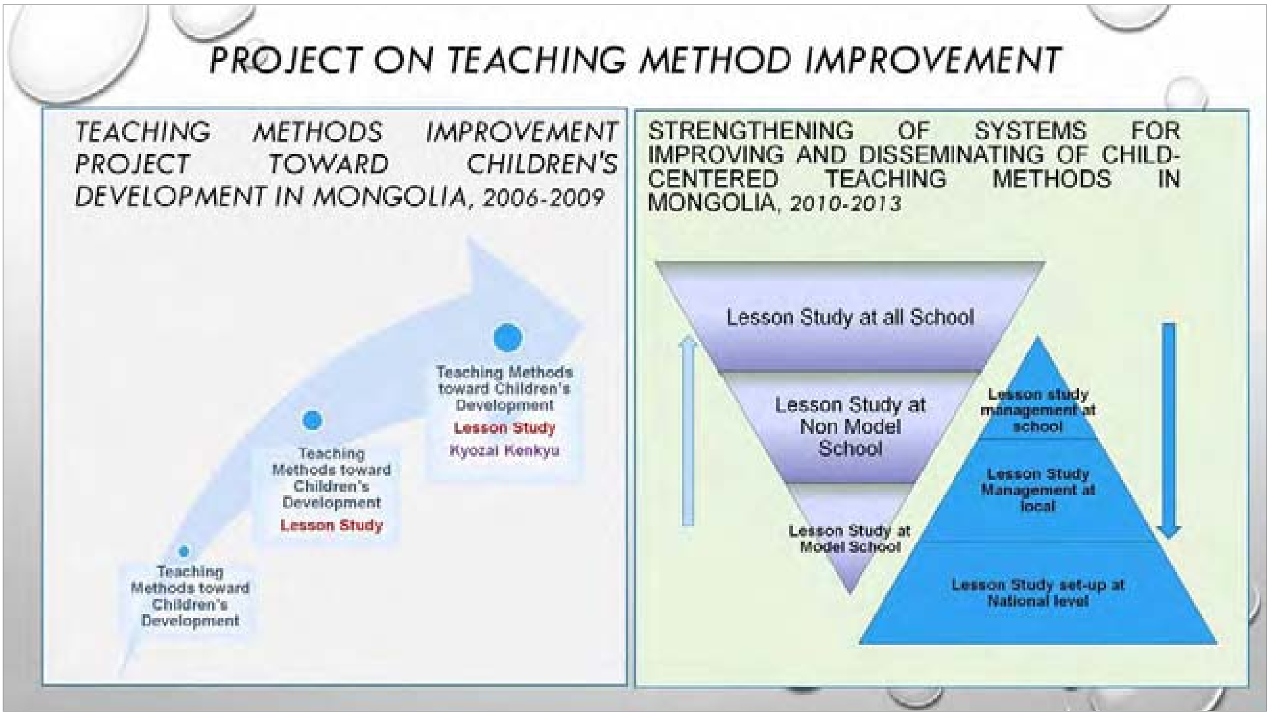

BACKGROUND OF EDUCATION IN MONGOLIA
Democratic structure
1990 –
Creating new system
1920 -1990
Soviet model
Free market economy
Transition (rapid changes)
Socialist regime

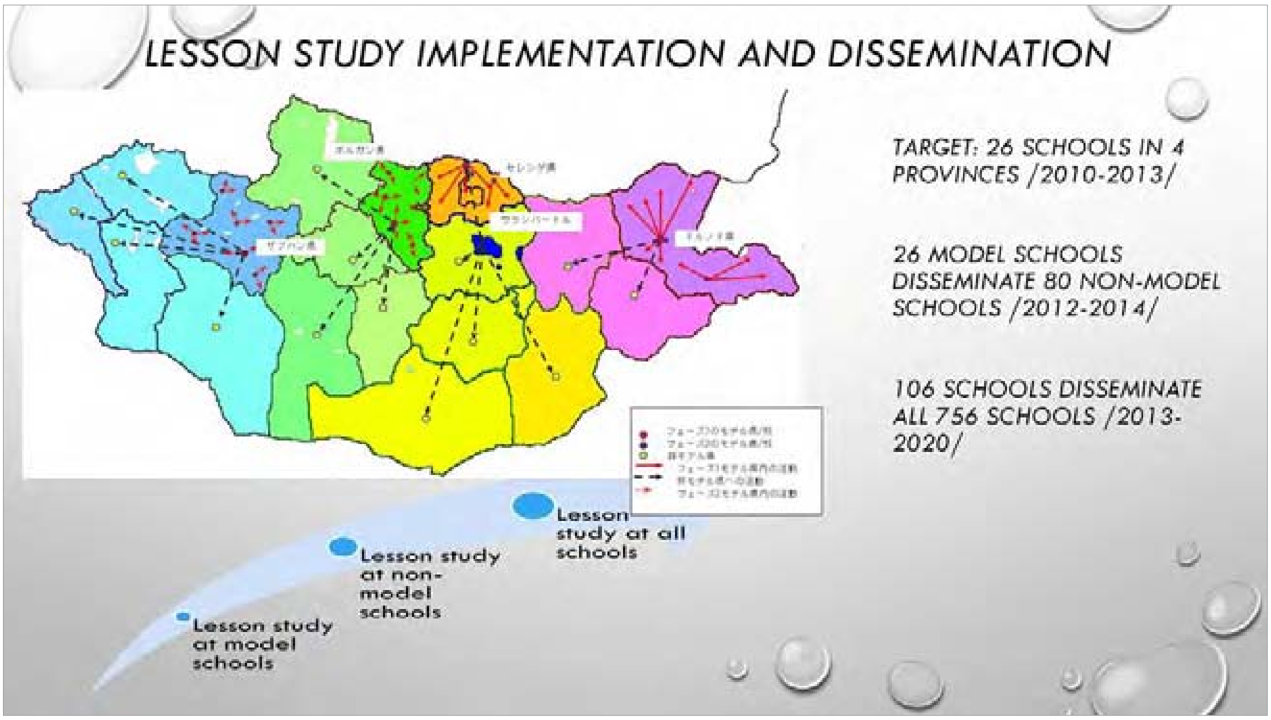
SESSION 3


EDUCATION - TRANSITION
rigid, standardized uniform curriculum
diversified curriculum in order to meet local and community needs
teacher-centered instruction
student-centered instruction
fully supported by the state
participatory financing
centralized administration
decentralization (partly)
society need-based
person need-based
strong ideological influence
orientation on common values of humanity


ARE WE MOVING SUCCESSFULLY TOWARDS …?
WHEN: 20 YEARS /SINCE 1992/
WHAT:
1. ACCESS AND ENVIRONMENT – /1992 – 2004/
2. STANDARD AND CURRICULUM – /2005 – 2012/
3. QUALITY OF EDUCATION - /2012 – 2020/
WHO:
1. THE GOVERNMENT OF MONGOLIA: PEOPLE'S PARTY-4, DEMOCRATIC PARTY-2
2. DONORS: ADB, WB, AUS, DANIDA, JICA, …
HOW:
EUDCATION REFORM:
HIGHER EDUCATION /1990-2010, 2010-2020/
GENERAL EDUCATION /2000-2010, 2010-2020/
PRESCHOOL /2012-2016/
TIMSS/PIRLS-2011 SHOWS THE RESULT AS 25.8% FOR 8TH GRADE STUDENTS, WHILE 39.6 FOR 4TH GRADE STUDENTS ON MATHEMATICS AND SCIENCE.


CURRICULUM DEVELOPMENT
- SHIFT FROM 10 TO 11 AND 12 YEARS SCHOOLING
- TOO MUCH ACADEMIC KNOWLEDGE
- TEACHER-CENTERED INSTRUCTION
- KNOWLEDGE - BASED ASSESSMENT
- 'RIGHT MONGOLIAN CHILD' PROGRAM
- QUALITY OF PRIMARY AND BASIC EDUCATION
- DEVELOP EACH CHILD /CHILD DEVELOPMENT/


PROJECT ON TEACHING METHOD IMPROVEMENT
TEACHING METHODS IMPROVEMENT PROJECT TOWARD CHILDREN'S DEVELOPMENT IN MONGOLIA, 2006-2009
Teaching Methods toward Children's Development
Lesson Study
Kyozai Kenkyu
Teaching Methods toward Children's Development
Lesson Study
Teaching Methods toward Children's Development
STRENGTHENING OF SYSTEMS FOR IMPROVING AND DISSEMINATING OF CHILD-CENTERED TEACHING METHODS IN MONGOLIA, 2010-2013
Lesson Study at all School
Lesson Study at Non Model School
Lesson Study at Model School
Lesson study management at school
Lesson Study Management at local
Lesson Study set-up at National level



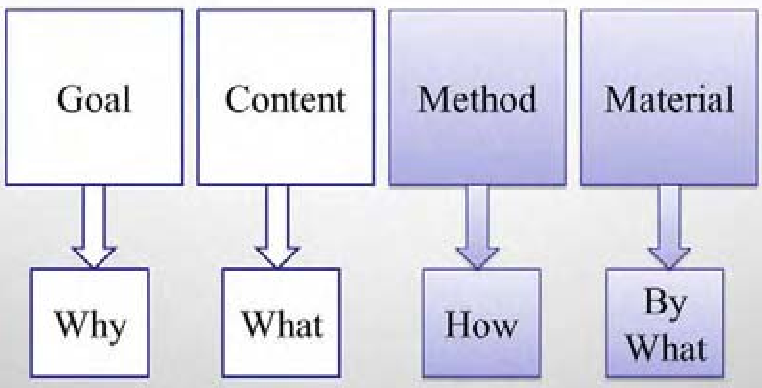
LESSON STUDY – REGULAR LESSON

LESSON	LESSON PLANNING	TEACHING	IMPROVING
LESSON	LESSON PLANNING	TEACHING	IMPROVING
LESSON	LESSON PLANNING	TEACHING	IMPROVING
LESSON STUDY	**LESSON PLANNING**	**TEACHING + OBSERVING**	**IMPROVING THROUGH DICUSSION**
LESSON	LESSON PLANNING	TEACHING	IMPROVING
LESSON	LESSON PLANNING	TEACHING	IMPROVING
LESSON	LESSON PLANNING	TEACHING	IMPROVING
LESSON	LESSON PLANNING	TEACHING	IMPROVING

CHALLENGES FOR INTRODUCING LESSON STUDY

- *TEACHER QUALIFICATION*
  - *SCIENTIFIC THEORITICAL KNOWLEDGE /PRIMARY TEACHERS, INTEGRATION/*
  - *TEACHING METHOD CONSIDERING SCIENTIFIC INQUIRY*
- *SCIENCE LABORATORY AND EXPERIMENTAL EQUIPMENT*
  - *NO PROVISION OF SCIENCE LAB AND NECESSARY EQUIPMENTS IN 20 YEARS*
  - *CLASS SIZE IS 40-50 IN URBAN SCHOOLS*
- *STANDARD AND CURRICULUM*
  - *TOO MUCH CONTENT, INSUFFICIENT GUIDELINE ON CHILD-CENTERED, SELF-EVALUATION*

DIRECTIVE METHODOLOGY OF LESSON AND TEACHING MATERIALS.



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QUALITY OF LESSON
✓PREPARING THE TEACHING MATERIALS
✓DEVELOPING APPROPRAITE QUESTIONS
✓UNDERSTANDING ON STUDENTS' LEARNING
✓STUDENTS' SKILLS TO LEARN


LESSON STUDY IMPLEMENTATION
✓LESSON PLANNING
✓LESSON OBSERVING AND TEACHING
✓LESSON DISCSSUION


THANK YOU FOR YOUR ATTENTION

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2009 - 2010	Project Director, Institute of Machines and Industment Tools (IMI)
1979 - 2009	Lecturer in Hanoi University of Technology, Ministry of Education and Traning (MOET)
2002 - 2008	Head of Personnel Office, Hanoi University of Technology, MOET
1996 - 2004	Head of Machine and Tribology Department, Hanoi University of Technology, MOET

RESEARCH INTEREST

- New Media for Science Communication,
- Cooperation and collaboration among Science Communication

ABSTRACT

STRATEGY OF SCIENCE AND TECHNOLOGY COMMUNICATION IN VIETNAM - THE NECESSARY AND THE CONTENTS

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The presentation refers to the need of defining S&T communication strategy for the development of science and technology in Vietnam to 2020, the vision to 2030 and the contents of this strategy.

This presentation consists of four parts:

The first part presents the standpoints and objectives of the S&T communication strategy comes from innovative for new base, sync and all interfaces of scientific and technological development strategy to 2020 of Vietnam's Government has been adopted in 2012.

Objects and messages of S&T communication will be presented in the second part of the report . The subject and object of S&T communication are summarized and categorized in four groups of media : policy makers, science and technology management; individuals and organizations engaged in scientific and technological activities; young people and the public; individual foreign cooperation in science and technology. Associated with the target audiences is the general message and the messages are appropriate for each target audience.

The third part referring to the modes and media content. The modes of S&T communication implemented from the central to local; systems and network of S&T communication; the type: media, conference, workshop, seminars, exhibitions, exchanges, education, museums, science Park... Content vital communication: policies and mechanisms for the development of science and technology; outstanding achievements, typically excellence in research, technology applications; common and connect research results to technology application; reflect the S&T activities (product quality, intellectual property, technology markets, nuclear energy ...); timely communication of national S&T facts.

The final section of the presentation introduced the solution and implementation for the. The main measures include: developing national infrastructure for S&T communication; communications network from central to local; mechanisms and financial; training and research; development of international cooperation for S&T communication. Organization of implementation is an important step to get success of this strategy.
Keywords: science and technology communication, objects, messages, media, content, implementation, network

ENGLISH TEXT

STRATEGY OF SCIENCE AND TECHNOLOGY COMMUNICATION IN VIETNAM - THE NECESSARY AND THE CONTENTS

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INTRODUCTION

Vietnam's Communist Party and Government considers science and technology its national first priority and driving force of the fast and sustainable national development. It has been reaffirmed in the Resolution No. 20-NQ/TW by the Party Central Executive Committee issued on December 1st, 2012 on the S&T development for fostered industrialization and modernization in the socialist-oriented market economy and international integration and it has also been approved by the National Assembly of the Socialist Republic of Vietnam on June 18th 2013. The perspective on S&T development has also reaffirmed in the management guidelines and policies of the Government, ministries, industries, and localities.

1. Perspectives on S&T communication development

Under guidelines of the S&T development, S&T communication has to take the role of communicating S&T activities to social communities: scientists, managers, businesses and public. It is important to raise public awareness of responsibility and encourage the potential for S&T innovation for national development. It is also an opportunity to improve S&T communication: S&T Communication Strategies and Action Plan; National S&T Week; methods and skills for S&T communication; research and training on S&T communication; S&T Museum, S&T Park; International Cooperation on S&T Communication.

In order to gradually orientate and specifize S&T communication activities, as a focal point for developing and implementing S&T communication, Centre for S&T Communication (CESTC) under MOST has initially done research and reported the basic contents for developing and completing the S&T Communication Development Project in the conference in upcoming time.

2. S&T Communication Development Goal

a. Overall Goal:

To enhance social awareness and responsibility of the role and significant impact of S&T on the fast and sustainable national development, S&T research and application is an indispensable way to improve the productivity, quality and efficiency of the economy and social living standard, unlock the creativity of the production force, innovate the growth model, increase the competitiveness of the economy, forster the national industrialization and modernization.

b. Specific objectives:

- To indentify objects in S&T communication and engage them in communication messages, contents and connection.
- To establish communication methods and skills, diversify communication types to communicate effectively and reach a high level of efficiency.
- To organize research and training activities, foster international cooperation on S&T communication.
- To draft contents and long-term plan for S&T communication development, e.g. science museums, parks, to attach S&T communication with educational system at all levels, expand communication activities to all regions.

3. Objects and messages of S&T communication

a. Objects of S&T communication (Subjects-objects)

- Policy-makers an managers of ST
- Individuals and organizations working in ST
  - Business and businessman
  - Research institutes and universities
  - National and international scientists
  - People interested in science, innovation and patent
- Young people, pupils, students: They are the national future generation, the major working force in the upcoming decades.
- General public
  - People working in ST

- People with motivation and innovation and able to generate technological changes in their organizations.
- Domestic and international individuals and organizations related to S&T activities.

b. S&T communication message

- Main message: S&T development is the national first priority and important driving force for the fast and sustainable national development.
- Individual message:
  - S&T policy-makers and national leaders: the main message is about enhancing awareness and responsibility in the management of the role and impact of S&T, especially in S&T innovation.
  - Individuals and organizations working in S&T field:
    - + Business: messages about strengthening investment in research and application of avanced technology into management and production, which play a vital role in the existence of business.
    - + Research institute and scientists: application of modern scientific research into market; commercialization of the research's results.
    - + People who are interested in science, innovation and patent: frequently use innovation in professional activities, and commercialization of innovative products.
  - Young people: messages about passion, interest in modern S&T, S&T changé life and provides opportunities for professional development.
  - General public: S&T improves life, practical use of S&T for individuals and communities, investment and application of new technology to improve living standard and efficiency in professions.
  - Individuals, domestic and international organizations related to S&T activities: S&T is a brige to success, bring into full play the intellectual potential and creativity, full and efficient exploitation of professional experience.

4. Modes and contents of S&T communication

a. Modes and types of S&T communication

- News agencies: television, broadcasting, electronic newspaper, Internet, printed media; of which mass media channel is more effective in communication.
- Technology market e.g. Techmart, Techdemo.
- Organizing S&T Day, S&T Week nation-wide, Communication Week, S&T conference and workshop,
- Organizing excursion and talk show between young people and public and research units, S&T businesses and laboratories,
- Organizng contests on S&T innovation, prizes for scientific research and technology application, prizes for S&T communication press.
- Science museum and parks.

b. S&T communication contents

- Guidelines and policies for S&T management,
- Outstanding achievements, honor typical examples in scientific research, technology application of businesses, scientists and people.
- Disseminating and connecting S&T research-application among social communities;
- Reflecting on industrial activities (product quality, intellectual property, technology market, atomic energy, etc.)
- Timely communication of outstanding S&T events in the industry.

5. Research and training in S&T communication

a. Training

- Firstly, the managers of organizations under the Ministry need training and updating knowledge to raise awareness and understanding of communication, PR and their role in implementation of S&T development strategy.

- Secondly, the communicators of S&T need training both in theory and practice, especially the consultancy capacity for leaders in communication and PR.
- Thirdly, journalists need training, workshop, knowledge and provided with opportunity to share skills and experience.

b. Scientific research on S&T communication
Do research into principles for communication, objects, contents, modes and plans to implement S&T communication

6. International cooperation in S&T communication

- Actively involve in international and regional organizations, biteral cooperation in S&T communication,
- International cooperation in training, fostering and doing scientific research,
- Participate in conferences, workshops, excursions and internship in regional countries and developed countries.

7. Solutions for developing S&T communication

a. Completing the system of law and regulation on S&T Communication

b. Organizing the S&T communication apparatus and network

c. Solutions for financial resources

- Financial resources: Buiding and completing the long-term and short-term projects for developing S&T communication: duties, plans and contents, which are used to identify financial resources, fully mobilize the financial resources from S&T communication socialization.
- Finance mechanism need to ensure the efficiency of S&T communication.

d. Solutions for infrastructure and material facilities
Investment in infrastructure for S&T communication: science museums, parks, facilities and equipments for communication modes, buiding information data base for S&T communication.

8. Implementaion

a. MOST leads the construction and implementation of S&T communication project, identifies long-term and short-term principal activities

b. Assigns tasks for ministries, industries, localities, research and training institutes in S&T communication,

c. Plans and specifizes the organization and implementation of S&T communication in each ministry, industry and locality.

CONCLUSION

The report has discussed basic contents related to major guidelines for S&T communication and has continuously been supplemented to reach a long-term S&T communication project. We expect and hope that more valuable exchanges and practical sharing ideas can be withdrawn from the conference to complete the important project of S&T communication.

Vietnam Ministry of Science and Technology

STRATEGY OF SCIENCE AND TECHNOLOGY COMMUNICATION IN VIETNAM THE NECESSARY AND THE CONTENTS

Dr. Nguyen Xuan Toan
Center for Science and Technology Communication - CESTC
Ministry of Science and Technology - MOST

SNU, Seoul, 12/6/2014

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CONTENTS OF LED REPORT

Introduction

- **Standpoints for the Development of S&T Comm.**
- **Goals, Objects and Messages**
- **Contents and Methods for S&T Comm.**
- **Research and Training**
- **Solutions**

SNU, Seoul, 12/6/2014

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INTRODUCTION

Resolution on S&T Development Serving National Industrialisation and Modernisation within the Conditions of the Socialist-oriented Market Economy and International Integration **(Resolution No. 20-NQ/TW)**, issued by **The Central Committee of PCV** on 1/12/2012:

"The State shall adjust budget allocation to scientific activities in order to overcome scattered and ineffective investment in this field. Total social capital for science and technology development will be increased to 1.5% GDP by 2015 and over 2% GDP by 2020 and 3% GDP by 2030"

"Develop the modern national infrastructure for S&T statistics and information; and build S&T museums"

Science and Technology Law 2013:

"State authorities for S&T at all levels shall take measures to strengthen S&T communication, dissemination of S&T law and knowledge".

"The State invests in building the information infrastructure, the national database of S&T activities order to ensure the complete and timely dissemination of information on S&T activities in the country and around the world"

SNU, Seoul, 12/6/2014

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INTRODUCTION

S&T Strategy (2011-2020):

✓ ***"Promote propaganda activities to raise social awareness about the role of S&T, particularly the guidelines, policies and laws of S&T, the key dynamics role of S&T for the national development".***

✓ ***Organize exhibitions to to introduce the achievements of S&T and innovation.***

✓ ***Develop services for providing S&T information to meet the need for leadership, management, forecasting, strategic planning, policy development, production, market development.***

✓ ***Strengthening update, sharing and provision of S&T information for training high-level human resource in S&T, for scientific research and technology development at universities, research institutes and enterprises.***

✓ ***Replicate and enhance the dissemination model of S&T knowledge for socio-economic development, poverty alleviation, rural development at the local level.***

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STANDPOINTS

1. PCV and State asserted: Science and Technology - top national policy and important motivations to develop the country.
2. S&T Communication: connect scientists-managers-business-people. Raising awareness and responsibility as well as the potential for the innovation.
3. Diversification of modes and forms of S&T communication.
4. Implement training and scientific research on S&T communication.

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GOAL, OBJECTS AND MESSAGES

The overall goal:

Raising awareness and responsibility of community of the role and large impact of science and technology for fast and sustainable development of country; Research and application of science and technology is the way indispensable to enhance the productivity, quality and efficiency of the economy and social life; Unleash the creativity, renewing the growth model, enhance the competitiveness of the products, accelerate the process of industrialization and modernization of the country.

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GOAL, OBJECTS AND MESSAGES
Specific Goals:
1. Clearly identify the subject and object of S&T communication, it is attached to the message and content,
2. Identify communication methods and skills, diversify the types of media to convey quality, high efficiency and effects of messages,
3. Organization of research activities and intensive training, promote international cooperation on S&T communication,
4. Proposal development content and plan in the long term: museums, science parks, S&T communication associated with the education system, expanded S&T communication activities to all local areas...
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GOAL, OBJECTS AND MESSAGES

Objects and Subjects:

1. **Policy makers, state management in the S&T field,**
2. **Individuals and organizations active in the S&T field:**
   - *Businesses and entrepreneurs,*
   - *The research institutes and universities,*
   - *Scientists,*
   - *Personal favorite science, passionate creativity, invention*
3. **Pupils and students: The future generation of the country's mainly workforce in the future;**
4. **Mass:**
   - *Individuals and organizations related to the S&T priorities field, S&T key in the development strategy*
   - *Personal motivation, creativity, ability to create technological change in their organizations.*
5. **Individuals and organizations in the country and abroad related to S & T activities**

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GOAL, OBJECTS AND MESSAGES

Messages:

- ✓ **Managers**: awareness and responsibility in executive management, innovation policy in the S&T development,
- ✓ **Enterprise**: increase investment in research and application of modern technologies in the management and organization of production. This work must be considered vital nature of the business,
- ✓ **Research institutions and scientists**: scientific research to meet the market, commercializing research results,
- ✓ **People love science, passionate creativity, invention**: innovation in professional, innovative technologies toward commercialization.
- ✓ **Youth:** messages directed to passion, curiosity about S&T modern, S&T changed life, as professional development opportunities,
- ✓ **Mass**: S&T to improve the lives and careers effectively.
- ✓ **Individuals, organizations in the country and abroad related to S&T activities**: S&T is the bridge to success, develop the intellectual potential and creativity,

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CONTENTS
1. S&T development policy,
2. Outstanding and honoring excellence scientific research and application,
3. Communication and common S&T research and application,
4. Reflecting the diversity of the S&T sector activities;
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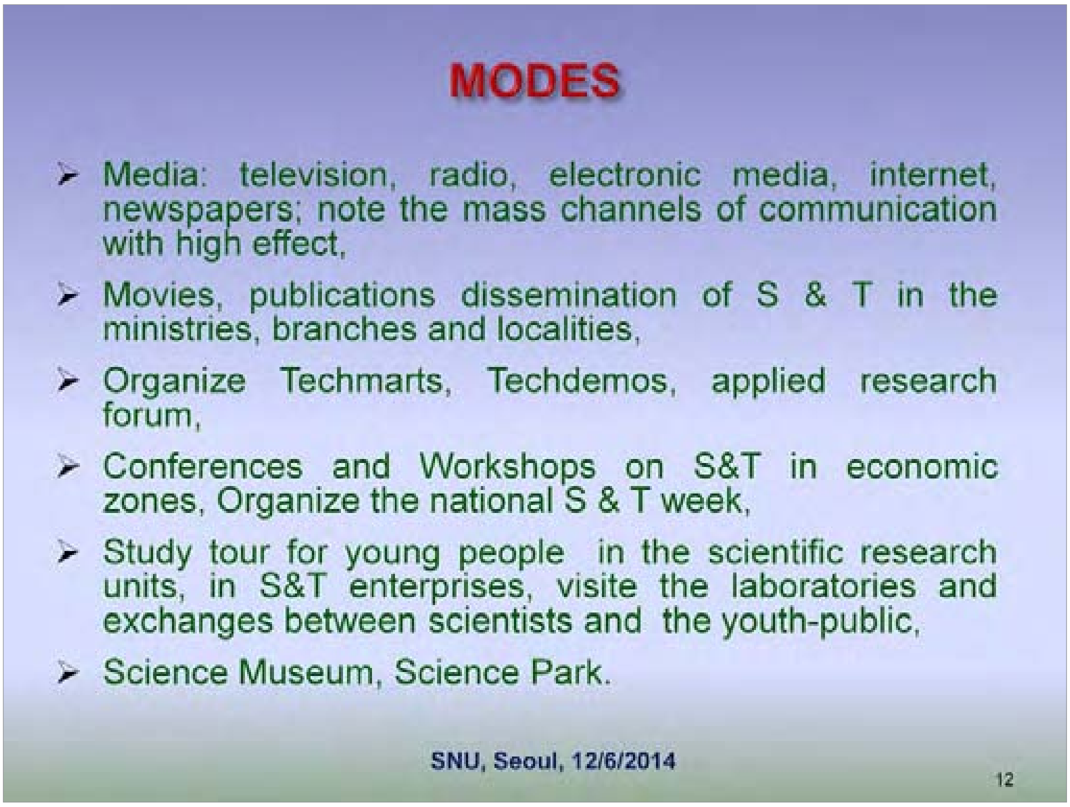
MODES
Media: television, radio, electronic media, internet, newspapers; note the mass channels of communication with high effect,
Movies, publications dissemination of S & T in the ministries, branches and localities,
Organize Techmarts, Techdemos, applied research forum,
Conferences and Workshops on S&T in economic zones, Organize the national S & T week,
Study tour for young people in the scientific research units, in S&T enterprises, visite the laboratories and exchanges between scientists and the youth-public,
Science Museum, Science Park.
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TRANING - RESEARCH
TRAINING
Leaders, S & T managers: Recognizing communication activities, public relations and its role in implementing the S&T development strategy, skills behave media in steering, especially when there is a crisis communications,
S&T professional communication officer: training theory and basic implementation skills of S&T communication, especially the capacity to leadership advise on issues of communication - public relations,
Journalists (reporters and editors): training and retraining just to provide information, S&T knowledge, has the opportunity to share their skills and experience in the S&T field,
Scientists, business: requirements and methods for dissemination of ideas, research methods, scientific results to the community.
RESEARCH
Objects, content, methods, plans, ... to ensure effective, quality and effects of communication processes.
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SOLUTIONS
1. Complete management mechanism
a) Complete apparatus
- Develop organizational structure, staff sufficient in number, have professional capacity,
- Building regulations coordinate activities to ensure communication action correcting orientation of the PCV and State,
- To strengthen information management apparatus, S&T communication in the industry, provincial offices,
b) complete a system of legal documents
2. Enhance the quality and effectiveness of S&T communication
- To strengthen the organization, apparatus, personnel S&T communication from the central to local levels,
- Identify the functions, tasks, goals and effectively serve the public to do the sorting criteria, planning and S&T communication networks in the country,
- Develop policies to promote economic self-reliance, diversification of unlawful activities to increase financial resources for activities of S&T communication,
- Increase resources, infrastructure for S&T communication.
3. Financial resources and policies
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SOLUTIONS
4. The Human Resource Solution
- Focus on program development , curriculum , training plans , training staff in the field of S&T communication, Especially for media members,
- Streamlining the system of training and retraining of S&T communication in the country towards a complete network of training institutions and fostering human resources S&T communication.
5. Solution of international cooperation
- Promote international cooperation in S&T communication,
- International cooperation in the field of training, research on methods and S&T communication skills, the skill to exploit modern technical means of information and S&T communication.
6. Solution of Technology
Science and Technology has a huge role in improving the quality and effectiveness of S&T communication (new technology, modern infrastructure, advanced communication methods, ...).
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IMPLEMENTATION
1. Planning and Contents,
2. Completing the apparatus and mechanism,
3. Implement of S&T communication activities
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THANK YOU!
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KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
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SESSION 4

Presider : ***Jae Chul Shim*** *(Member, Organizing Committee / Professor, Korea University, Korea)*

ICT Volunteer Program as the Instrument of Public Communication of Science and Technology

*- **Finarya Legoh** (Principal Engineer, Agency for Assessment & Application of Technology (BPPT), Indonesia)*

Learning from Diverse Perspectives in Science Communication

*- **Manoj Kumar Patairiya** (Adviser/ Scientist 'G', National Council for Science & Technology Communication, Ministry of Science & Technology, India)*

S4SC: A National S&T IEC Campaign Initiative on Disaster Preparedness

*- **Aristotle P. Carandang** (Chief, Communication Resources and Production Division, Science and Technology Information Institute, Department of Science and Technology, the Philippines)*

Presider

Jae Chul Shim

Member, Organizing Committee / Professor, Korea University, Korea
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Jae-chul Shim is Professor in the School of Media and Communications at Korea University. He was a Dean there from 2012 to 2014 and a Chair of the Journalism Department from 2004 to 2006. He received his PhD in mass communication from the University of Wisconsin-Madison in 1992. Since then, he has taught at the university level including University of North Dakota (1992-1993), University of Missouri both in Kansas City (1993-1995) and Columbia(2001-2002), and Korea University (1995-Present).

He is the author of *Economic News and Economic Reality* (1997), *The Ideal and Reality of Korean Economic and Business Reporting* (1999), and *Market Capitalism and Economic Journalism* (2005). He has published academic journal articles in *Journalism Quarterly*, *International Journal of Communication*, *Sungkok Journalism Review*, *Korean Journal of Journalism and Communication Studies*, *Korean Journal of Broadcasting*, *Journal of Broadcasting Research*, *Media and Society*, *Communication Sciences*, *Kwanhun Journal*, and *Journal of Public Relations Research*. In addition, he has occasionally published his newspaper column in *Donga Ilbo, Chosun Ilbo, Joongang Ilbo, Hankook Ilbo, Kookmin Ilbo,* and *Segye Ilbo.* He is currently working on a research project titled “Mass Media and Their Coverage of Social Conflict in the Public Sphere.”

Professor Shim is a President-Elect at the Korean Society for Journalism and Communication Studies and was an editor of Communication Theories, official journal of the Korean Society for Journalism and Communication Studies. He served a chair person of the Division of Journalism and Society, Korean Society for Journalism and Communication Studies. Dr. Shim served the Korea Communications Standards Commission as a standards member of the first special committee of journalism reporting and documentary.

KAST-ASM-IAP
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Finarya Legoh

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EDUCATION

1981	Bachelor in Architecture from the Engineering Faculty of University of Indonesia, Jakarta
1988	Master of Science (MSc) in Room Acoustics from the Applied Acoustics Department, Faculty of Engineering, The University of Salford, UK
1993	Doctor of Philosophy (PhD) in Room Acoustics, from the same University

WORK EXPERIENCES

1981 - 1999	at the Agency for Application and Assessment of Technology (BPPT), as researcher then posted in various positions concerning S&T Management
2000 - 2011	as Director for various positions at the Ministry of Research & Technology (RISTEK); and as the Executive Director for Science & Technology Center (PP-IPTEK)
Since 2013	Part-time Lecturer at the University of Pelita Harapan and at the University of Indonesia
Since 2008	Associate Professor at the University of Pelita Harapan
Since 2011	Principal Engineer at the Agency for Assessment & Application of Technology (BPPT)

PROFESSIONAL EXPERIENCES IN SCIENCE AND TECHNOLOGY COMMUNICATION (selected)

2008 - 2009	As panel of judges for the 1st and 2nd National Young Innovator Awards (NYIA), organized by the Indonesia Institute of Science (LIPI)
Dec, 2008	As chairman of panel judges for Indonesia Creative Idols in the field of Applied Science & Technology, organized by RISTEK
Fev, 2009	As Indonesian delegation participant for Australia-Indonesia Institute (AII), interlink science communication and creativity between Indonesia and Australia
Since 2009	As panel of judges and member of the International Advisory Committee for the annual World Creativity Festival (WCF) for gifted students (elementary & junior) in Daejeon - Korea, organized by the Korean Society for the Gifted (KSG) & KAIST.
Since 2009	As Indonesia evaluator and Focal Point for ASEAN+3 Center for Gifted in Science (ACGS), under ASEAN+3 Committee on S&T, covering : Junior Science Odyssey, Students Camp, Teachers Training.
Since 2009	As Indonesia evaluator and Focal Point for APEC Mentoring Center for Gifted in Science (AMGS), under APEC Policy Partnership on S&T Innovation, covering : APEC Future Scientist Conference, on-line mentoring, APEC Youth Scientist Journal.
Since 2012	As panel of judges for the Indonesian Science Festival for elementary, junior and senior

	high students, organized by the Ministry of Education.
2011. 2013	As Focal point and organizer for Public Communication of Science & Technology International Symposium in Jakarta – Indonesia.

PROFESSIONAL AWARDS

2003	Bintang Karya Pembangunan (Professional Development Award) from the Government of Indonesia for establishing S&T network (IPTEKnet)
2008	the First Female Indonesian Scientist in Architectural Acoustics, awarded by MURI (Museum of Records of Indonesia).
2009	the Lee Kimche McGrath Worldwide Award, awarded by the Association of Science-Technology Centers of US (ASTC), for 2009 ASTC Annual Conference at Fort Worth – Texas.
2012	Satya Lencana Karya Satya XXX (30 Years of Career Development Award) from the Government of Indonesia.

SESSION 4

ABSTRACT

ICT Volunteer Program as the Instrument of Public Communication of Science and Technology

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It is understandable that the function of science and technology (S&T) is to improve the quality of people's life. Public literacy and awareness of S&T have become a high priority in order to introduce innovation, new technologies, etc. S&T communication then has its place in the area of research and development, as an intermediary among scientists / engineers as well as public in providing appropriate information through various channels.

The advent of information and communication technology (ICT) provides wide range of possibilities on disseminating information, so that creative approaches using ICT applications are envisaged to attract segmented public in particular areas. The fast growth of internet media such as Social Network Services has also made public more familiar with computer and smart phone applications, and other advance technologies. ICT therefore is a powerful catalyst for the communication and the socialization of S&T. ICT access entails to affordability and literacy to the means of communcation with infinite resources from the internet, where these factors are not equally developed within provincial areas in Indonesia.

ICT program for public communication established in Indonesia is the ICT Volunteer Program. Its basic tasks are for education, networking, partnership, socialization and publication. The program is also an intermediary in promoting S&T to public that shows interesting and popular content. It copes with the change of a fast-changing world. Besides, the promotion is applied through the local socio culture which public has already familiar, that is done through education and media.

The Ministry of Communication and Information (MCIT) has initiated the program, although the volunteers are independent entities. Collaboration with various partners such as academics, research and development institutes, business communities, is recommended through activities of education, advocating, socialization, communication, etc. The efforts taken in developing S&T communication is effective in building a better hub of change agent to support important issues.

There should be contemporary S&T based issues in Asia that people have to deal with. By using approach of scientific capacity and nurturing S&T communication network, people in Asia should work in partnership to attack the problems and to outlook for the future of Asia.

Keywords : S&T awareness and literacy, S&T communication, ICT Volunteer Program.

ENGLISH TEXT

ICT Volunteer Program as the Instrument of Public Communication of Science and Technology

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1. Introduction

The global economic sustainability depends upon science and technology (S&T) competitiveness, so that S&T become important factor for many nations to improve the quality of people's life. In this sense, spreading knowledge and public awareness of S&T has become a high priority in introducing innovation and technologies. S&T communication placed as an intermediary, stand among scientists, engineers and public in providing appropriate information through various channels. However, their promotion in Indonesia is less persistence. The government has to put initiatives to create programs in order to popularize S&T and to educate public in S&T commonality.

There is no doubt that the advent of information and communication technology (ICT) provides wide range of possibilities on disseminating information, so that creative approaches using ICT applications are envisaged to attract segmented public in particular areas. The fast growth of internet media such as Social Network Services has also made public more familiar with computer and smart phone applications, and other advance technologies. ICT therefore is a powerful catalyst for the communication and the socialization of S&T. ICT access entails to affordability and literacy to the means of communcation with infinite resources from the internet, where these factors are not equally developed within provincial areas in Indonesia.

One of the ICT programs for public communication introduced in Indonesia in July 201 by the Ministry of Communication and Information Technology (MCIT) is the ICT Volunteer Program. The basic tasks of volunteers are for : providing informal education of ICT, developing partnership in ICT business, socialization and publication. The program is also a mediator in promoting S&T to public that shows interesting and engaging ways as well as creative, attractive and in a popular content. They are applied through the local socio culture, which has already been familiar to public. The activities include collaborative efforts of academics, research and development institutes, private sectors, central government / local governments, and communities.

This paper contributes twofold : to the awareness of public communication of S&T and to the promotion of ICT Volunteers Program that has been successfully applied for S&T communication. On the same time, the roles of ICT communities are identified through the program. The activities are carried out in different provinces as well as target group of people. The presentation of the program is followed by analytical judgment before summing up the paper with concluding remarks.

2. Material and Method

The conceptual framework and methodology developed for this paper covers data collection in relation with : literature reviews, brief overview of S&T communication, different target group of receivers, technology delivered and ICT as the enabler. Factors that have been facilitated and influenced success story of activities are also identified by their program, implementation and target group. Brief case studies as best practices of the programs are identified, in the field of S&T communication applying ICT.

ICT has much to offer access to information and services. ICT could give information of S&T, opportunity to secure new jobs (media, web, programming, data entry, sales), people-friendly working models (tele-working), etc. Besides, ICT offer access to education at all levels and at all times through e-learning; access to business finance, and provides a communication network through email, creation of web sites, chat rooms, distribution lists, etc.

S&T communication is actually a hub to connect different needs from various types of communities.It is considered to be introduced to public in ways, such as :

- Types of communication in the profiles of : competition, festival or exhibition, publication, outreach, science club, science camp, science theatre, training and workshop for specific users, public discussion and gathering, dissemination and promotion at public space and social media.
- Various media available can be used and developed in spreading the S&T knowledge, in order to increase public awareness as well as to promote their participa-

tion.

- The familiarity and local knowledge engagement should be embedded in the development of S&T communication, it also cannot be separated from the local culture of society.
- The prerequisite of interesting and engaging ways in promoting S&T to public, should be coined with creative and attractive content to cope with the fast-changing need.

3. ICT Volunteer Program

In light of the need to accelerate the development efforts, The MCIT has built ICT infrastructure access points at strategic areas within districts and sub districts, in order to provide low cost access as well as information services to public. The supports available such as : Community Access Point, Mobile Community Access Point, information society cafe, smart home and smart village, ringing village, etc. With many ICT projects underway, it is important that government should share their ICT strategies, and invite communities to participate in sharing their knowledge, experiences and learning.

The ICT Volunteer Program is an instrument to promote ICT sharing strategies and knowledge in a broad range of development fields. It provides the potential scalability to leverage skill needed for education, business and other opportunities. Its activities are to provide technical knowledge in the field of ICT security, digital content and ICT applications development. The program requires collaboration among academics, research and development institutes, private sectors, government / local governments, and communities. Since the program is delivered to certain access points by the MCIT, anyhow it should be supported and maintained through collaboration among ICT volunteers for continuous operation. The collaboration can be made by two or more parties, depend upon the nature of core business has to be put into operation.

For common people, to effectively utilize ICT in their daily activities, training is required as well as a continued support structure, at least for the initial stages. People will feel empowered only if they are able to clearly see the benefits of using ICT and improve the quality of their lives. It is, therefore, the vision of ICT Volunteer Program is to create ICT volunteers as self-reliance movement to lead into volunteer organizations that are readily serving public as humanitarian mission for the society. The program also empowers people through socializing, educating and training skills of ICT for the benefits of the nation.

The basic programs of ICT Volunteers are : volunteerism and organization, capacity building, public education on ICT, partnership, socialization and publication. They are divided into several tasks, such as :

- For education : training ICT knowledge and application, road show to schools, training ICT application to SMEs.
- For partnership : build partnership with central / local government, ICT organization and communities, companies that willing to support ICT volunteers.
- For socialization and publication : socialization in various activities related to ICT, utilization of web sites and social media (Facebook and Twitter).

Some Initiatives of ICT Volunteer Activities

- Teacher Movement on Internet Literacy: This is a collaboration of the Indonesia Teacher Association (IGI), the Computing Institutes Association (APTIKOM), and the Indonesia Telecommunication Company (PT Telkom) as a sponsor for community development. The idea is to accelerate the professionalism of teachers in computing and internet literacy, which activities consist of workshop, design and utilization of web site and social media, training of trainers, and the establishment of ICT volunteers in the West Java region, with 500 participants.
- Technopreneur Goes to School: This is a collaboration of technology magazine "Komputek" and the Indonesia Telecommunication Company (PT Telkom). The volunteers visit high schools and vocational schools to confer awareness to the

students about the updated ICT applications and using ICT for business, such as multimedia, HTML, audio digital, over clocking PC.

- ICT Literacy for Society: This is the movement of volunteers in Lampung Province to transfer ICT knowledge to society by using supports provided by the government, i.e. Community Access Point and Mobile Community Access Point. They provide services, internet access and information in certain locations. They also give training in email communication, using social network and blog design, to students, community, and government officials. As e-identity is now being applied in Indonesia, not all operators and public are being familiar with the application and process, so that the volunteers provide training to uplift the knowledge and skill.
- Citizen Journalism: This is a collaboration workshop of Lampung Province, Blog Society and ICT volunteers, with 80 blogger participants. The objective is to promote electronic journalism in a positive way.
- Media Online for Business Prospect: This training was provided by Bali Province in ICT application to SMEs with 100 participants. This ICT training should contribute to developing new business prospect and process as well as expanding income-generating opportunities.

4. Results

The optimizing of science and technology (S&T) roles can be realized by increasing the awareness of S&T and empowering the ability of local / national S&T. It is necessary to promote a strong bond for both researchers and public communicators to work together for obtaining a high value of results. In more strategic role, public communication of S&T acts as the change agent or the intermediary to people.

The differences in resources and capabilities should be identified to access and to effectively utilize ICT for development that exist within and between countries, regions, sectors and socio-economic. However, new technologies have a vast potential for empowerment which needs to be fully exploited as well.

Although the ICT Volunteer Program is the instrument that has been initiated by the Government of Indonesia through the MCIT, but the organization and implementation of the program is merely rely on the initiative actions of the volunteers in the associated areas. Champions of volunteers are always necessary to deliver the program, to speed up the actions, to accelerate the activities, based on the demands of public in associated locations.

For the volunteers themselves, they must catch up with the current knowledge, customize the viable ICT in certain areas, and facilitate the ICT implementation. These tasks are not easy, as there are many technologies being promoted by ICT developers. There is also significant expense involved, coupled with uncertainty, make a deterrent to volunteer ICT. Identifying strategies for selecting appropriate technology for their activities are essential as well as evaluating their impact.

Practical factors affect the program in district areas are the inadequate infrastructure, such as unreliable power sources, internet and mobile phone connectivity, poses challenges to the successful implementation of the program. It is important for the volunteers to allocate some time, energy and resources to learn about and discuss the ICT applications with community, to obtain community ideas about using them and to search out solution to challenges.

5. Conclusions

Novel efforts and initiatives are taken to develop S&T communication, in order to build a better hub of change agent to support the urgent issues as well as the cutting edge of S&T. In order to share specialized knowledge, S&T communication is adjusted to make this knowledge available and understandable by common people within targeted group of age and skill.

The rapid development of ICT has commonly been adopted by means of multimedia access, mobile devices and other newly advance technologies. Web site, Blog and social media are the effective instrument of S&T communcation with unlimited resources from the internet. The Government of Indonesia applies ICT media as S&T public communication more effectively as an intermediary, to provide appropriate information. This condition has made the ICT Volunteer Program spread out dramatically throughout the regions in Indonesia, which can be seen through evaluation of areas that have been actively success.

There should be contemporary S&T based issues in Asia that people have to deal with. By using approach of scientific capacity and nurturing S&T communication network, people in Asia should work in partnership to attack the problems and to outlook for the future of Asia.

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- *Legoh, Finarya; Permatasari, Dyah Ratna; (2012); Café Scientifique and Workshop to Empower Women in Information Technology; paper at the Proceeding of 12th International Public Communication of Science and Technology; Florence, Italy, 18-20 April 2012.*
- *Ministry of Communication & Information Technology (2011); Relawan TIK Indonesia, BersamaMembangunMasyarakat Indonesia Informatif; a guide book of ICT Volunteer Program.*
- *Ministry of Communication & Information Technology (2012); Relawan TIK Indonesia 2012; an information booklet of ICT Volunteer Program.*

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

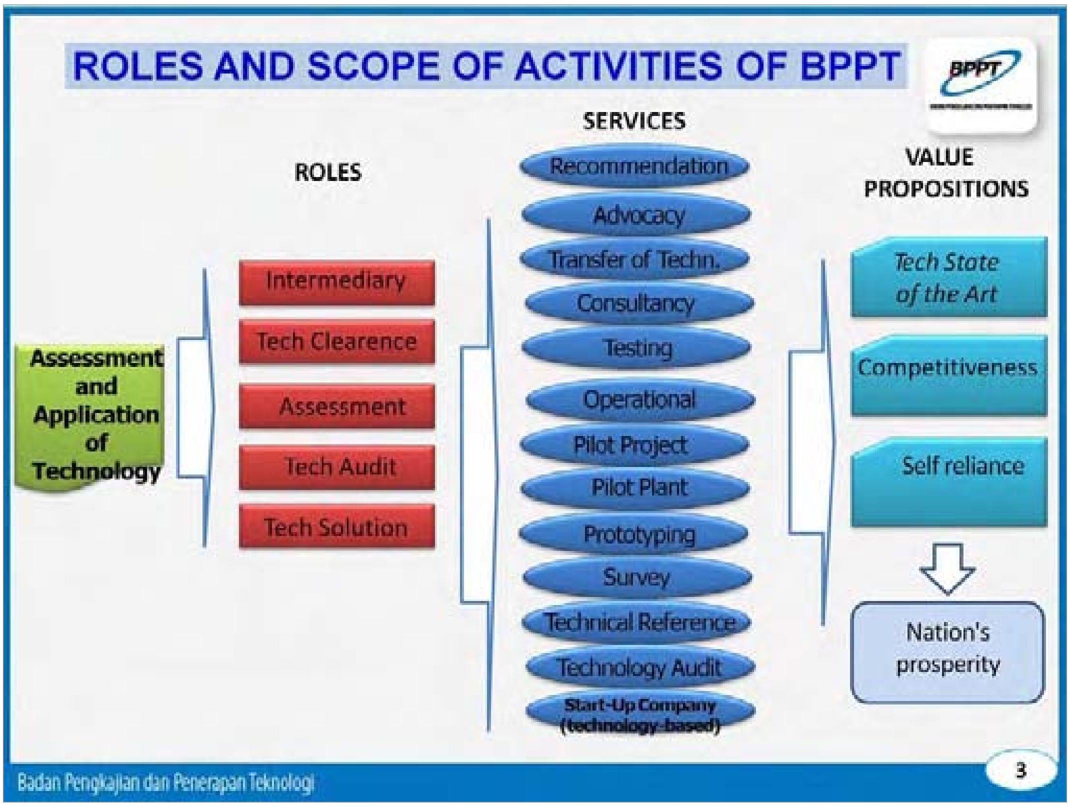
JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

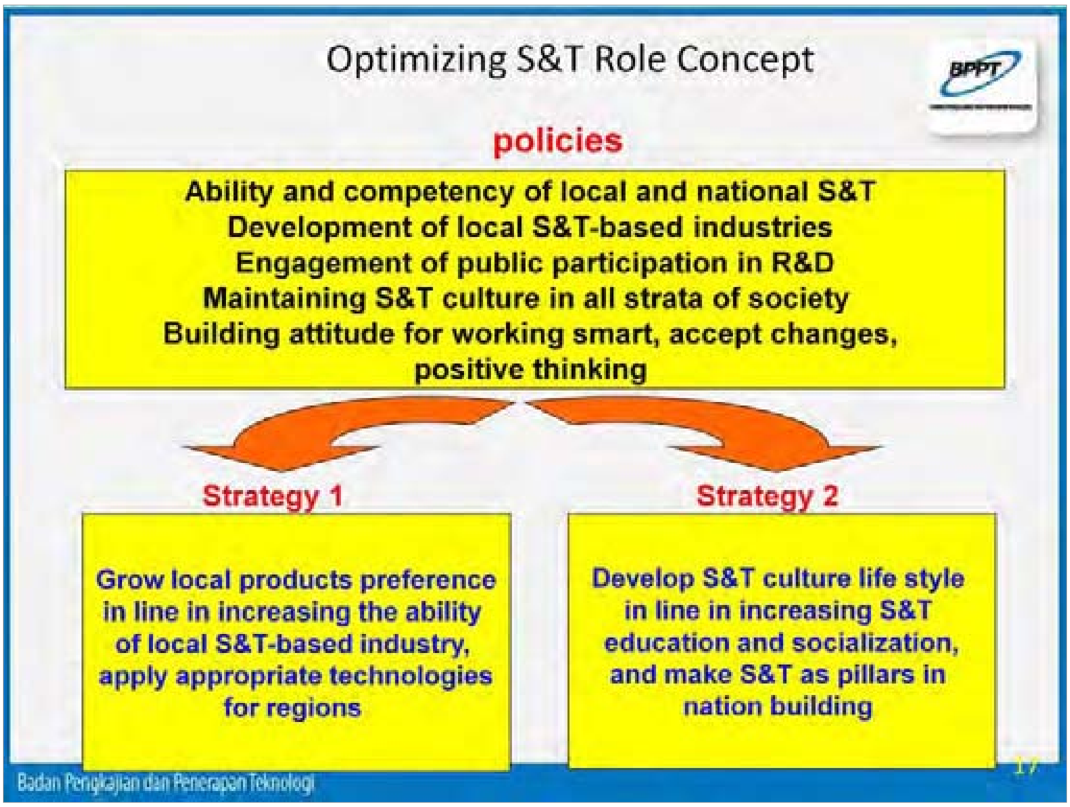
SESSION 4

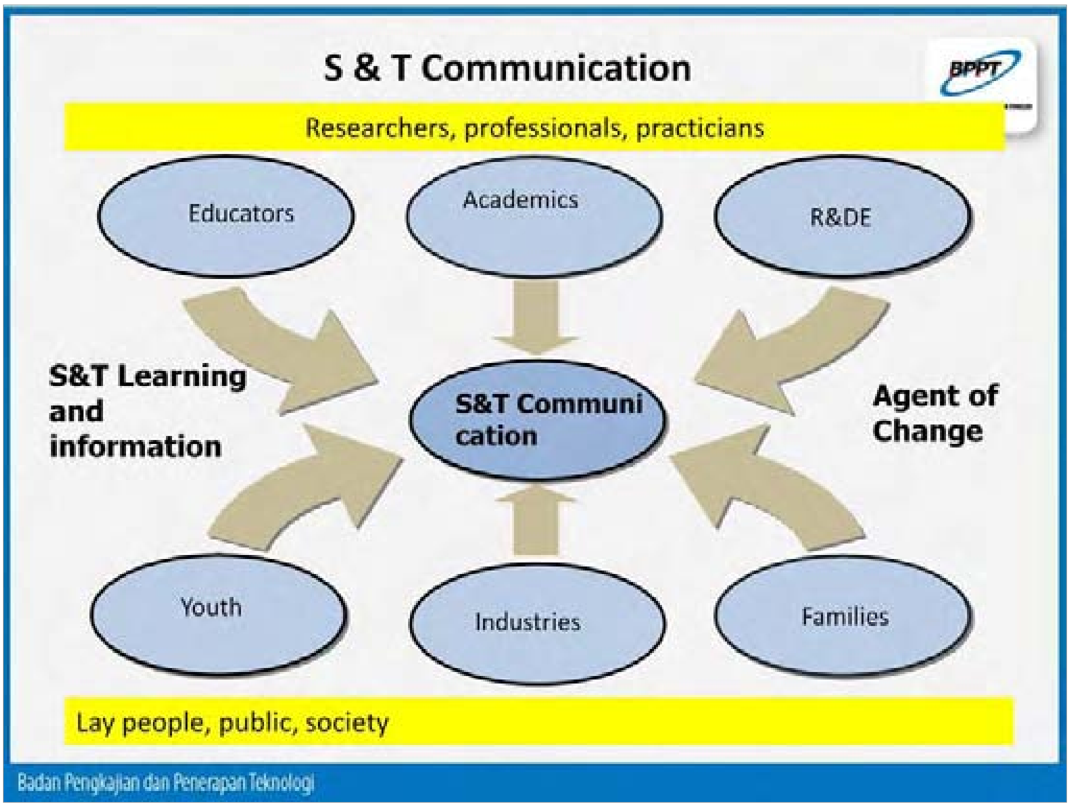

BADAN PENGKAJIAN DAN PENERAPAN TEKNOLOGI
Badan Pengkajian dan Penerapan Teknologi


ICT Volunteer Program as
Instrument of
Science & Technology Communication
Badan Pengkajian dan Penerapan Teknologi
KAST-ASM-IAP WORKSHOP
"Science Literacy: Science Communication &
Science Outreach"
11-13 June 2014, Seoul National University, Seoul, Korea


ROLES AND SCOPE OF ACTIVITIES OF BPPT
BPPT
ROLES
SERVICES
VALUE PROPOSITIONS
Assessment and Application of Technology
Intermediary
Tech Clearence
Assessment
Tech Audit
Tech Solution
Recommendation
Advocacy
Transfer of Techn.
Consultancy
Testing
Operational
Pilot Project
Pilot Plant
Prototyping
Survey
Technical Reference
Technology Audit
Start-Up Company (technology-based)
Tech State of the Art
Competitiveness
Self reliance
Nation's prosperity
Badan Pengkajian dan Penerapan Teknologi
3


BPPT
Platform : Law No. 18/2002
The National System of Research, Development & Application of Science & Technology.
– Accelerate the development & application of S&T resources effectively.
– Trigger networking among R&D institutions.
– Regulate the inter-connection between the doer and the user of S&T.
– Define roles and functions of government (local and central) and public to contribute actively in the participation of research, development & application of S&T.
– Regulate task and responsibilities of government, R&D institutions, public, and also possibilities of sharing resources among others.
– Request responsibilities of local government in establishing S&T centers , either individually or through collaboration with other local governments / institutes / third parties.
Badan Pengkajian dan Penerapan Teknologi


Optimizing S&T Role Concept
BPPT
policies
Ability and competency of local and national S&T
Development of local S&T-based industries
Engagement of public participation in R&D
Maintaining S&T culture in all strata of society
Building attitude for working smart, accept changes, positive thinking
Strategy 1
Strategy 2
Grow local products preference in line in increasing the ability of local S&T-based industry, apply appropriate technologies for regions
Develop S&T culture life style in line in increasing S&T education and socialization, and make S&T as pillars in nation building
Badan Pengkajian dan Penerapan Teknologi
17


S & T Communication
BPPT
Researchers, professionals, practicians
Educators
Academics
R&DE
S&T Learning and information
S&T Communi cation
Agent of Change
Youth
Industries
Families
Lay people, public, society
Badan Pengkajian dan Penerapan Teknologi

Types of S&T Communication

- Joint research & joint collaboration : transferring / getting knowledge, share resources , diffusion ;
- Competition : national, international, specific topic, e.g. competition for journalists to write and publish S&T article in newspapers / magazines; give award to a person for the contribution of engineering work article; competition of innovation for youth;
- Festival / exhibition : RITECH, BPPT Annual Anniversary , open house and open laboratories;
- Publication : magazine, journal, e-newsletter, social media, website, annual report;
- Outreach : combine with specific program for certain issue, social action activities;
- Training and Workshop : teachers, students , public (café scientifique, community discussion), gathering, open house;
- Dissemination & promotion at mall, remote area, public space, social media;
- Give honorary award to distinguish person for the innovative activities in S&T.

Badan Pengkajian dan Penerapan Teknologi

S&T Communication through ICT

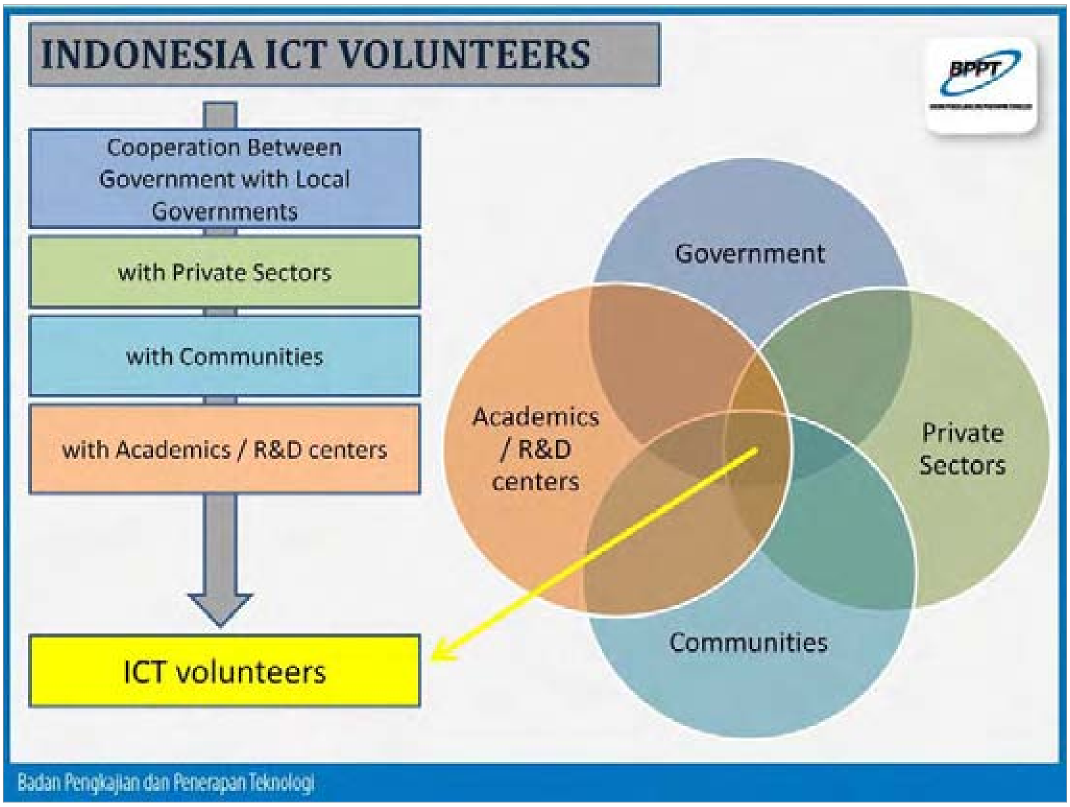
- Currently, Internet has become the most useful and popular form of media available to public.
- In line with this phenomenon, Ministry of Communication and Information Technology (MCIT) of Indonesia designed **Indonesia ICT Roadmap** - bring into reality information to society, with strong supported ICT based.
- MCIT built several ICT Infrastructure Access Point at strategic areas (district and sub district) - to provide low cost access and information services to public. Examples : smart village, mobile tele-center, mobile media center, internet kiosk, creative house.
- Cooperation between MCIT and BPPT – development of "ICT Volunteers".

Badan Pengkajian dan Penerapan Teknologi


PUSAT INTERNET DESA
SIMPANG EMPAT
PERLIS
WARDES SAMARANG
ICT Programs launched by Indonesia Government : smart village, access point, internet kiosk, mobile internet, etc.
DESA PINTER


Social Network Services (SNS)
BPPT
facebook
YouTube
bebo
Technorati
nyspace.com
USTREAM
flickr
del.icio.us
WordPress
Badan Pengkajian dan Penerapan Teknologi


Indonesia ICT Status
BPPT
Social Media Indonesia
47.16
juta
pengguna
59%
41%
Jakarta (#1) & Bandung (#6)
di antara kota dengan
pengguna twitter paling aktif
Mobile Users : 220 Mio
ARPU : USD 2.3
Smartphone VS Feature : 20%
Mobile Internet Users : 29%
Indonesia Internet Users
(millions)
63 Million in 2012
0.5 1 1.9 4.2 4.5 8 11.2 16 20 20 25 30 42 55 63
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012
Source: www.apjii.or.id
Badan Pengkajian dan Penerapan Teknologi


INDONESIA ICT VOLUNTEERS
BPPT
Cooperation Between Government with Local Governments
with Private Sectors
with Communities
with Academics / R&D centers
ICT volunteers
Government
Academics / R&D centers
Private Sectors
Communities
Badan Pengkajian dan Penerapan Teknologi

Bridging

- Supply HR from community, universities, R&D ↔ Demand for ICT learning
- Between ICT communities, NGOs, bloggers
- Public, communities ↔ government / local government
- ICT Communities (supply) ↔ donor, industries (demand)

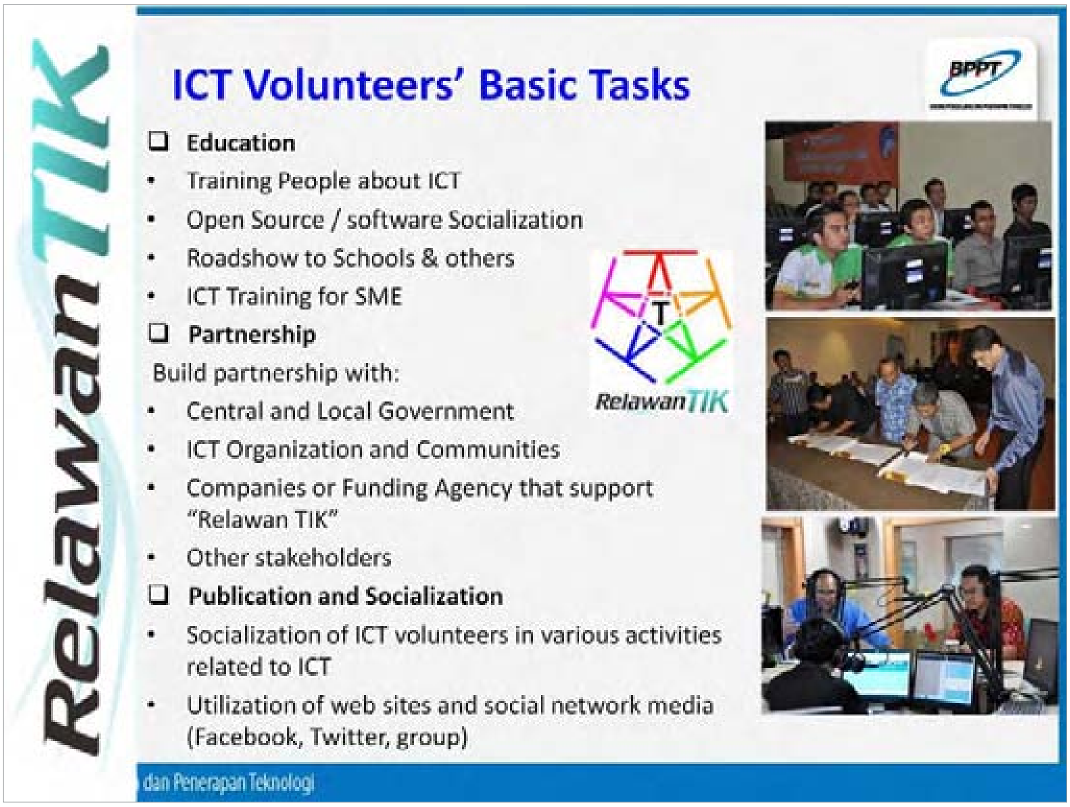
- Activities should be documented
- Activities should be published through SNS
- Should write / expose, published through media

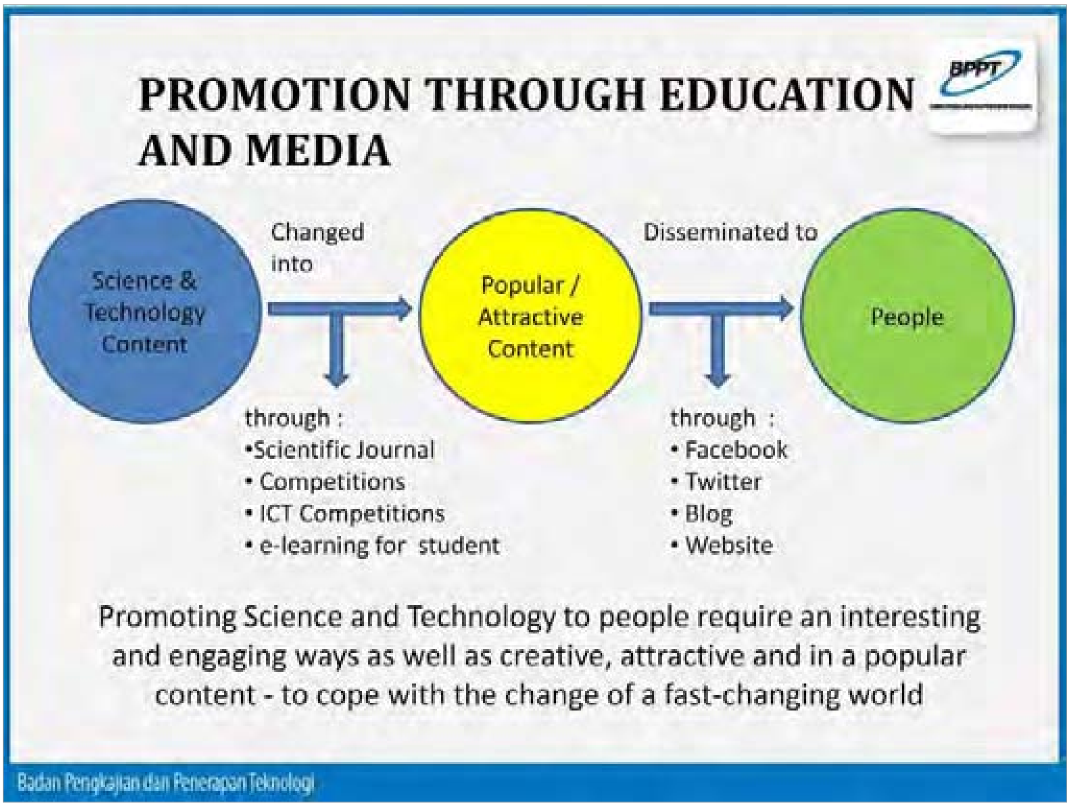
Badan Pengkajian dan Penerapan Teknologi

Programs

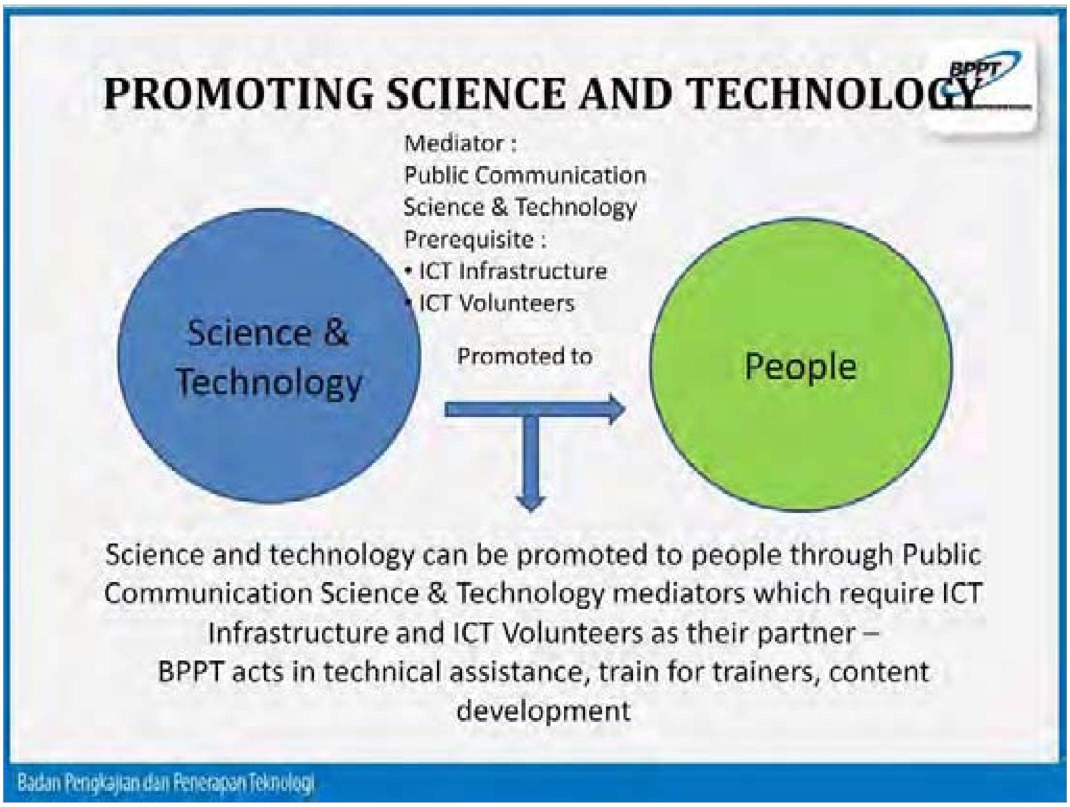
- ICT education for public / communities
- Team work and collaboration network building
- Publication and socialization
- Organization and membership
- Capacity Building

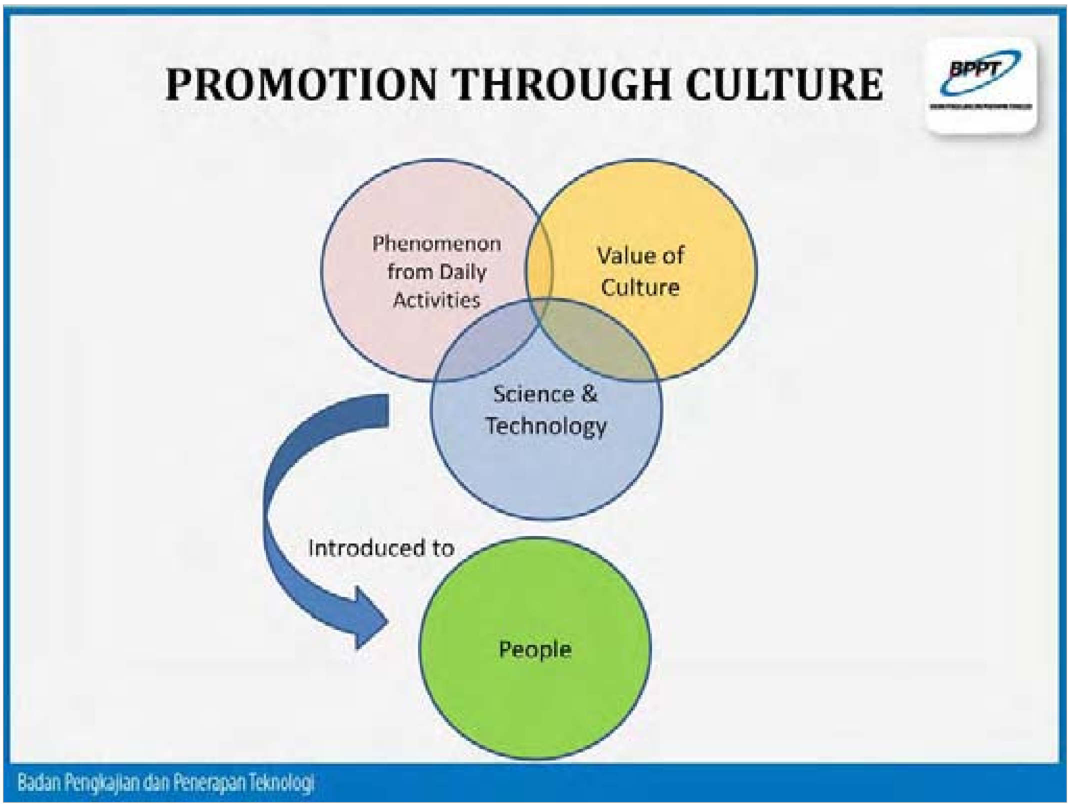
Badan Pengkajian dan Penerapan Teknologi


RelawanTIK
ICT Volunteers' Basic Tasks
BPPT
Education
Training People about ICT
Open Source / software Socialization
Roadshow to Schools & others
ICT Training for SME
Partnership
Build partnership with:
Central and Local Government
ICT Organization and Communities
Companies or Funding Agency that support "Relawan TIK"
Other stakeholders
Publication and Socialization
Socialization of ICT volunteers in various activities related to ICT
Utilization of web sites and social network media (Facebook, Twitter, group)
RelawanTIK
dan Penerapan Teknologi


PROMOTION THROUGH EDUCATION AND MEDIA
BPPT
Science & Technology Content
Changed into
Popular / Attractive Content
Disseminated to
People
through :
•Scientific Journal
• Competitions
• ICT Competitions
• e-learning for student
through :
• Facebook
• Twitter
• Blog
• Website
Promoting Science and Technology to people require an interesting and engaging ways as well as creative, attractive and in a popular content - to cope with the change of a fast-changing world
Badan Pengkajian dan Penerapan Teknologi

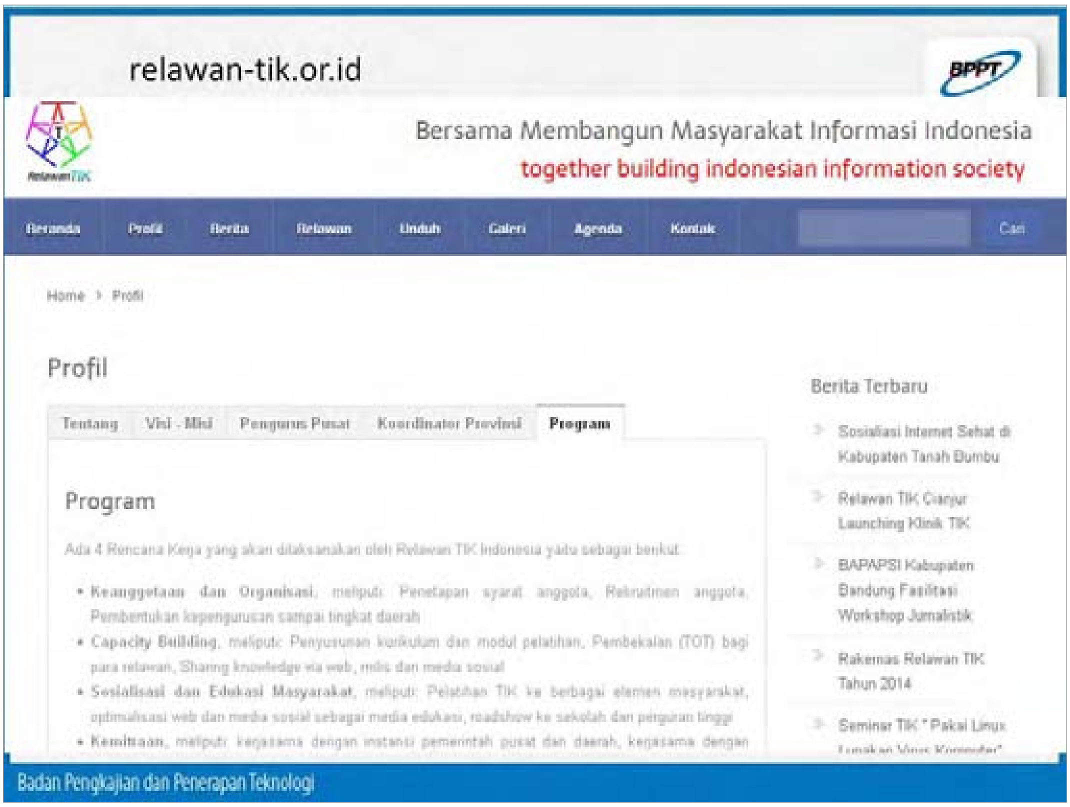
SESSION 4


PROMOTING SCIENCE AND TECHNOLOGY
Mediator :
Public Communication
Science & Technology
Prerequisite :
• ICT Infrastructure
• ICT Volunteers
Science & Technology
Promoted to
People
Science and technology can be promoted to people through Public Communication Science & Technology mediators which require ICT Infrastructure and ICT Volunteers as their partner –
BPPT acts in technical assistance, train for trainers, content development
Badan Pengkajian dan Penerapan Teknologi


PROMOTION THROUGH CULTURE
Phenomenon from Daily Activities
Value of Culture
Science & Technology
Introduced to
People
Badan Pengkajian dan Penerapan Teknologi

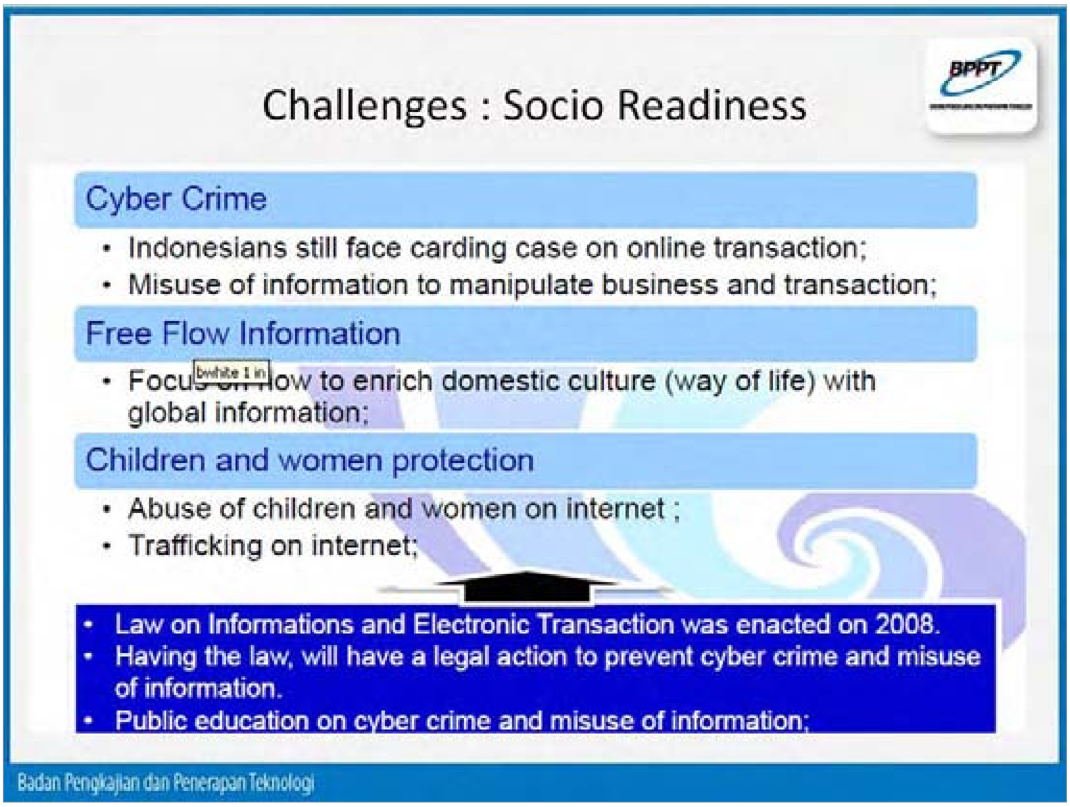

Development of Local Application & Contents
BPPT
CATFIZ
GET THE APPS
Picmix is an Indonesian-based photo sharing platform with simple, square Polaroid-esque aesthetics, that displays photos from friends in streaming feed
13
million+ users
WORLDWIDE
and still counting!
DreadOut is an upcoming Indonesian survival horror video game developed
DreadOut
PC
Badan Pengkajian dan Penerapan Teknologi


BPPT
Interactive Games
News Portals
Mobile & Internet Content Industry
Business Software
Drive Game
Logistics
INTELIX
PESONAEDU
Interactive Advertisements
ANDAL software
Zahir
CARONET
Industrial Software
Mobile
Badan Pengkajian dan Penerapan Teknologi


relawan-tik.or.id
BPPT
Bersama Membangun Masyarakat Informasi Indonesia
together building indonesian information society
Beranda
Profil
Berita
Relawan
Unduh
Galeri
Agenda
Kontak
Cari
Home > Profil
Profil
Tentang
Visi - Misi
Pengurus Pusat
Koordinator Provinsi
Program
Program
Ada 4 Rencana Kerja yang akan dilaksanakan oleh Relawan TIK Indonesia yaitu sebagai berikut:
Keanggotaan dan Organisasi, meliputi: Penetapan syarat anggota, Rekrutmen anggota, Pembentukan kepengurusan sampai tingkat daerah
Capacity Building, meliputi: Penyusunan kurikulum dan modul pelatihan, Pembekalan (TOT) bagi para relawan, Sharing knowledge via web, milis dan media sosial
Sosialisasi dan Edukasi Masyarakat, meliputi: Pelatihan TIK ke berbagai elemen masyarakat, optimalisasi web dan media sosial sebagai media edukasi, roadshow ke sekolah dan perguruan tinggi
Kemitraan, meliputi: kerjasama dengan instansi pemerintah pusat dan daerah, kerjasama dengan
Berita Terbaru
Sosialiasi Internet Sehat di Kabupaten Tanah Bumbu
Relawan TIK Cianjur Launching Klinik TIK
BAPAPSI Kabupaten Bandung Fasilitasi Workshop Jurnalistik
Rakernas Relawan TIK Tahun 2014
Seminar TIK " Pakai Linux
Badan Pengkajian dan Penerapan Teknologi


Social network Services
for ICT Volunteer Program
BPPT
Groups:
relawanTIK-id@googlegroups.com
Page:
facebook.com/relawanTIK
Twitter:
@relawanTIK
Web:
relawan-tik.or.id
Badan Pengkajian dan Penerapan Teknologi


BPPT
open source
Training & Sosialisasi
Open Source Software
Badan Pengkajian dan Penerapan Teknologi


BPPT
Challenges : Socio Readiness
Cyber Crime
• Indonesians still face carding case on online transaction;
• Misuse of information to manipulate business and transaction;
Free Flow Information
• Focu … ow to enrich domestic culture (way of life) with global information;
bwhite 1 in
Children and women protection
• Abuse of children and women on internet ;
• Trafficking on internet;
• Law on Informations and Electronic Transaction was enacted on 2008.
• Having the law, will have a legal action to prevent cyber crime and misuse of information.
• Public education on cyber crime and misuse of information;
Badan Pengkajian dan Penerapan Teknologi

Types of ICT Volunteers Initiatives

- **Teacher Movement on Internet Literacy** : collaboration of Indonesia Teacher Association (IGI), Computing Institutes Association (APTIKOM), and Indonesia Telecommunication Company (PT Telkom) – accelerate teachers' professionalism in computing & internet literacy.
- **Technopreneur Goes to School** : collaboration of technology magazine "Komputek" and PT Telkom – volunteers run workshop at vocational schools for ICT application for business.
- **ICT Literacy for Society** : movement of ICT volunteers by using ICT support services provided by government, Community Access Points – volunteers provide services, internet access, information, in certain locations. Also provide training of multimedia design, blog design, internet exploring, etc.

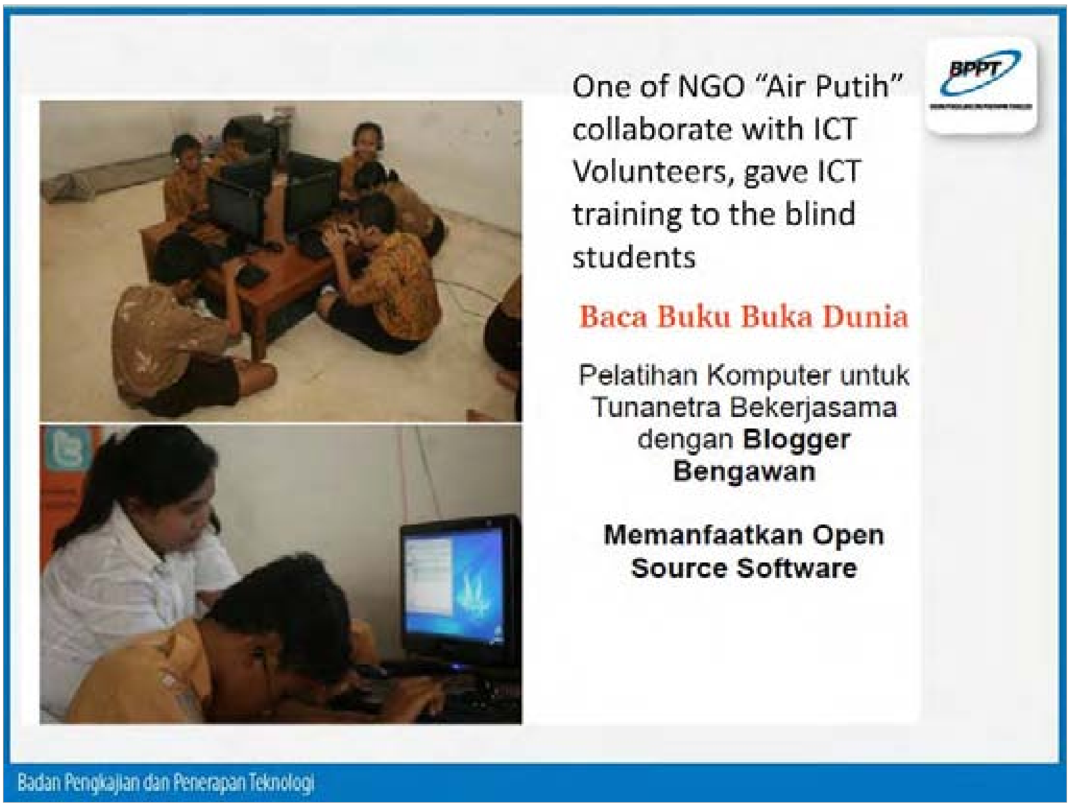
Badan Pengkajian dan Penerapan Teknologi

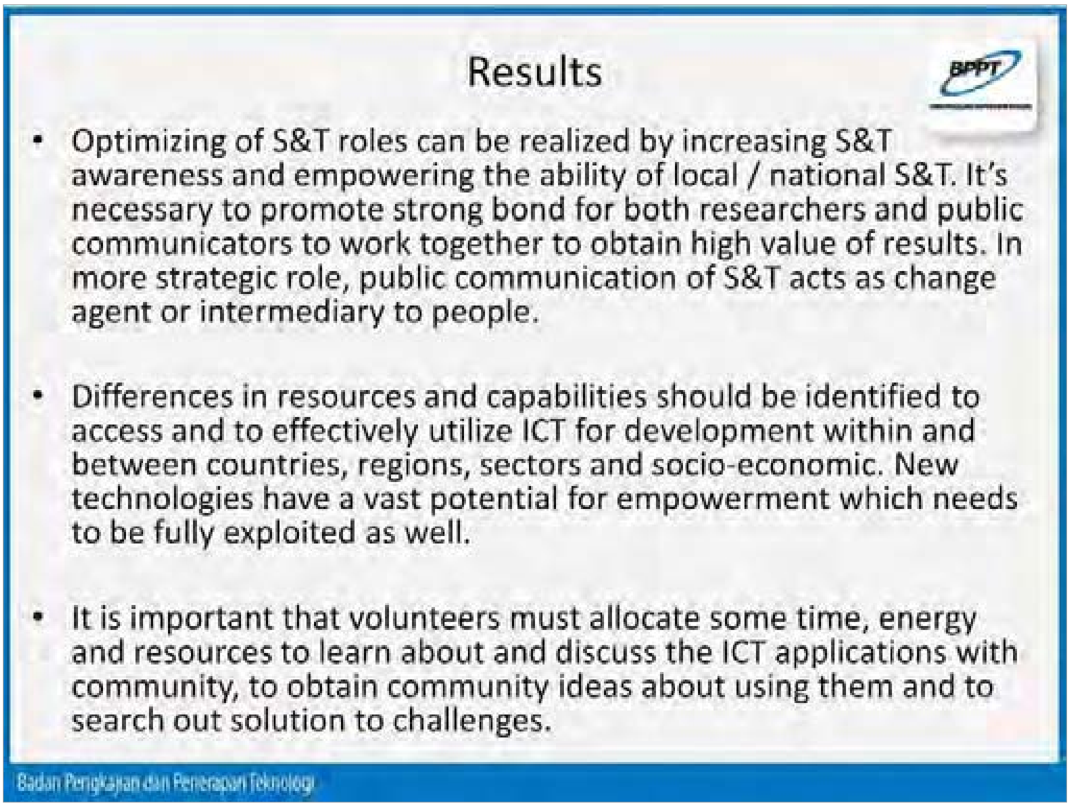
Types of ICT Volunteers Initiatives

- **Citizen Journalism** : collaboration workshop among Lampung Province, Blog Society, & ICT Volunteers – to promote electronic S&T journalism in a positive way.
- **Media Online for Business Prospect** : training provided by Bali Provincial Government in ICT application to SMEs approx. 100 participants. ICT should contribute to developing new business prospects and process, to expand income-generating opportunities.

Badan Pengkajian dan Penerapan Teknologi


BPPT
KOMUNITAS SANTRI INFORMATIKA
RelawanTIK
ROADSHOW SOSIALISASI
INTERNET SEHAT - BOGOR
Introduce healthy internet at shopping mall
To boy & girl scouts
Badan Pengkajian dan Penerapan Teknologi


BPPT
One of NGO "Air Putih" collaborate with ICT Volunteers, gave ICT training to the blind students
Baca Buku Buka Dunia
Pelatihan Komputer untuk Tunanetra Bekerjasama dengan Blogger Bengawan
Memanfaatkan Open Source Software
Badan Pengkajian dan Penerapan Teknologi


Results
BPPT
• Optimizing of S&T roles can be realized by increasing S&T awareness and empowering the ability of local / national S&T. It's necessary to promote strong bond for both researchers and public communicators to work together to obtain high value of results. In more strategic role, public communication of S&T acts as change agent or intermediary to people.
• Differences in resources and capabilities should be identified to access and to effectively utilize ICT for development within and between countries, regions, sectors and socio-economic. New technologies have a vast potential for empowerment which needs to be fully exploited as well.
• It is important that volunteers must allocate some time, energy and resources to learn about and discuss the ICT applications with community, to obtain community ideas about using them and to search out solution to challenges.
Badan Pengkajian dan Penerapan Teknologi


BPPT
• For the volunteers themselves, they must catch up with the current knowledge, customize the viable ICT in certain areas, and facilitate the ICT implementation. These tasks are not easy, as there are many technologies being promoted by ICT developers. There is also significant expense involved, coupled with uncertainty, make a deterrent to volunteer ICT. Identifying strategies for selecting appropriate technology for their activities are essential as well as evaluating their impact.
• Although ICT Volunteer Program is the instrument initiated by Government of Indonesia, but organization and implementation is merely rely on the initiative actions of the volunteers in the associated areas - **champions of volunteers** are always necessary to deliver the program, to speed up the actions, to accelerate the activities, based on the demands of public in associated areas.
Badan Pengkajian dan Penerapan Teknologi

Conclusions

- Novel efforts and initiatives are taken to develop S&T communication to build better hub of change agent to support urgent issues and cutting edge of S&T.
- S&T communication is adjusted to share specialized knowledge – in order to make it available and understandable by common people within targeted group of age and skill.
- Web site, Blog and social media are the effective instrument of S&T communcation with unlimited resources from the internet. It's important they are introduced to public in wise manner. This condition has made the ICT Volunteer Program spread out dramatically throughout the regions in Indonesia, which can be seen through evaluation of areas that have been actively success.
- There should be contemporary S&T based issues in Asia that people have to deal with. By using approach of scientific capacity and nurturing S&T communication network, people in Asia should work in partnership to attack the problems and to outlook for the future of Asia.

Badan Pengkajian dan Penerapan Teknologi

BPPT

BADAN PENGKAJIAN DAN PENERAPAN TEKNOLOGI

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Badan Pengkajian dan Penerapan Teknologi

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

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Seoul National University

Manoj Kumar Patairiya

Adviser, National Council for Science & Technology Communication
Ministry of Science & Technology, Govt. of India
manojpatairiya@yahoo.com / mkp@nic.in

EDUCATION

1981	B.Sc., Botany, Chemistry, Zoology, Bundelkhand University, India
1983	P.G.D., Journalism & Mass Communication, Rajasthan University, India
1988	M.Sc., Zoology – Environmental Biology, Annamalai University, India
1995	M.Sc.(Tech.), Science & Technology Communication, Lucknow University, India
1998	Ph.D., Botany - Environmental Biology, H.N.B. Garhwal University, India
2001	M.B.A., Human Resource Development, Annamalai University, India
2008	S.T.I.P., Science Technology & Innovation Policy, Harvard University, USA

MAJOR ACTIVITIES / ASSIGNMENTS

1980 - 1984	Inventor, Researcher, Science Journalist, Science Columnist, Radio-TV Anchor
1981 - present	Presenter-News Reader, Krishi Darshan, a weekly agriculture show, Doordarshan National TV Network
1984 - 1990	Senior Technical Assistant, Council of Scientific & Industrial Research-NISCAIR, Govt. of India
1990 - 1991	Scientist 'B', Council of Scientific & Industrial Research-NISCAIR, Govt. of India
1991 - 1996	Senior Scientific Officer-I, National Council for S&T Communication, DST, Govt. of India
1997 - 2002	Principal Scientific Officer, National Council for S&T Communication, DST, Govt. of India
2002 - present	Founder Editor, Indian Journal of Science Communication (Honorary)
2003 - 2013	Director/ Scientist 'F', National Council for S&T Communication, DST, Govt. of India
2004 - present	Scientific Committee Member, Public Communication of S&T Network, Australia (Honorary)
2005 - 2012	President, Indian Science Writers' Association (Honorary)
2007 - 2009	International Advisory Committee Member, Hands-on Science Network, Portugal (Honorary)
2010 - 2010	Visiting Professor, Global Communication in S&T, Chungnam National University, South Korea
2011 - present	Area Welfare Officer, Dept. of Personnel & Training, Govt. of India (Voluntary)
2014 - present	Adviser/ Scientist 'G', National Council for S&T Communication, DST, Govt. of India Additional Director General, Broadcasting Corporation of India, Govt. of India (Likely to join soon)

AWARDS / FELLOWSHIPS

1991	Indira Gandhi National Award, Ministry of Home Affairs, Govt. of India
1992	1Bhartendu Harischandra National Award, Ministry of Information & Broadcasting, Govt. of India
2001	Dr. B.C. Deb National Award, Indian Science Congress, Govt. of India
2002	National Media Fellowship, Indian Renewable Energy Development Agency, Govt. of India
2003	Konard Adenure Fellowship, Ateneo de Manila University, The Philippines
2003	Global Science Popularization Award, Centre for Global Studies, USA
2005	Baburao Vishnu Paradkar Award, Uttar Pradesh Hindi Sansthan, Govt. of Uttar Pradesh
2007	National Research Fellowship, MLC National University of Journalism & Communication, Bhopal, India
2008	Robert Bosch-ESOF Mentorship, Robert Bosch Foundation, Germany
2009	Dr. Atmaram National Award, Ministry of Human Resource Development, Govt. of India
2012	Rajiv Gandhi National Award, Ministry of Home Affairs, Govt. of India

RESEARCH AND ACADEMIC INTERESTS

Environmental Biology: Physico-chemical and microbiological assessment of Ganges river streams in Himalayas in terms of algal growth and studying diffusion pattern of such scientific knowledge.

Science & Technology Communication: Origin and evolution of science and technology communication in Indian sub-continent, comparing it with South Asia and other developing and developed countries.

Publications/ Patents: 500 articles, 500 Radio-TV programmes, 500 lectures, 100 papers, 20 books, 10 reports, 10 journals, 3 encyclopaedias, 2 Indian Patents, 30 Educational Aids-Exhibits.

Invited Visits Abroad: Visited 35 countries; delivered invited talks; imparted training; coordinated Indian delegations.

Institution Building: 30 University Courses; 3 Centres for Science Communication; Science Archives; 3 Networks, etc.

Events Organization: 500 Regional, national, international conferences/ workshops organized/ attended in India and abroad.

Experience: Over 35 years in research, innovation, education, science communication, policy, administration, and project management; with government, non-government, university, industry, mass media, and international sectors.

ABSTRACT

Learning from diverse perspectives in science communication

Dr. Manoj Kumar Patairiya
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Editor
Indian Journal of Science Communication

Public communication of science, research and development is not the job of scientists only; it requires a common ground to be developed by experts from diverse fields to evolve it truly as an interdisciplinary area of knowledge. Equal participation and contribution of scientists, technologists, communicators, and specialists from socio-cultural sectors will ensure the overall and inclusive growth of the area to serve the very purpose of science communication. The field is growing so as the challenges, and therefore it has to be looked at from diverse perspectives, i.e, scientific, technological, communication, socio-cultural, and political.

Science communication in emerging nations is developing fast for two reasons: i) may be because of the fact that science communication keeps pace with the developments taking place in different sectors, such as research and development in leading edge science and technology, agriculture, environment, industry, computers, education, social welfare, mass media, service sectors, and so on; and ii) the schooling and upbringing of children in emerging nations is limited to prescribed learning only and there is rarely any chance for the children to get acquainted with the current advancements in science, technology, innovation and other developmental aspects as compared to those of the developed nations! Therefore, it appears that science communication is not only a tool but a prerequisite for emerging nations to supplement science curriculum with a dose of science communication and popularization activities for enhancing science literacy.

A comparative assessment suggests that the 'deficit model' of public communication of science involving 'science museums, planetariums, exhibitions, lectures, audio-video media and high-end technological application' approach is common amongst developed nations. Whereas, India and other emerging nations tend to follow 'participatory model' involving 'folk forms, print and visual media, road-shows, and people's involvement' approach, which seems cost effective and fits into social milieu of these countries. Another observation has revealed a strong research base and shows encouraging trends for undertaking innovative research projects in diverse areas of science education and commu-

nication. It offers opportunity to learn and share, amongst others, the innovative ideas and best practices from diverse cultures and disciplines for inclusive growth.

The paper gives an analytical account of diverse perspectives of science, education, communication and literacy and examines it from scientific and socio-cultural perspective.

Keywords : Science literacy, Diverse cultures, Participatory model, Science communication.

Aristotle P. Carandang

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apcarandang@yahoo.com

EDUCATION

2012	Ph.D. in Applied Cosmic Anthropology, Asian Social Institute, Manila, Philippines
2001	MPS in Development Communication, University of the Philippines Open University, Los Baños, Laguna, Philippines
1996	AB English, San Pablo Colleges, San Pablo City, Laguna, Philippines

MAJOR ACTIVITIES

2014	Alternate Focal Person, Science for Safer Communities Project
2013 - Present	Assistant Project Leader, NOAH Strategic Communications Intervention
2013 - Present	Co-Project Leader, Science Content Transformation and Visualization for Disaster Risk Reduction
2013 - Present	Associate Member, National Research Council of the Philippines (NRCP)
2012 - Present	Member, Technical Working Group on Dengue Vector Surveillance Project
2011 - 2013	Program Leader, Changing the Mindset: A Program on Building a Culture of Science for S&T Agenda and National Development
2011 - 2013	Project Leader, Study on the Adoption of OL Trap
2010 - Present	Editor-in-Chief, Balitang RapiDOST
2009 - Present	Chief Science Research Specialist, DOST-STII
2009 - Present	Executive Editor, S&T Post
2007 - Present	Vice President, Philippine Science Journalists Association (PSciJourn)
2007 - 2013	Chair, IEC Group for Technology Transfer Framework
2007 - 20011	Chair, IEC Group, Filipinnovation Network
2001 - 2009	Information Officer V, National Academy of Science and Technology, Phl
2000 - 2001	Public Relations Officer/Speechwriter, Office of the Secretary, DOST

Writer/Editor of four books:

1. ASTI: 15 Years and Beyond (2002)
2. Paving the Way for Advanced S&T (2003)
3. Nina: Reflections and Insights at the Helm (2011)
4. Creating Wealth from Public R&D: The RA 10055 Experience (2012)

Contributed articles in several books; Published news and feature articles in various newspapers and magazines of national circulation and the Internet; Published research articles and has been conducting lectures on writing and information and communication-related topics.

Maintains a **blog** at www.science.ph

ABSTRACT

S4SC: A National S&T IEC Campaign Initiative on Disaster Preparedness

Aristotle P. Carandang, PhD
Chief, Communication Resources and Production Division
Science and Technology Information Institute
Department of Science and Technology, Republic of the Philippines
Email: apcarandang@yahoo.com

"S4SC" is the moniker for Science for Safer Communities – a national Information, Education and Communication (IEC) campaign for the 17 regions of the Philippines. Priority is given to the project because calamities are common in the country; and yet most local government units (LGUs) appear not to be fully prepared in saving lives and properties in their respective turfs. This was exemplified in the Yolanda (Haiyan) experience in November 2013. Thus, the project was designed to address the perennial problem of the LGUs in responding to and mitigating the impacts of calamities via appropriate messaging. It is anchored on the fact that preparedness is still the best way to prevent terrible effects of disasters by way of early warning and early action.

S4SC is a one-year, inter-agency collaborative project spearheaded by the Department of Science and Technology (DOST) through its agencies such as the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Philippine Institute for Volcanology and Seismology (PHIVOLCS), Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), and Science and Technology Information Institute (STII). Other partners include the Department of Interior and Local Government, (DILG), Office of Civil Defense (OCD) as the implementing arm of the National Disaster Risk Reduction and Management Council (NDRRMC), and DOST's Project NOAH (Nationwide Operational Assessment of Hazards). S4SC is an example where government actions become convergent.

The first part of the project is a three-month regional IEC campaign geared to help equip local chief executives or LCEs (e.g. governors, mayors, and disaster managers) as the first receiver of information with the knowledge and know-how on disaster preparedness. The campaign consists of a two-day workshop for every region where S4SC shares information and tools that are crucial in preparing disaster risk plans for the participants' respective communities. Tools include localized geological and meteorological hazard maps, websites, and apps that LCEs and disaster managers can use. Each regional activity consists of tabletop exercises for them to learn more about their vulnerabilities on

certain risks through the use of hazard maps. Subsequently, they can formulate their respective risk communication and disaster plans unique to their respective localities. A special package, on the other hand, is designed for media practitioners for them to appreciate and learn how to properly disseminate disaster-related information. After the three-month regional IEC, the next phase of S4SC is monitoring and evaluation in order to know whether the outputs during the workshops are being used in one way or another or totally disregarded. This will be done in collaboration with the DOST, DILG, and OCD regional offices that form part of the feedback mechanism. Expected outcome of the nationwide project is a safer, more prepared and resilient Philippines against disasters.

Keywords : S4SC, Science for Safer Communities, IEC, early warning, early action, disaster preparedness

ENGLISH TEXT

S4SC: A National S&T IEC Campaign Initiative on Disaster Preparedness

Aristotle P. Carandang, PhD
Chief, Communication Resources and Production Division
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Department of Science and Technology, Republic of the Philippines
Email: apcarandang@yahoo.com

Introduction

The "Science for Safer Communities" or S4SC is a nationwide project initiated by the Department of Science and Technology of the Republic of the Philippines. It is an Information, Education and Communication (IEC) Campaign strategy in the form of a roadshow dubbed "Iba na ang Panahon: Science for Safer Communities" intended for local chief executives (LCEs) and disaster risk reduction and management (DRRM) officers in 17 regions.

Meanwhile, it has now become a public knowledge that the impact of typhoon Yolanda (Haiyan) was truly enormous and unprecedented worldwide; considering its toll on lives and properties. Post disaster assessment has proven that while communities prepared for the typhoon, the destruction was beyond anyone's expectation. Filipinos are now one in saying that we no longer want to be trapped in the vicious cycle of destruction and reconstruction because there is disaster after disaster. It is a well known fact that the Philippines is visited, on the average, by 20 typhoons per year; along with associated floods and storm surges as well as earthquakes, among others.

The Department of Science and Technology (DOST) – Philippines believes that the use of science to better understand and improve disaster planning and preparations at the national and local community levels is truly necessary.

Convergence and Science-based Formula

To deal with calamities, the Philippine government has formulated a science-based formula in dealing with calamities as seen in Figure 1:

Figure 1. Steps formulated by the DOST in dealing with calamities

Early Warning leads to Early Action; Early Action minimizes Loss; Therefore, reduced amount of loss leads to Early Recovery.

Fortunately, the Department of Interior and Local Government (DILG) and the Office of Civil Defense (OCD) of the Department of National Defense (DND) are one with the DOST in supporting this principle of using science and technology coupled with local knowledge to ensure safer and disaster resilient communities.

The S4SC has solidified partnership in this one-year, inter-agency collaborative project spearheaded by the DOST through its agencies such as the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Philippine Institute for Volcanology and Seismology (PHIVOLCS), Philippine Council for Industry, Energy and Emerging Technology Research and Development (PCIEERD), and Science and Technology

Information Institute (STII). Other partners include the DILG and its Local Government Academy (LGA), OCD as the implementing arm of the National Disaster Risk Reduction and Management Council (NDRRMC), and DOST's Project NOAH (Nationwide Operational Assessment of Hazards). S4SC is an example where government actions become convergent.

The National IEC Campaign

Although there have been initiatives on disaster preparedness, not much attention has been given to them. It was only after the onslaught of Typhoon Yolanda (Haiyan) that most have become truly concerned. Such immeasurable devastations have become lesson and thus, the DOST have come up with a four-point agenda in guiding community disaster preparedness:

1. Increase local risk knowledge
2. Capacitate hazards monitoring
3. Test warning and communications protocol
4. Build response capability in communities

The four-point initiative has become the core of the national IEC campaign – Iba na ang panahon: Science for Safer Communities. The slogan, Iba na ang panahon, bears two meanings. One deals with the changes in our seasonal climate and weather patterns, with weather disturbances coming in more frequently and with great intensity -- a possible effect of climate change. This is why Ondoy, Pepeng, Sendong, Reming, and what would otherwise be a harmless Habagat (southwest monsoon) happened one after the other.

The other change is about the available tools such as the latest high-resolution maps and flood modeling solutions that allow our scientists to study hazards and bring better forecast warnings which give ample lead time for the community folks to take the necessary action. Through these tools, the DOST hopes to raise awareness and understanding as LCEs, DRMM managers, partner civil society organizations, and even the local community media on different hazards.

The Event

The first part of the project is a three-month regional IEC campaign geared to help equip local chief executives or LCEs (e.g. governors, mayors, and disaster managers) as the first receiver of information with the knowledge and know-how on disaster preparedness. The campaign consists of a two-day workshop for every region where S4SC shares information and tools that are crucial in preparing disaster risk plans for the participants' respective communities. Tools include localized geological and meteorological hazard maps, websites, and apps that LCEs and disaster managers can use. Each regional activity consists of tabletop exercises for them to learn more about their vulnerabilities on certain risks through the use of hazard maps. Subsequently, they can formulate their respective risk communication and disaster plans unique to their respective localities.

Through the event, new tools such as high-resolution hazard maps which are good for understanding inundation, floods and storm surges down to the municipal and even up to the community level in barangays are introduced. These information will spur the right disaster imagination to guide participants in their respective community plans.

In the exercises, the DOST introduces the concept of disaster imagination and its importance in planning. After all, Albert Einstein once said that 'Imagination is more important than knowledge."

Indeed, by anticipating worst-case scenario, local chief executives and disaster managers can think and act two steps forward — using scientific data — and have a visual estimate of the potential impact. And the DOST's early warnings should do just that – to trigger disaster imagination that will prompt early action.

A public storm warning signal like a Signal No. 2 or 3, for example, must instantly activate the right disaster imagination so that the corresponding early action, be it evacuation or simply cascading information to the people is taken.

The Yolanda (Haiyan) experience has taught the Filipinos a lot… what a Signal No. 4 typhoon could do to a coastal community and even across regions situated along its path. The Department believes that the painful experiences from this super storm are solid enough for the Filipinos to take warnings more seriously.

The Workshops

The presentations from plenary experts tackle hydrometeorological and geological hazards in the regions. Knowledge of the local hazards easily lead to the visualization or imagination of the disaster's impact – hence, creating actionable disaster plans and encouraging closer coordination between communities in the region as well as with the national warning agencies.

The project team expects that participation in the disaster imagination workshops allows them to visualize the catastrophic impact of hazards based on the vulnerabilities of the location and population so they can seek better solutions and lower their vulnerability to disasters.

Partnership with regional and national experts is crucial to implement an end-to-end communications protocol. To be established is a feedback loop to ensure that information and early warnings will reach the intended audience and prompt proper action from the community.

With its new and sophisticated tools, PAGASA is expected to give dependable climate outlooks and forecasts for typhoons and storms, storm surges, floods and drought. PHIVOLCS on the other hand will be monitoring earthquakes, whether tectonic or volcanic, and also warn against tsunami, when necessary.

Meanwhile, Project Noah and DREAM continually builds up on the present data and present them in a visual manner on a platform made available for everyone's use. Scientists of Project NOAH and DREAM LIDAR group are working 24/7 to complement the data issued by our national weather bureau, DOST-PAGASA. Their goal is to help extend the forecasting of weather and rain probability from hours to several days; and hopefully allow the concerned offices to provide better seasonal forecasts, which will be crucial to complement state, commerce, and agricultural planning in the Philippines, among other activities.

True, the Philippines is blessed with more than 7,100 islands. And each municipality, province and region has distinct landscapes and vulnerabilities. Through these workshops, the DOST and its project implementors and partners hope to learn from each other on how to build better teamwork between and among the national government, the local government units and their communities. Still, the best strategy calls for everyone to work as one.

The project hopes to cover the end-to-end process for science-based and scenario-driven community disaster preparedness from early warning and early action to achieve minimum loss and establish quick recovery system.

SESSION 4

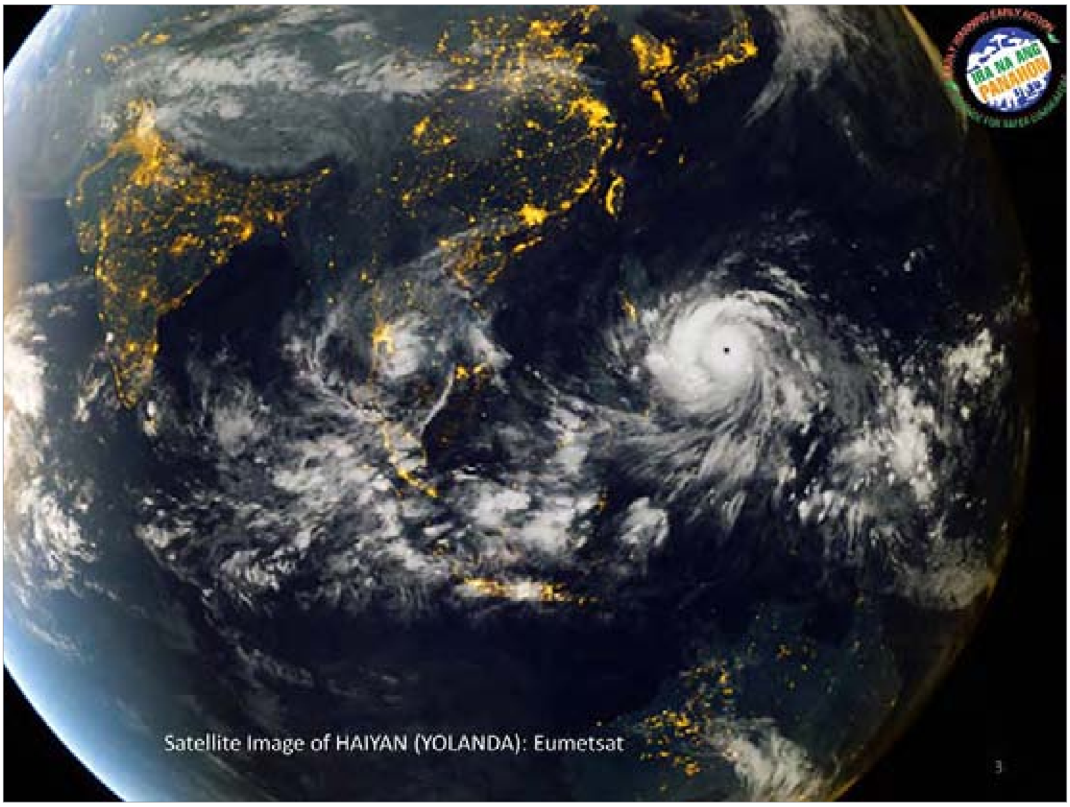
S4SC: A National IEC Campaign Initiative on Disaster Preparedness

ARISTOTLE P. CARANDANG, PhD
Chief, Communication Resources and Production Division
Science and Technology Information Institute
Department of Science and Technology
Republic of the Philippines

S4SC means Science for Safer Communities.

It is a nationwide IEC project initiated by the DOST.

It is a 17-region roadshow dubbed *"Iba na ang Panahon"*.


Satellite Image of HAIYAN (YOLANDA): Eumetsat
3


AMBULA


IBA NA ANG PANAHON
Photo by: Reuters
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EARLY WARNING EARLY ACTION
IBA NA ANG PANAHON
SCIENCE FOR SAFER COMMUNITIES
Implementation of Community Disaster Preparedness
Step 1: EARLY WARNING
Step 2: EARLY ACTION
Step 3: MINIMUM LOSS
Step 4: EARLY RECOVERY
SCIENCE + LOCAL KNOW-HOW
Safer Communities
6

The Partners:

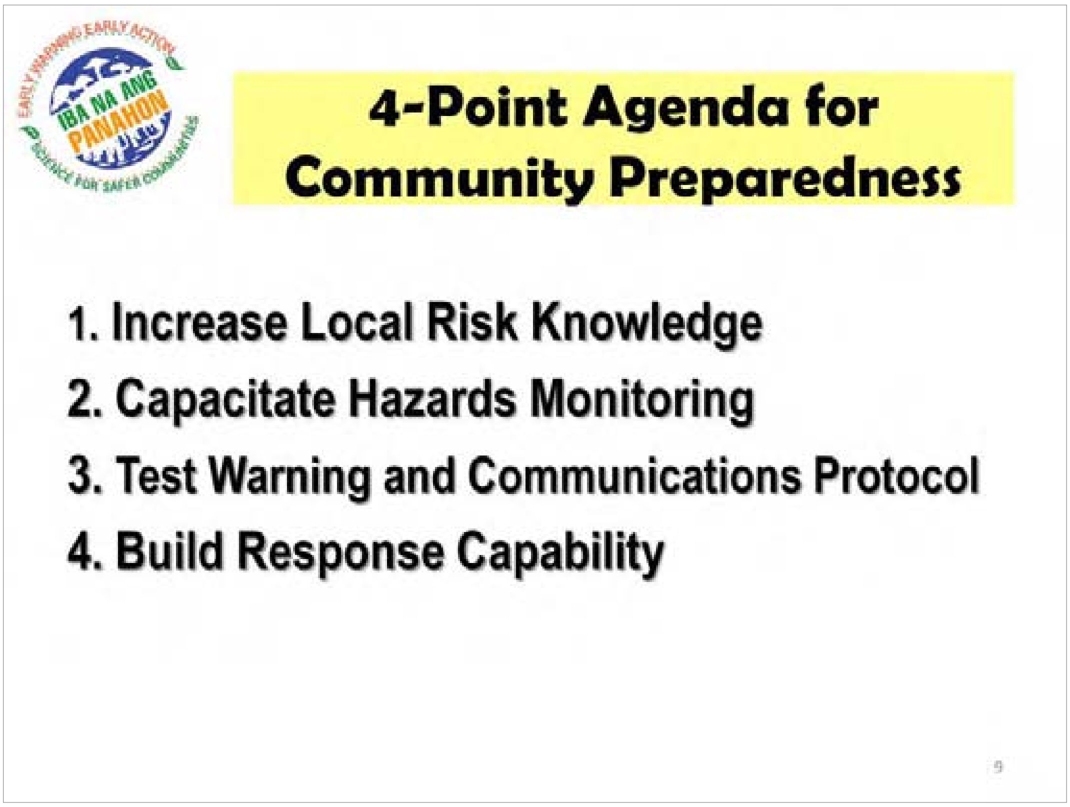
1. **DOST**
   - PAGASA, PHIVOLCS, PCIEERD, STII

2. **DILG and LGA**

3. **DND – NDRMMC – OCD**

The National IEC Campaign

SESSION 4


EARLY WARNING EARLY ACTION
IBA NA ANG PANAHON
SCIENCE FOR SAFER COMMUNITIES
4-Point Agenda for Community Preparedness
1. Increase Local Risk Knowledge
2. Capacitate Hazards Monitoring
3. Test Warning and Communications Protocol
4. Build Response Capability
9


EARLY WARNING EARLY ACTION
IBA NA ANG PANAHON
SCIENCE FOR SAFER COMMUNITIES
Iba na ang panahon refers to:
WEATHER PATTERNS
NEW TOOLS
Changes in the climate and weather in terms of intensity and frequency
Equipment and information from PAGASA, PHIVOLCS, other entities.

The first part of the project is a three-month regional IEC campaign geared to help equip LCEs as the first receiver of information with the knowledge and know-how on disaster preparedness.

DISASTER IMAGINATION

17

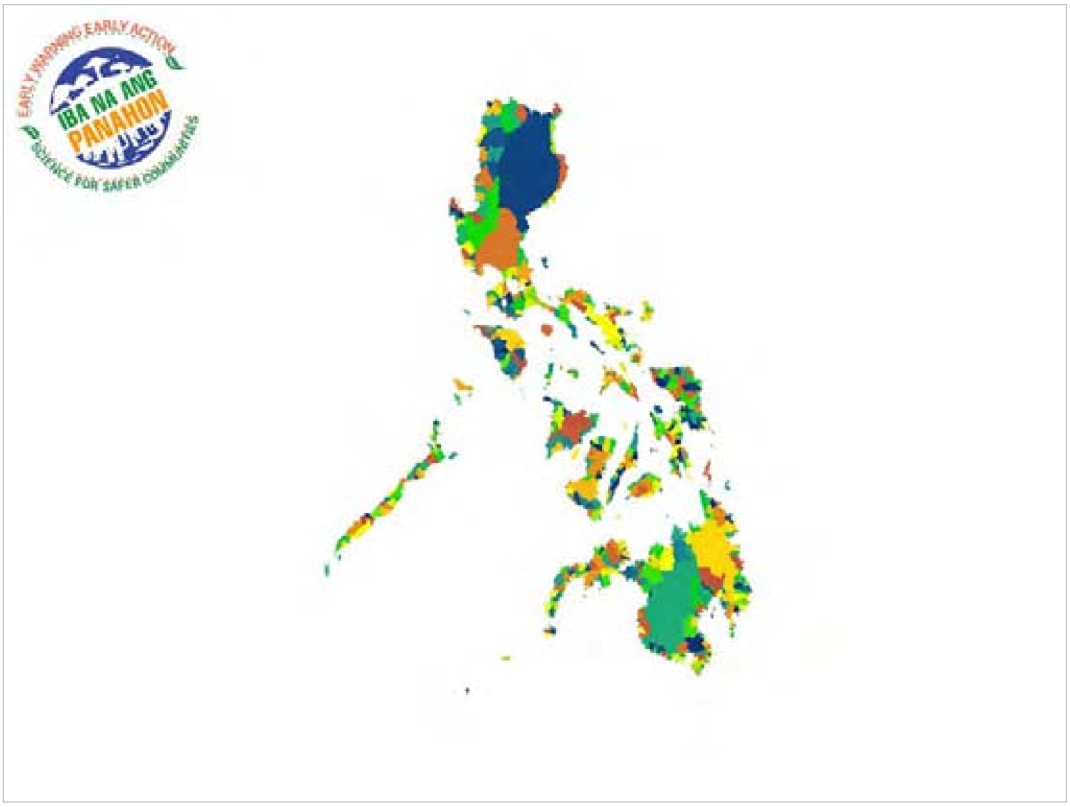
"Imagination is more important than knowledge"

– Albert Einstein

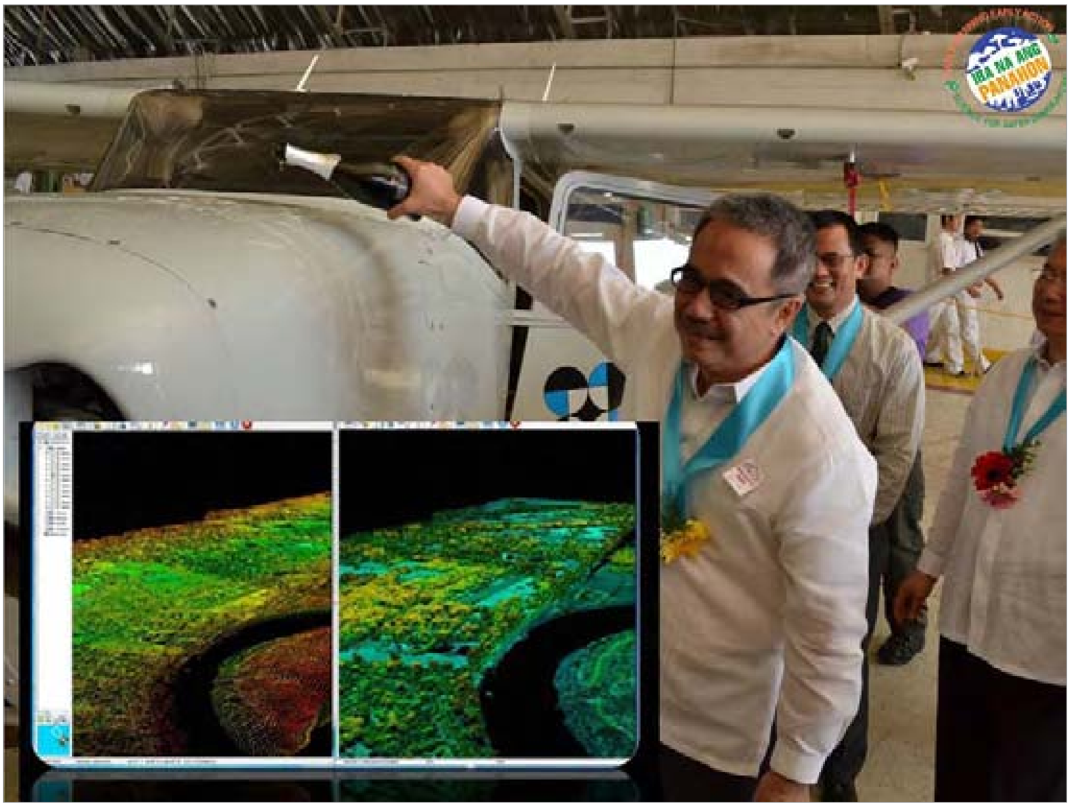
13

Collective memory of hazards

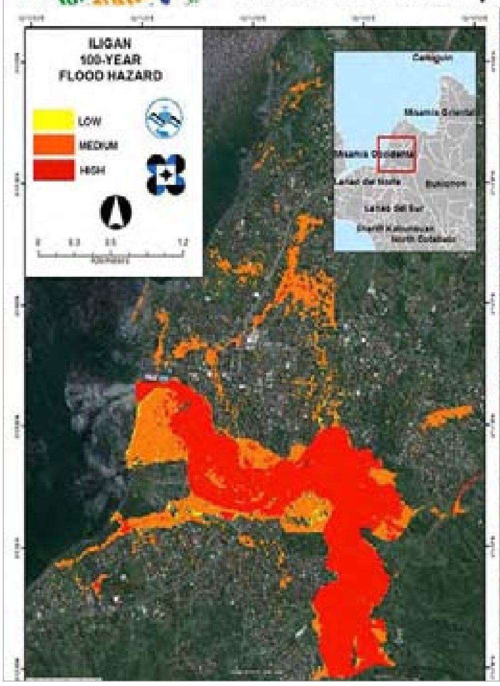

EARLY WARNING EARLY ACTION
IBA NA ANG PANAHON
SCIENCE FOR SAFER COMMUNITIES
The Workshops
Regional IEC Campaign
1. Plenary Presentations
- Regional Perspectives on Hazards and Disasters
2. Breakout Sessions
- Provincial Workshops for Local Risk Knowledge and Local Hazards Appreciation


EARLY WARNING EARLY ACTION
IBA NA ANG PANAHON
SCIENCE FOR SAFER COMMUNITIES


IBA NA ANG PANAHON


IBA NA ANG PANAHON

Using hi-res multi-hazard maps to study hazards and plan ahead of disasters.

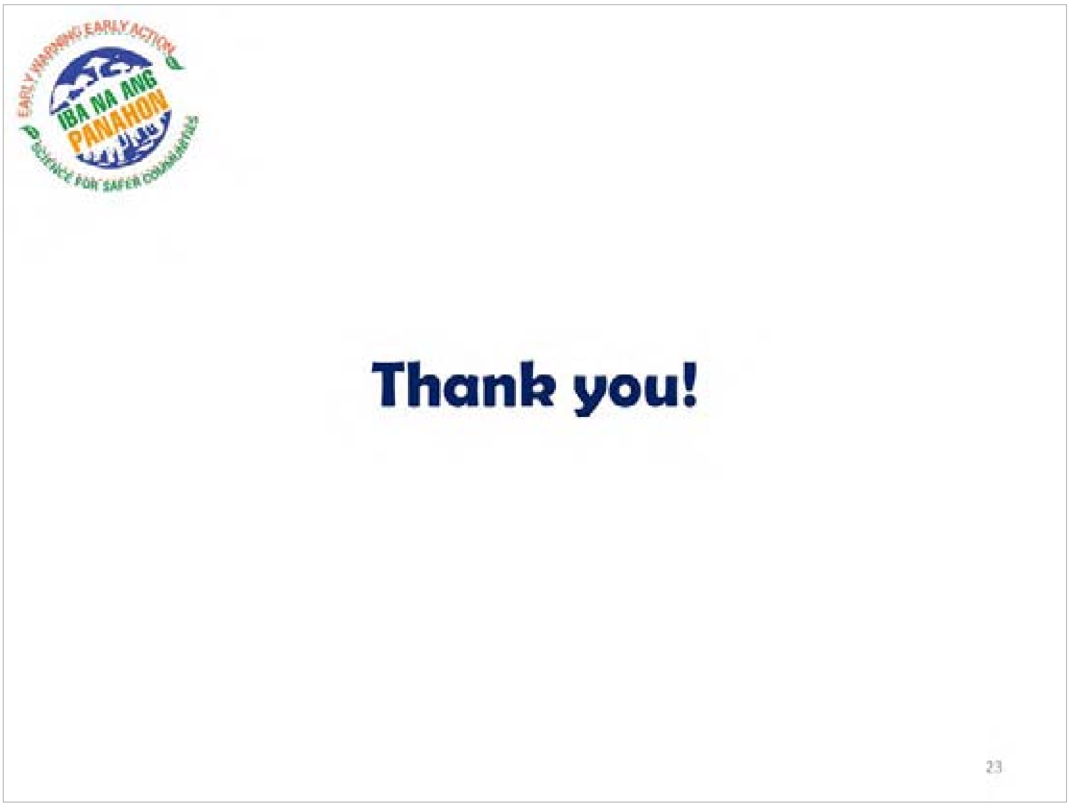


Early warning calls for **early action.**

20


EARLY WARNING EARLY ACTION
IBA NA ANG PANAHON
SCIENCE FOR SAFER COMMUNITIES
Still, the best strategy calls for
everyone to work as one.
21


EARLY WARNING EARLY ACTION
IBA NA ANG PANAHON
SCIENCE FOR SAFER COMMUNITIES
Please visit:
www.dost.gov.ph
www.stii.dost.gov.ph
www.science.ph
22


EARLY WARNING EARLY ACTION
IBA NA ANG PANAHON
SCIENCE FOR SAFER COMMUNITIES
Thank you!
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KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

SPECIAL SESSION

*Presider : **Yoo Hang Kim** (Member, Organizing Committee / Executive Director, AASSA)*

Promoting Science Literacy: KAST Activities

*- **Kyu-Tek Park** (Executive Vice President, KAST)*

The Role of Science Magazines in Science Communication Between Experts and the General Public: The Case of Science Donga

*- **Hokwan Ko** (Team Manager for Media Strategy, DongaScience)*

SPECIAL SESSION

Presider

Yoo Hang Kim

Executive Director,
Affiliation The Association of Academies and Societies of Sciences in Asia (AASSA)
yhkim@inha.ac.kr

EDUCATION

1966	B.S., Seoul National University, Chemical Engineering
1972	Ph.D., University of Nevada Reno, USA, Chemistry

MAJOR ACTIVITIES

1972 - 2010	Professor, Department of Chemistry, Inha University
1980 - 1981	Research Professor, Nantes University, France
1988 - 1989	Visiting Professor, University of Florida, USA
1990 - 1992	Dean of Academic Affairs, Inha University
1998	President, Physical Chemistry Division, Korean Chemical Society
2001 - 2005	Vice President, Inha University
2010 - present	Professor Emeritus, Inha University
2011 - 2012	Executive Vice President, The Korean Academy of Science and Technology
2012 -	Executive Director, The Association of Academies and Societies of Sciences in Asia
2013 -	Member, Board of Director, The Korean Academy of Science and Technology

HONORS AND AWARDS

1966	Presidential Medal, Seoul National University
1972	Phi Beta Phi, University of Nevada
2010	Order of Service Merit with Yellow Stripes, Korean Government

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

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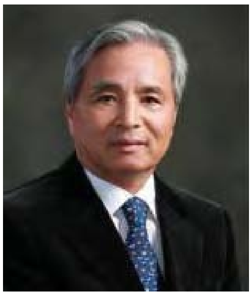

Kyu-Tek Park

Executive Vice President,
The Korean Academy of Science and Technology(KAST),
ktpark02@gmail.com

EDUCATION

1967	B.S. Agro-biology, Seoul National University, Seoul, Korea
1980	M.S. Zoology, Kyunghee University, Seoul, Korea
1983	Ph.D., Entomology, Seoul National University, Seoul, Korea

MAJOR ACTIVITIES

2013 - Present	Executive Vice president, KAST, Korea
2010 - 2012	Vice president, The Korean Academy of Science and Technology (KAST)
2007 - Present	Professor Emeritus of Kangwon Natn. University, Korea
2007 - 2012	Invited scholar, McGuire Center, University of Florida, Gainesville, UF 32611, USA
2005	President, Association for Tropical Lepidoptera, USA
2003 - 2004	President, Korean Society of Appl. Entomology, Seoul, Korea
2000 - 2001	President, Korean Society of Systematic Zoology, Seoul, Korea
1999 - 2001	Dean, College of Agriculture and Life Science, Kangwon Natn. University, Korea
1994 - Present	Fellow, Korean Academy of Science and Technology, Korea
1983 - 2007	Professor, Kangwon Natn. University, Chuncheon, Korea
1974 - 1975	Visiting Researcher, The Natural History Museum, London, UK
1970 - 1979	Researcher, Inst. of Agricultural Science, Rural Development Administration, Korea

HONORS AND AWARDS

2010	The 2nd Korean Entomology Award- The Korean Society of the Applied Entomology
1994	The 6^{h} Award for Research Achievement- Hwanong Scholarship Foundation.
1993	The 1^{s} Award for Researcher in Entomology- SongJung Entomological Scholarship Foundation.

RESEARCH INTERESTS

Insect taxonomy on Lepidoptera, with descriptions of more than 500 new species and 23 new genera; Conservation of biodiversity.

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

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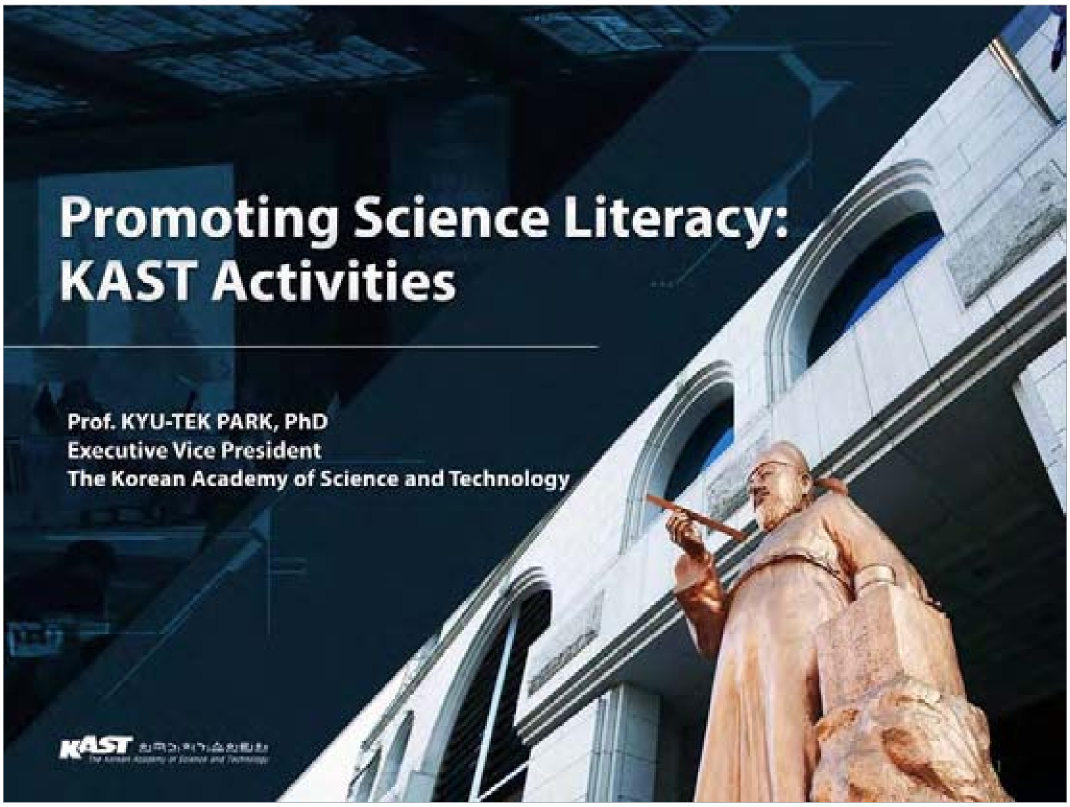
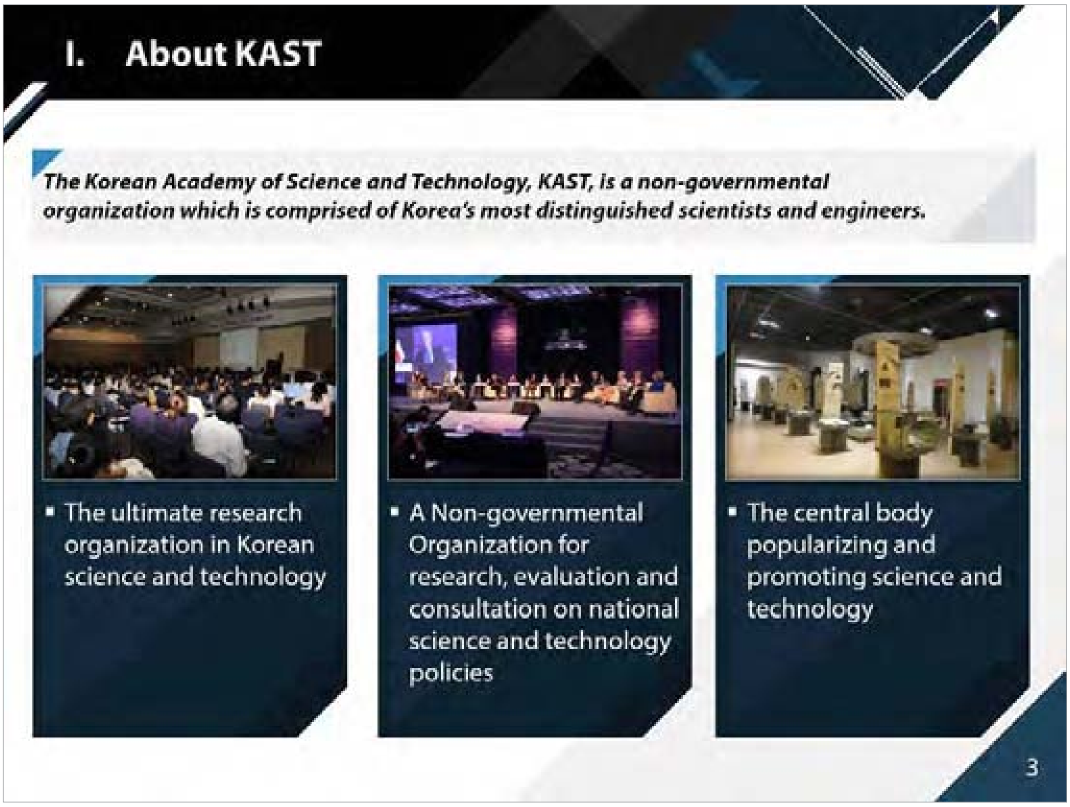
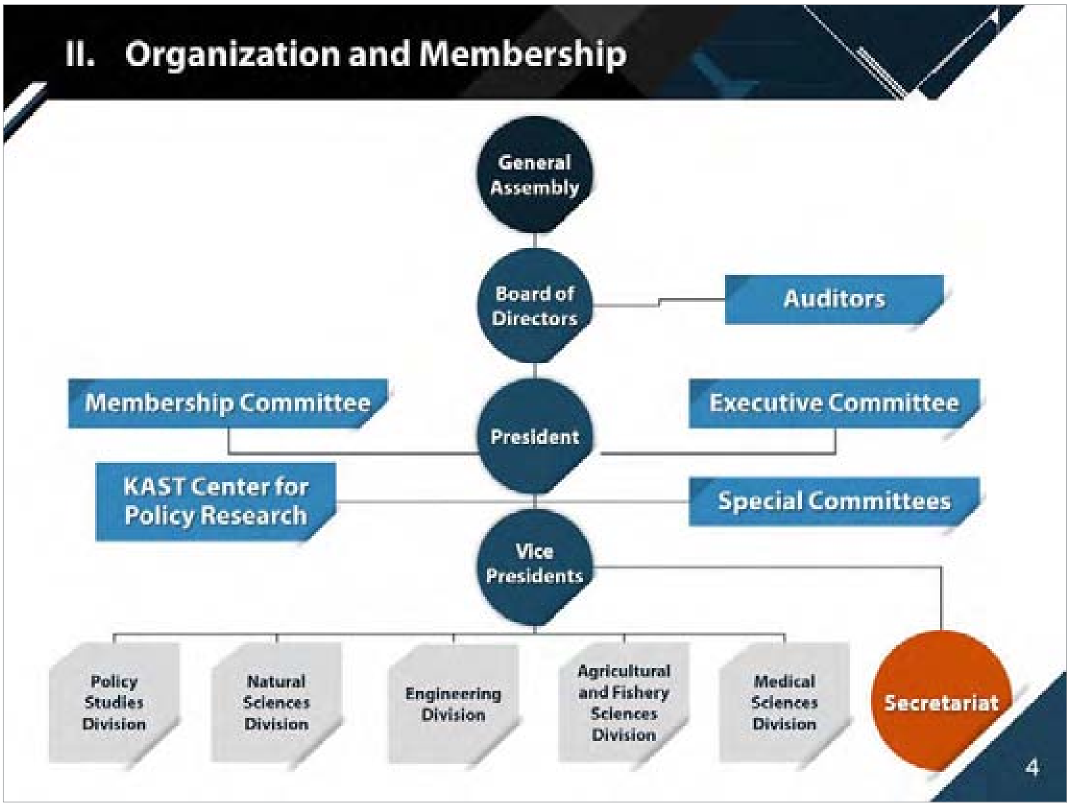

Promoting Science Literacy:
KAST Activities
Prof. KYU-TEK PARK, PhD
Executive Vice President
The Korean Academy of Science and Technology
KAST


Contents
I. About KAST
II. Organization and Membership
III. Major Activities


I. About KAST
The Korean Academy of Science and Technology, KAST, is a non-governmental organization which is comprised of Korea's most distinguished scientists and engineers.
▪ The ultimate research organization in Korean science and technology
▪ A Non-governmental Organization for research, evaluation and consultation on national science and technology policies
▪ The central body popularizing and promoting science and technology
3


II. Organization and Membership
General Assembly
Board of Directors
Auditors
Membership Committee
President
Executive Committee
KAST Center for Policy Research
Special Committees
Vice Presidents
Policy Studies Division
Natural Sciences Division
Engineering Division
Agricultural and Fishery Sciences Division
Medical Sciences Division
Secretariat
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II. Organization and Membership

KAST's members are categorized into Fellow, Fellow Emeritus, Foreign Member, Associate Member, Honorary Member, and Patron Member. The full number of Fellows is 500.

Membership Statistics (as of June 1, 2014)

Fellows

Policy Research	Natural Sciences	Engineering	Agricultural & Fishery Sciences	Medical Sciences	Total
18	145	145	67	98	473

Others

Fellow Emeritus	Foreign Member	Associate Member	Honorary & Patron Member	Total
364	73 (Nobel Laureates 38)	59	6	502

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III. Major Activities

Science & Technology Policy Consultation

- Voice of the KAST
- KAST Roundtable Discussions
- Publications and Public Relations
- KAST Policy Research by Distinguished Scholars

The KAST presents pan-governmental long-term visions in science and technology through consultations and recommendations on government policies.

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III. Major Activities

Talent Development in Science and Technology

Meet the Distinguished Scholar of KAST

Science Mentorship Program

Nobel Science Essay Contest

The KAST works to develop competitive talent for the future of science and technology by providing in-depth lectures on basic science as well as interdisciplinary symposia and networking opportunities for its members.

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III. Major Activities

International Cooperation

8

III. Major Activities

International Cooperation

Cooperation with Overseas Academies

International Symposia

Frontier Scientists Workshop

The KAST exchanges and networks with scientists and engineers of foreign academies to fulfill its role as a central portal of non-governmental diplomacy within the field of science and technology.
The KAST contributes to the nation's globalization and advancement in science technology and to enhancement of Korea's status on the global scene by sponsoring programs such as international symposia, international joint research, scientist exchange and information sharing.
The KAST selects KAST Frontier Scientists, who are national leaders in the fields of science and technology, and supports them in networking with foreign distinguished scholars and global research institutions of excellence.

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III. Major Activities

International Cooperation

AASSA Secretariat

The Association of Academies and Societies of Sciences in Asia (AASSA) is a non-profit international organization with science and technology interests. It is made up of 34 scientific and technological academies and science societies in Asia and Australasia.
The AASSA Secretariat is hosted by KAST.

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III. Major Activities

Broadcasting of the Nobel Prize Lectures

The program is aimed at enhancing interest of science and technology of the public. KAST purchases the copyright of Nobel Prize Ceremony and Lectures from Nobel Media AB. The lectures are dubbed in Korean and broadcast all over Korea.

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III. Major Activities

Korea Hall of Fame in Science and Technology

Gwa-cheon National Science Museum

The Hall of Fame was initiated to remember and preserve the achievements of Korean scientists and engineers selected for their outstanding contributions to the development of the country and the welfare of the people.

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III. Major Activities

Science and Technology Awards

- KAST Science and Technology Awards
- Young Scientist Awards
- Deokmyeong-KAST Engineer Award

The Academy administers various award programs to recognize and encourage scientists and engineers who have made outstanding achievements in scientific research and development in addition to great contributions to national scientific and technological development.
The awards programs are aimed at enhancing the pride and dignity of scientists and engineers as well as promoting public interest in science and technology, thereby fostering national leaders as well as playing a central role in advancing science and technology in the 21st century.

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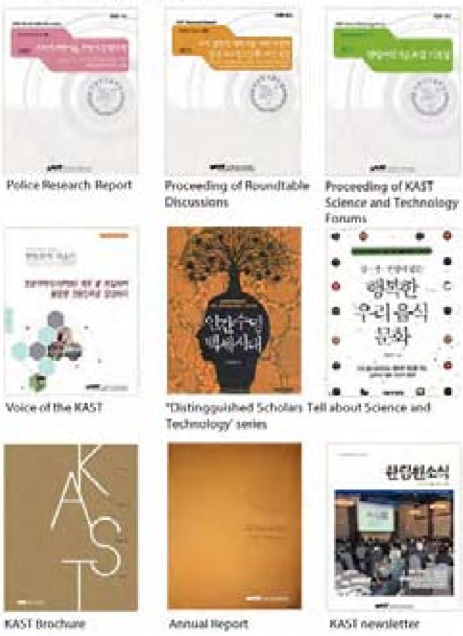
III. Major Activities

Publications



- **'Distinguished Scholars Tell about Science and Technology' Series**
  - KAST has published a total of 18 books in the series.
- **Policy Research Reports**
- **Proceedings of Roundtable Discussions**
- **Voice of the KAST**
- **Proceedings of KAST Science and Technology Forums**
- **Proceedings of KAST Symposia**
- **Proceedings of KAST Distinguished Lecture Series**
- **Annual Report**
  - Published in Korean and English separately
- **KAST Newsletter**
  - Published bimonthly in Korean and English separately
- **Membership Directory**
- **KAST Brochure**
  - A booklet introducing the Academy published in Korean and English separately

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THANK YOU
The Korean Academy of Science and Technology

Hokwan Ko

Team Manager for Media Strategy, DongaScience
ko@donga.com, hokwan.ko@gmail.com

EDUCATION

2003	B.S., Architecture in Yonsei University
2006	M.S., History of Science, Seoul National University

MAJOR ACTIVITIES

2006 - 2009	Reporter, ScienceDonga for children
2009 - 2010	Reporter, MathDonga
2010 - 2013	Reporter, ScienceDonga
2013 -	Team Manager for Media Strategy

ABSTRACT

The Role of Science Magazines in Science Communication Between Experts and the General Public: The Case of Science Donga

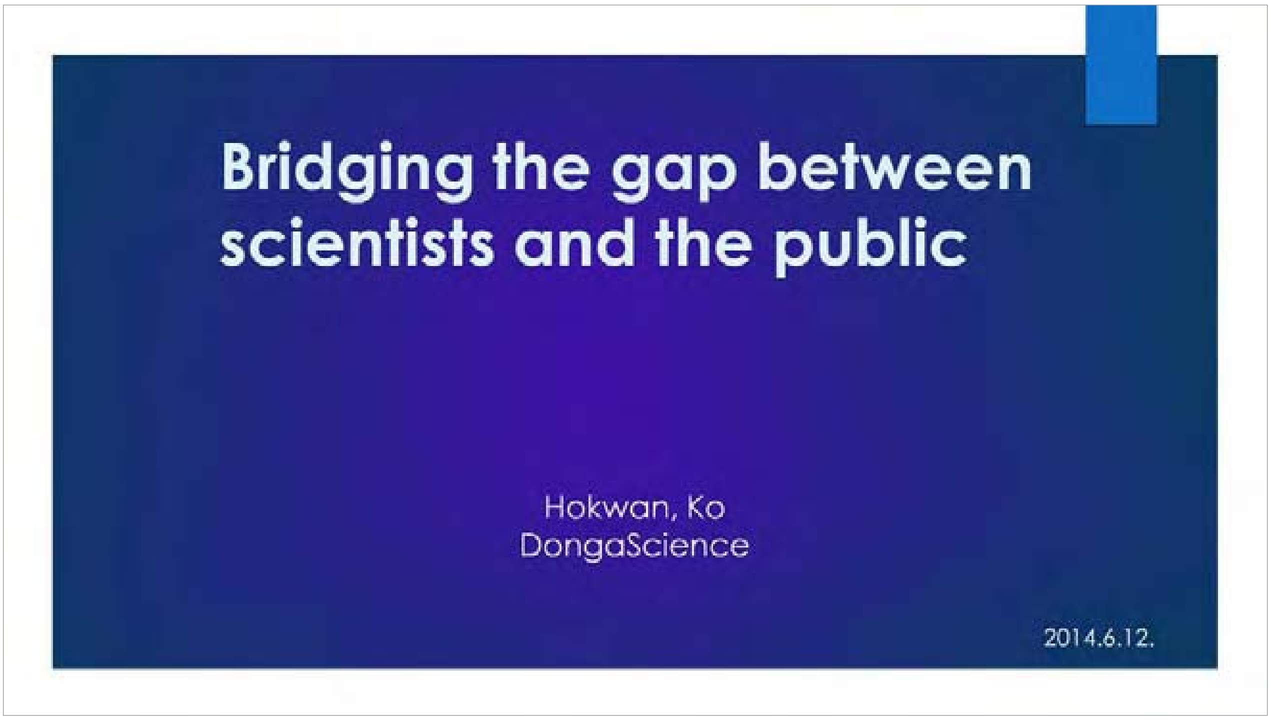
Hokwan Ko
Team Manager for Media Strategy, DongaScience
ko@donga.com, hokwan.ko@gmail.com

The 'ScienceDonga' led the field of science magazine with the most possession of subscription in the area, taking responsibility of communication between professional scientists and researchers, and general public.

The first part will introduce how ScienceDonga has been conveying new scientific topics to those who are willing to be scientists in the future. It has been introducing scientific breakthroughs and trends of the world of science to the public faster than textbooks which is relatively slowly-changing.

Next, it will be showed that ScienceDonga has been playing a role as a bridge between scientists and general public. We've been encouraging scientists to write for the magazine and arranging them to meet with the readers. It helped the scientists to get better with their writing, presentation skills and contributed to making them to be better communicators. It also gave the readers opportunities to meet and hear from field scientists.

Lastly, we will discuss some new strategies to adapt to the digital era and how to give the magazine sustainability for the future.


Bridging the gap between scientists and the public
Hokwan, Ko
DongaScience
2014.6.12.


Contents
1. History&Introduction
2. scientific Literacy
3. Challenges

ScienceDonga
: popularization of science for 28 years

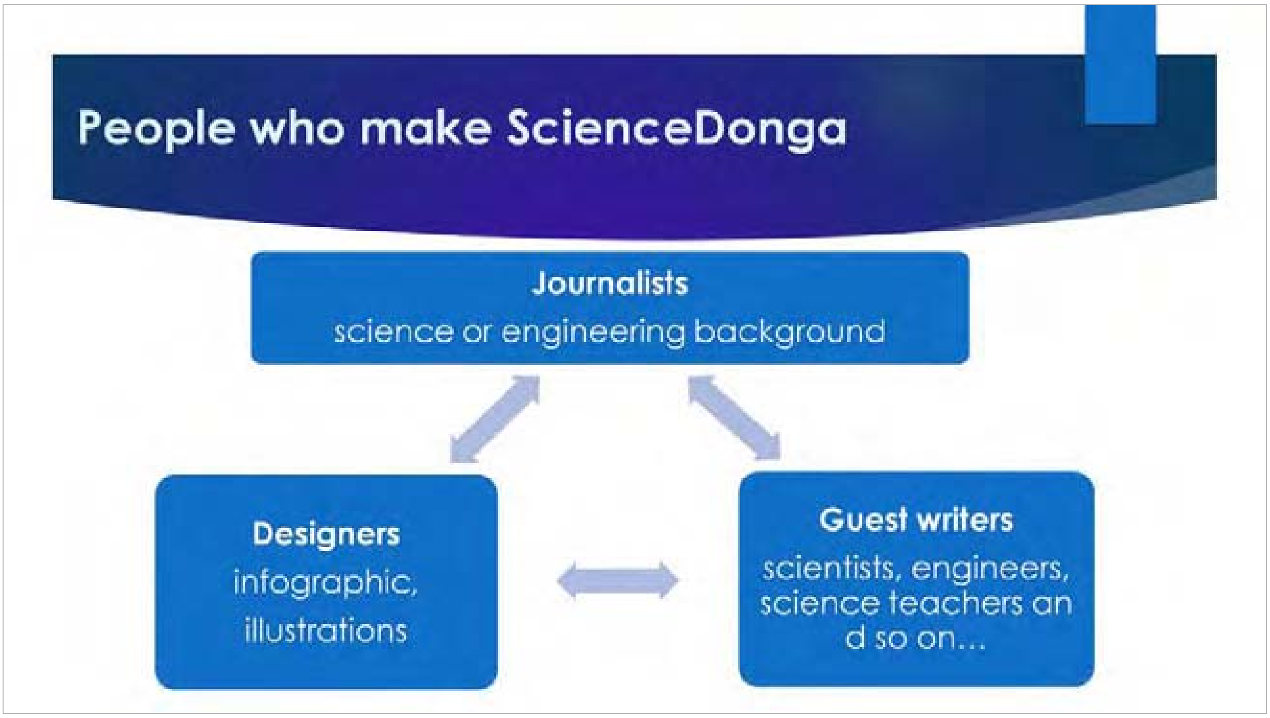
Issue no. 1 (Jan 1986) → Issue no. 121 (Jan 1996) → Issue no. 241 (Jan 2006) → Issue no. 342 (June 2014)

Introduced hot science topics to readers

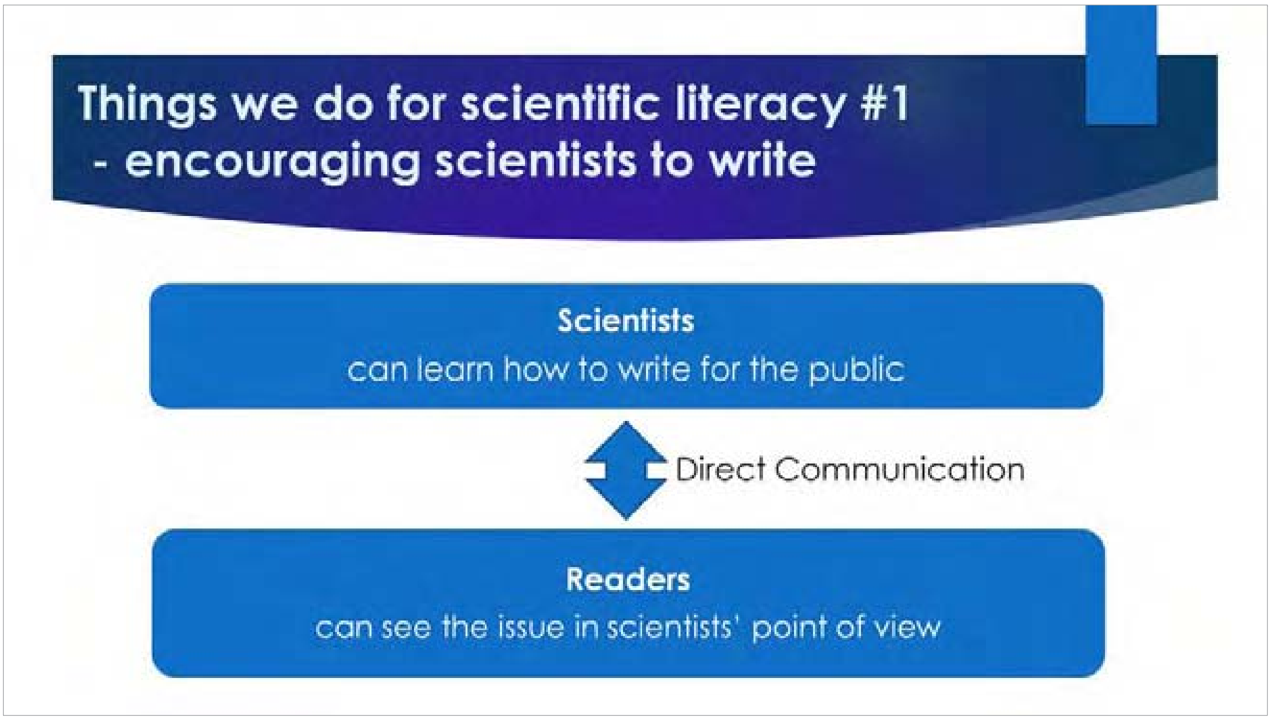
- 1980s - computer virus, nuclear safety, semi-conductor
- 1990s - chaos theory, virtual reality, theoretical physics
- 2000s - convergence, focusing more on Korean scientists


Why magazine?
TV, Newspaper
• quick&popular, but too simplified
Magazine
• more information&analysis than other medium


Why is ScienceDonga important?
Shedding light on korean issues
The longest history among popular science magazines
Top-selling in the market and the most influential


People who make ScienceDonga
Journalists
science or engineering background
Designers
infographic, illustrations
Guest writers
scientists, engineers, science teachers an d so on…


Scientific literacy
Communication
Experience
Knowledge
Value
Attitude
Argument
Observation
Calculation
……


Things we do for scientific literacy #1
- encouraging scientists to write
Scientists
can learn how to write for the public
Direct Communication
Readers
can see the issue in scientists' point of view


Things we do for scientific literacy #1
- encouraging scientists to write
Prof. Jung
Jaeseung
Prof. Choi
Jaechun

Things we do for scientific literacy #2
- scientists meeting readers

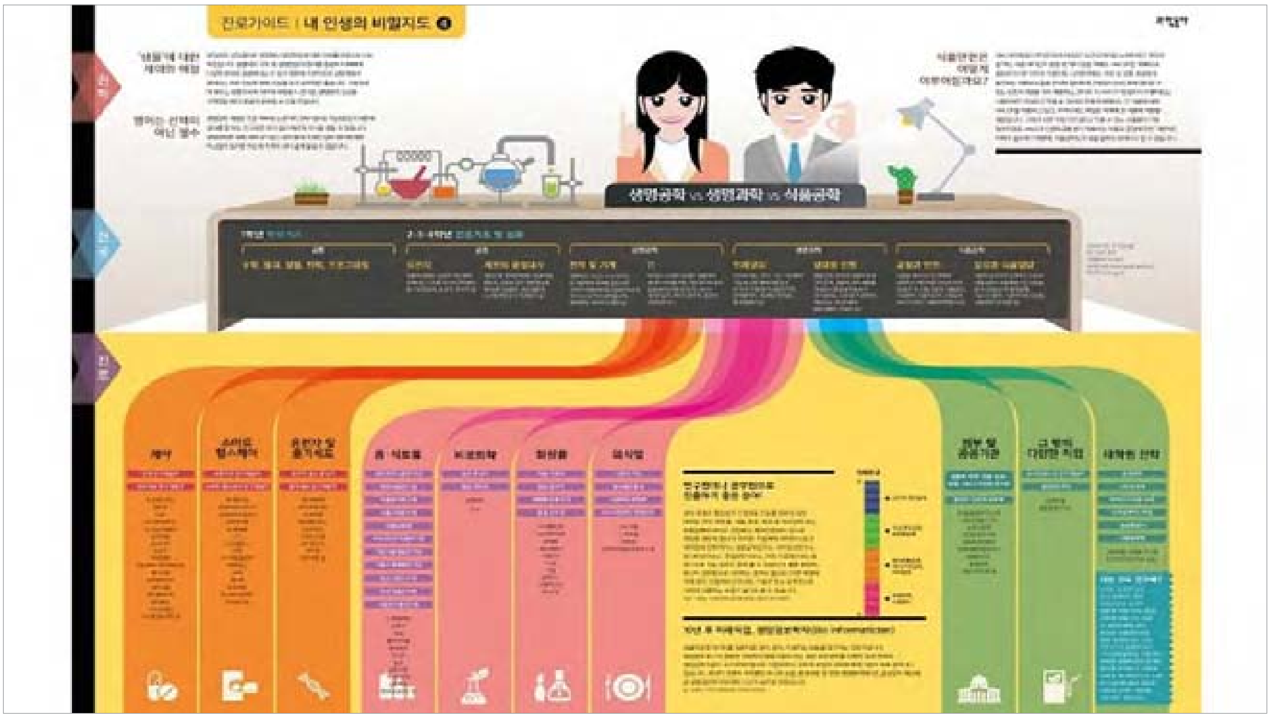
Writing is just not enough!

The scientists who wrote for the magazine can meet the readers and talk more about the subject face to face

과학동아 Cafe

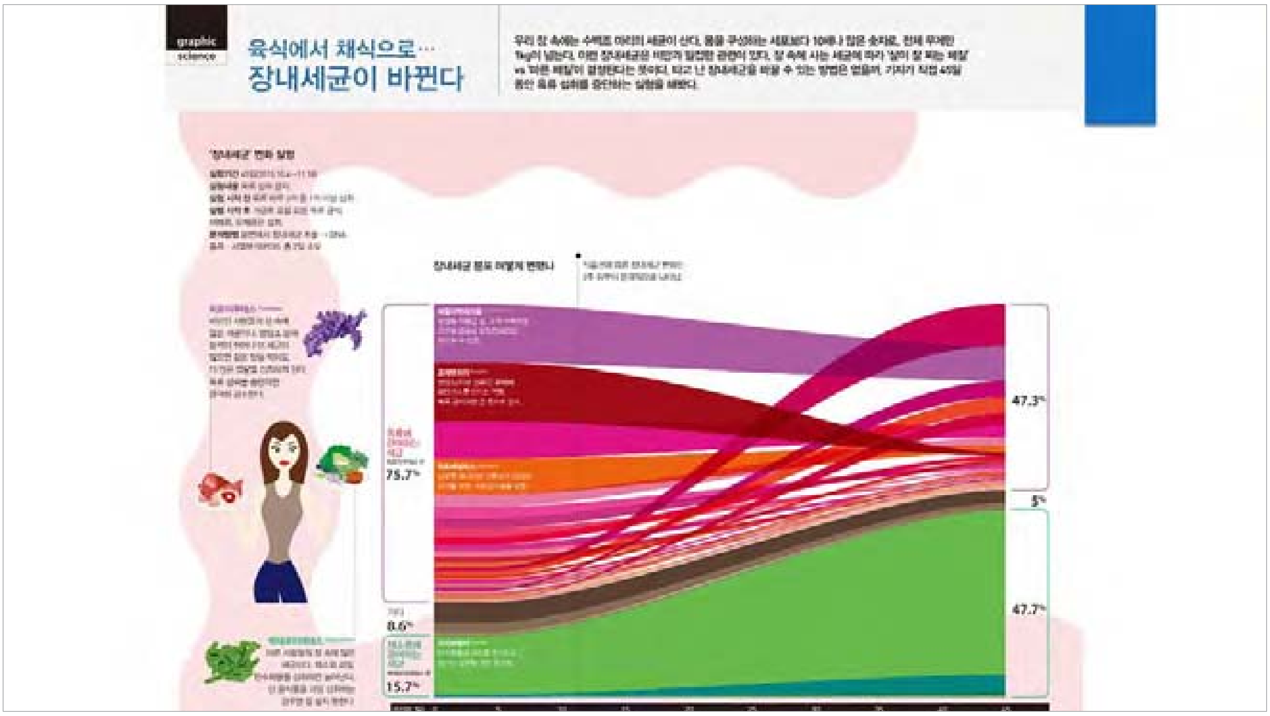
Things we do for scientific literacy #2
- scientists meeting readers

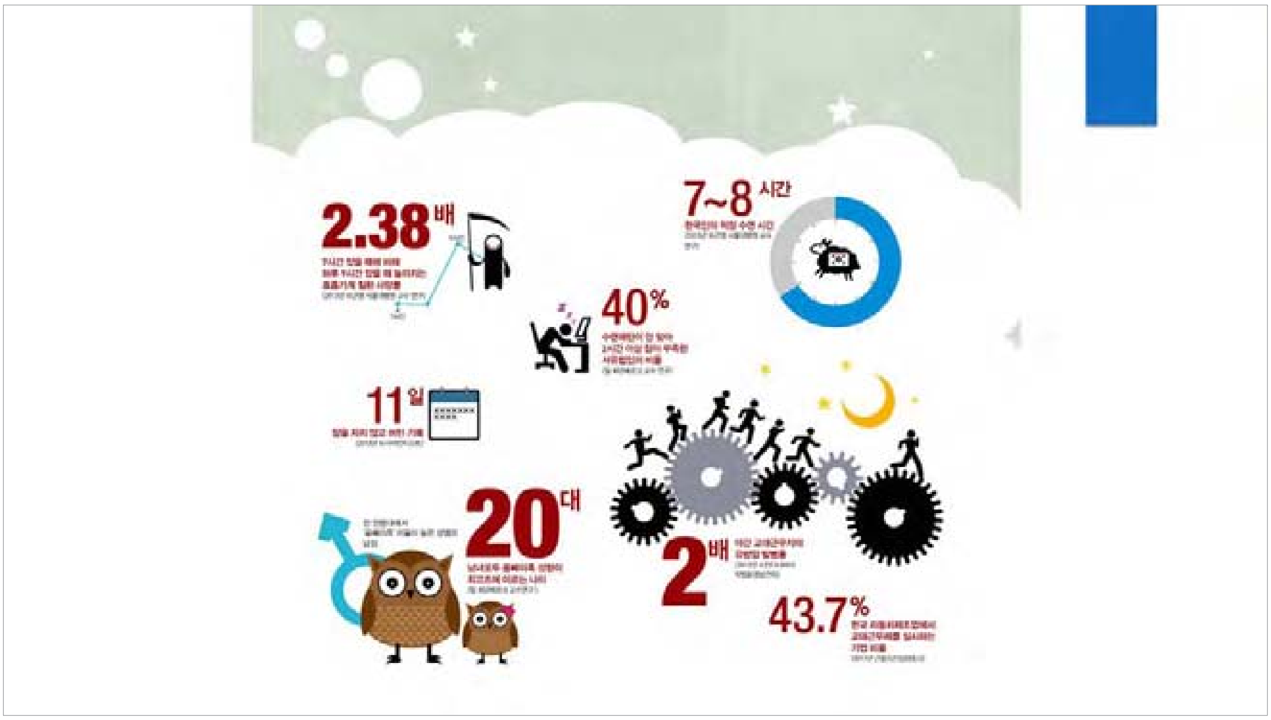

Things we do for scientific literacy #3
- Education & Career
University lab tour for student readers
You can watch the video online


진로가이드 | 내 인생의 비밀지도
생명공학 vs 생명과학 vs 식품공학

Things we do for scientific literacy #4
- Infographics

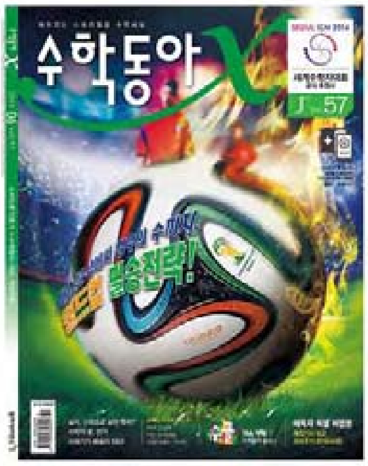
- Collaboration between designers and journalists and scientists
- Providing easy way to understand




2.38배
7~8 시간
40%
11일
20대
2배
43.7%


Things we do for scientific literacy #5
- Experience
Jangbogo Station, Antartica
Pacific Ocean Research Center

Family Magazines
- MathDonga



- The only mathematics magazine in Korea.
- Targeted for the age of 10~15
- Official sponsor of International Congress of Mathematicians 2014

Family Magazines
- ScienceDonga for kids

- Science magazine for kids
- Targeted for the age of 8~13
- Consisted of comics & article
- Comics is a really good tool to explain scientific principles to kids

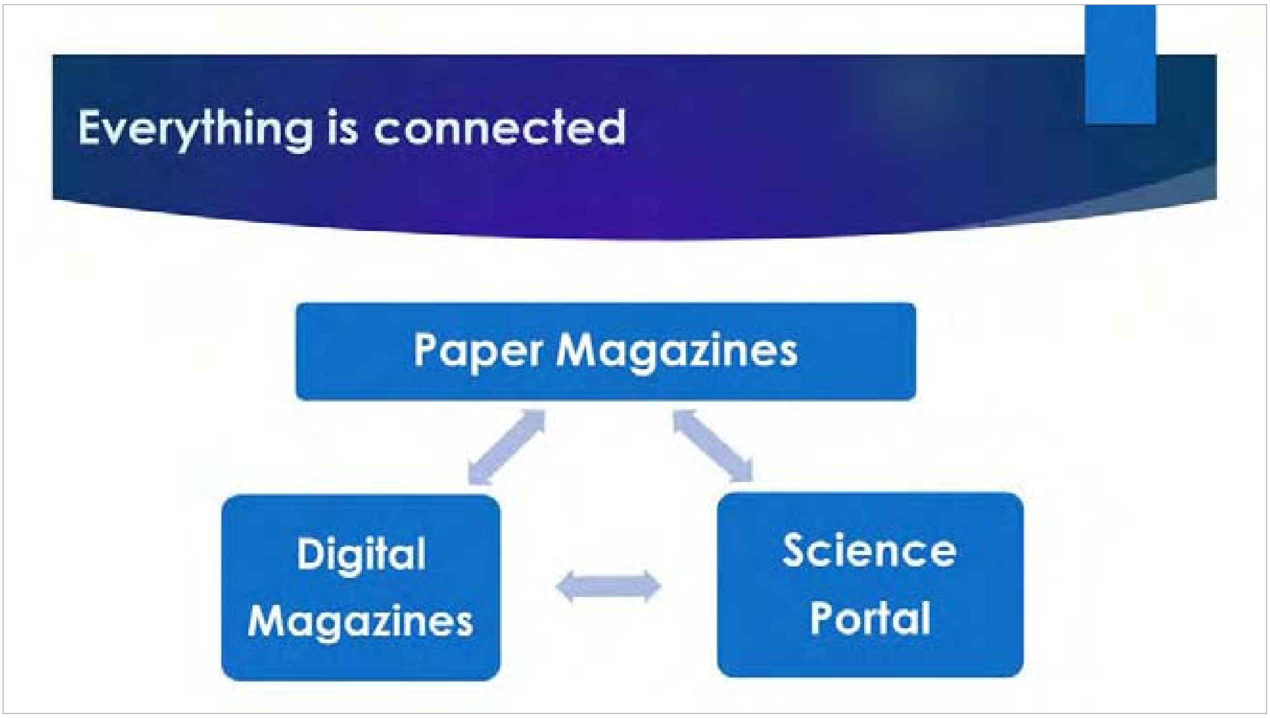
Today's concerns

- Subscription is going down
- The population of younger generation is going down
- People read less than before

For the future

- Digital Appbook for Tablet PC

- Science Portal


Everything is connected
Paper Magazines
Digital Magazines
Science Portal


Thank you!

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

SESSION 5

*Presider : **Manoj Kumar Patairiya** (Adviser/ Scientist 'G', National Council for Science & Technology Communication, Ministry of Science & Technology, India)*

Applying a Communication Index to Evaluate Science Communication

*- **Sung Kyum Cho** (Professor, College of Social Sciences, Chungnam National University, Korea) &*
*- **Bumjune Lee** (Researcher, Institute for Social Science, Chungnam National University, Korea)*

Lesson Learned and a Success Story of Science Communication

*- **Aphiya Hathayatham** (Director, Information Technology Museum, National Science Museum, Thailand)*

25 Years of Research in Public Understanding of Science in India: Empirical Evidences from Kumbh Mela Survey Studies

*- **Gauhar Raza & Surjit Singh** (CSIR-National Institute of Science Communication and Information Resources, India)*

Presider

Manoj Kumar Patairiya

Adviser, National Council for Science & Technology Communication
Ministry of Science & Technology, Govt. of India
manojpatairiya@yahoo.com / mkp@nic.in

EDUCATION

1981	B.Sc., Botany, Chemistry, Zoology, Bundelkhand University, India
1983	P.G.D., Journalism & Mass Communication, Rajasthan University, India
1988	M.Sc., Zoology – Environmental Biology, Annamalai University, India
1995	M.Sc.(Tech.), Science & Technology Communication, Lucknow University, India
1998	Ph.D., Botany - Environmental Biology, H.N.B. Garhwal University, India
2001	M.B.A., Human Resource Development, Annamalai University, India
2008	S.T.I.P., Science Technology & Innovation Policy, Harvard University, USA

MAJOR ACTIVITIES / ASSIGNMENTS

1980 - 1984	Inventor, Researcher, Science Journalist, Science Columnist, Radio-TV Anchor
1981 - present	Presenter-News Reader, Krishi Darshan, a weekly agriculture show, Doordarshan National TV Network
1984 - 1990	Senior Technical Assistant, Council of Scientific & Industrial Research-NISCAIR, Govt. of India
1990 - 1991	Scientist ‘B’, Council of Scientific & Industrial Research-NISCAIR, Govt. of India
1991 - 1996	Senior Scientific Officer-I, National Council for S&T Communication, DST, Govt. of India
1997 - 2002	Principal Scientific Officer, National Council for S&T Communication, DST, Govt. of India
2002 - present	Founder Editor, Indian Journal of Science Communication (Honorary)
2003 - 2013	Director/ Scientist ‘F’, National Council for S&T Communication, DST, Govt. of India
2004 - present	Scientific Committee Member, Public Communication of S&T Network, Australia (Honorary)
2005 - 2012	President, Indian Science Writers’ Association (Honorary)
2007 - 2009	International Advisory Committee Member, Hands-on Science Network, Portugal (Honorary)
2010 - 2010	Visiting Professor, Global Communication in S&T, Chungnam National University, South Korea
2011 - present	Area Welfare Officer, Dept. of Personnel & Training, Govt. of India (Voluntary)
2014 - present	Adviser/ Scientist ‘G’, National Council for S&T Communication, DST, Govt. of India Additional Director General, Broadcasting Corporation of India, Govt. of India (Likely to join soon)

AWARDS / FELLOWSHIPS

1991	Indira Gandhi National Award, Ministry of Home Affairs, Govt. of India
1992	1Bhartendu Harischandra National Award, Ministry of Information & Broadcasting, Govt. of India
2001	Dr. B.C. Deb National Award, Indian Science Congress, Govt. of India
2002	National Media Fellowship, Indian Renewable Energy Development Agency, Govt. of India
2003	Konard Adenure Fellowship, Ateneo de Manila University, The Philippines
2003	Global Science Popularization Award, Centre for Global Studies, USA
2005	Baburao Vishnu Paradkar Award, Uttar Pradesh Hindi Sansthan, Govt. of Uttar Pradesh
2007	National Research Fellowship, MLC National University of Journalism & Communication, Bhopal, India
2008	Robert Bosch-ESOF Mentorship, Robert Bosch Foundation, Germany
2009	Dr. Atmaram National Award, Ministry of Human Resource Development, Govt. of India
2012	Rajiv Gandhi National Award, Ministry of Home Affairs, Govt. of India

RESEARCH AND ACADEMIC INTERESTS

Environmental Biology: Physico-chemical and microbiological assessment of Ganges river streams in Himalayas in terms of algal growth and studying diffusion pattern of such scientific knowledge.

Science & Technology Communication: Origin and evolution of science and technology communication in Indian sub-continent, comparing it with South Asia and other developing and developed countries.

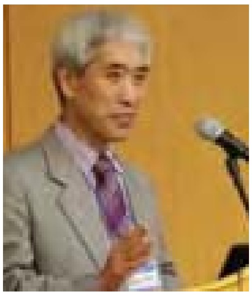
Publications/ Patents: 500 articles, 500 Radio-TV programmes, 500 lectures, 100 papers, 20 books, 10 reports, 10 journals, 3 encyclopaedias, 2 Indian Patents, 30 Educational Aids-Exhibits.

Invited Visits Abroad: Visited 35 countries; delivered invited talks; imparted training; coordinated Indian delegations.

Institution Building: 30 University Courses; 3 Centres for Science Communication; Science Archives; 3 Networks, etc.

Events Organization: 500 Regional, national, international conferences/ workshops organized/ attended in India and abroad.

Experience: Over 35 years in research, innovation, education, science communication, policy, administration, and project management; with government, non-government, university, industry, mass media, and international sectors.



Sung Kyum Cho

Dean & Professor, College of Social Sciences, Chungnam National University
President, Asian Network for Public Opinion Research
skcho99@gmail.com

EDUCATION

1991	Ph. D., Communication, Seoul National University, Korea
1983	M.A., Communication, Seoul National University, Korea
1981	B.A., Communication, Seoul National University, Korea

MAJOR ACTIVITIES

1991 - present	Professor (since 2003), Department of Communication, Chungnam National University: Associate Professor (1998-2003); Assistant Professor (1994-1998); Fulltime Lecturer (1991-1994)
2014 - present	Dean, College of Social Sciences, Chungnam National University
2013 - present	Vice Chair of the Local Press Chair, Ministry of Culture, Sports and Tourism
2012 - present	Director, Institute of Social Sciences, Chungnam National University
2012 - present	President, Asian Network for Public Opinion Research (ANPOR)
2012 - 2013	Member of Policy Advisory Committee, Daejeon Metropolitan City Hall
2010 - present	Member, Self-evaluation Committee, Military Manpower Administration
2010 - 2013	Chairman, Committee on the Impact of Media Concentration, Ministry of Culture, Sports and Tourism.
2009 - 2012	Member of Advisory committee, CNU Center for Biomedial Human Resources
2008 - present	Director, Center for Survey Research, Chungnam National University
2008 - present	Chair of Science, Health, Environment and Risk Communication Division, Korean Society for Journalism & Communication Studies
2007 - present	Member of Editorial Board, Indian Journal of Science Communication
2005 - present	Member of IRB, Seoul National Hospital
2003 - present	Member, Subcommittee Chair (since 2011), KOSTAT Self-evaluation Committee
1997 - 2010	Member of Advisory Committee on Election Polling, Korean Broadcasting Network

AWARDS

2004	Gallup Korea Award
2006	Deputy Prime Minister Commendation

SELECTED PUBLICATIONS

Books (in Korean):

Jeongro Yoon, Kyuwon Jeong, Sung Kyum Cho. **Understanding of Biotechnology and Human Life.** Daejeon: Kung Media. 2012.

Haksoo Kim, Sung Kyum Cho, Hong-gyun Kim, Yongsung Park, Jun Kim, Jongtae Lee, Byungmoo Min. **An Interdisciplinary Approach to Climate Change.** Jeesaem. 2010.

Choonryul Ryu and Sung Kyum Cho. **Communication Skills for Scientist and Engineers.** Seoul: Nanam. 2007.

Jeong-ro Yoon, Heyran Hwang, Sung Kyum Cho, Kwonjung Cho. **The Institutionalization of Science and Technology Practice and Policy Formulation: Toward a New Research Culture.** Science & Technology Policy Institute. 2000.

Recent Papers Published in Korean Journals:

Eunhee Cho and Sung Kyum Cho. **"Public's wishful thinking toward the risky industrial facilities."** Journal of Social Science. 2010. 1(2). 225-242.

Sung Kyum Cho. **"Social Awareness of the Use of Genetic Information."** Journal of ELSI Studies. 2(2). 99-118. 2004. October.

Sung Kyum Cho. **"Communication Plans for the Protection of Genetic Information."** Journal of ELSI Studies. 2(1). 2004.

Sung Kyum Cho and Jeong-ro Yoon. **"Social Perception on Biotechnology in Korea."** Journal of Science & Technology Studies 2. 2001. 343-369.

Presentations:

Sung Kyum Cho. **"Public perception of bioethics and life science".** Spring conference, the Korean Bioethics Association. 2008. May. 31.

Sung Kyum Cho. **"A new communication model for Radiation Research Institute".** Spring Conference. KCJCS. 2007. May.

ABSTRACT

Applying a Communication Index to Evaluate Science Communication

Sung Kyum Cho[1] and Bumjune Lee[2]
[1] *Dean and Professor, College of Social Sciences, Chungnam National University*
[2] *Researcher, Institute for Social Science, Chungnam National University*
[1] *skcho99@gmail.com*, [2] *dawnbreak@naver.com*

This presentation proposes a new way to evaluate science communication. In the past, we have evaluated science communication based primarily on the public's attitude and/or knowledge about scientific issues as revealed by surveys. While these surveys have provided useful information, it is difficult to use them to evaluate specific science communication efforts. When someone expresses an attitude about science, it may have been impacted by a number of factors, not only a specific science communication campaign or event. Furthermore, to our surprise, surveys in South Korea have shown that awareness of and attitudes toward certain scientific subjects are not correlated as strongly as we previously believed.

As an alternative method for evaluating science communication, we propose evaluating the communication itself rather than looking for expected outcomes of the communication. Our research team identified three factors that indicate good communication: Rationality, interactivity, and courtesy. Rationality is characterized by the use of facts, logical reasoning, and evidence. Interactivity requires that a person with an opposing view or a question can speak and that his ideas will be addressed. Courtesy is indicated by a consideration of others' feelings or experiences. For example, if the scientific information that we are trying to share goes against the religious beliefs of a large segment of the population, we need to address them with sensitivity and awareness. It goes without saying that ad hominem attacks are never appropriate in any kind of communication. By employing these three factors to create a communication index, we hope to provide a new and innovative way for communication scholars to evaluate their work, allowing them to improve the efficacy of communication efforts.

Keywords: communication index, science communication evaluation

- **This work was supported by the National Research Foundation of Korea Grant funded by the Korean Government (NRF-2010-330-B00280)**

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

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Applying a Communication Index to Evaluate Science Communication

Sung Kyum Cho
Bumjune Lee

Communication Index

- A way to measure how we communicate
- Can look at several factors
- Measures the communication process, not the outcome
- Quality communication is important
- A new way to evaluate communication (including science communication)

Other Methods to Assess Science Communication: Outcome-Based Methods

- Surveys
  - Public opinion surveys
  - Surveys at a science museum, science fair, etc.
- Outcomes
  - People may start accepting new technology/scientific advancements
    - Use new technology
    - Not protest when nuclear power plant is open

Limitations of Current Assessment Tools

- Many things may affect public opinion, so we do not know which communication efforts were effective.
- Surveys often asked about awareness/knowledge, but our results find that awareness and attitude are not always correlated.
- Need a new tool to analyze communication.

Advantages of Evaluating Communication Process

- Allows us to evaluate the work that communicators are doing
- Fairer to communicators than looking for expected outcomes
- Allows us to analyze how the public is interacting with science media

Background and Theory

- Habermas
  - Public sphere needs to be mobilized for a genuine democracy
  - Good communication is needed among citizens, bureaucrats, politicians, and journalists
  - Identified two criteria of good communication:
    - rationality
    - reciprocity
- Interpersonal communication scholars
  - Identified an additional condition important in dialogue and discussion:
    - conversational courtesy

Background and Theory

- Why should we apply this to science communication?

1) In the Internet age, the public actively participates in discussions.
2) Public considers **how** and what is communicated.

➔ Cannot only use one-way communication anymore. Public will respond negatively if one-way communication is used, because it may seem condescending.

Three Factors Indicating Good Communication

- Rationality
- Reciprocity
- Courtesy
- Possible fourth factor: Timing

Rationality

- Characterized by a use of:
  - Facts
  - Logical reasoning
  - Evidence
- Requires communicators to put aside personal feelings and focus on the actual science-based information that they are sharing

Reciprocity

- Characterized by:
  - Listening to opposing view points
  - Addressing alternate theories and opinions
- Requires that the communicator understand the current opinions of his audience and respond to them.
  - May require looking at survey results or big data analysis.
- Listening:
  - The ability to hear the other side is important to communicators
  - Science communicators must understand both sides so they can address audience properly.
  - This is different from a decision-maker's listening skills. Decision makers (CEOs, etc.) must choose the most important information to quickly reach the correct decision for them. This is not a communicator's role.

Courtesy

- Characterized by
  - Consideration of others' feelings and experiences
  - Avoiding ad hominem attacks or rude language
- Requires the communicator to understand the background of his audience and respond accordingly, helping the audience grow from their current understanding of the world
  - Example: If a scientific theory contradicts the religious beliefs of a large portion of your population, you may have to acknowledge and address that, while not dismissing religious beliefs as "superstitions." When people's beliefs are dismissed, they sometimes cling to them more strongly.

One Additional Factor? Timing

- Speed may be important for some kinds of communication.
- It can be critical in a risk communication situation.
- In other science communication situations, it is less important.
- Good timing (in regards to holidays, other major news stories, etc.) is also useful, but not necessarily critical and cannot always be controlled.
  - E.g., Your story may get less media attention if you share it on Election Day.

Items for Self-Analysis

- Communicators can analyze and improve their own work.
- Items are still being tested.
- Items may need to be adjusted for use in other cultures.
- Items will be different for interpersonal discussions and political debates than for science communication.
- Rate each item on an strongly agree, agree, disagree, strongly disagree scale.
- The following items are our preliminary items for self-assessment. We encourage you to test and modify them when applying this communication index in your own country/situation.

Rationality

- The information I shared was based on actual scientific data. A
- I have not exaggerated the information. A
- I emphasized only some aspects of the research and ignored some limitations mentioned by the scientists. D
- I have not let my personal opinions or experiences affect the information I shared. A
- I use facts to try to disprove misinformation I encounter. A

Reciprocity

- After sharing information, I listen to the public's opinion. A
- I know both sides of the issue. A
- I try to understand the other side. A
- It feels unpleasant when people do not accept the information I share. D

Courtesy

- I use derogatory terms like "ignorant," "superstitious," or "uneducated" to describe people who disagree or do not accept the information I am trying to share. D
- I am respectful of the religious beliefs of my audience. A
- I try not to upset people when sharing information. A

Timing

- My time sensitive information was effectively shared in the required time frame. A
- I missed my deadline. D
- I considered the date, time, and method to share my information to maximize its impact. A

Conclusion

- There are three main factors that indicate good communication:
  - Rationality
  - Interactivity
  - Courtesy
- A fourth factor may also be important: Timing
- Items to measure these factors are useful in analyzing and assessing communication efforts.
- This communication index provides an additional tool for self-analysis and improvement for effective science communication.

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SESSION 5

Aphiya Hathayatham

Director, Information Technology Museum
aphiya.h@nsm.or.th or aphiya@gmail.com

EDUCATION

- Ph.D. in Science Communication. The National Centre for the Public Awareness of Science, Faculty of Science, The Australian National University, Canberra, Australia
- M.Sc. in Seed Technology, Mississippi State University, U.S.A.
- B.Sc. in Agriculture (Horticulture), Kasetsart University, Thailand

PROFESSIONAL TRAINING

- Certificate, Knowing our neighbors: Public opinion research in Asia in a time of media revolution and aging societies. Asian Network for Public Opinion Research, Seoul National University, South Korea.
- Certificate, Museum Management Course, Deutsches Museum, Germany
- Certificate, Professional Development Program, Questacon – The National Centre of Science and Technology, Australia
- Certificate of Mastery, Science Edutainment and Science Museum Management, Questacon and The Australian National University Australia
- Certificate, The Group Training Course in Vegetable Seed Production จาก Tsukuba International Agricultural Training Centre, Tsukuba, Japan
- Certificate, 5th International Course on Seed Production and Seed Technology, International Agricultural Centre, Wageningen, The Netherlands

WORKING EXPERIENCE

- Director, Information technology Museum, National Science Museum, Thailand
- Director, Strategic Planning Division, Office of the President, National Science Museum, Thailand
- Director, Exhibition Division, Science Museum, National Science Museum
- Secretary, National Sub-Standing Committee on Public Understanding of Science.
- Director, Foreign Affairs and Public Relations Division, Office of the President, National Science Museum
- Secretary to the Foreign Affairs Standing Committee, House of Representatives
- Head of Seed Quality Control Division, Ratchaburi Seed Center, Department of Agricultural Extension, Ministry of Agriculture and Cooperative.

ABSTRACT

Lesson learned and a success story of science communication

Aphiya Hathayatham, Ph.D.
Director, Information Technology Museum
National Science Museum, Thailand
aphiya.h@nsm.or.th or aphiya@gmail.com

Science communication has been a keyword in the science museum business of the National Science Museum (NSM), Thailand for more than a decade. Many activities have been developed and implemented but not have been totally successful. This presentation reveals some key factors that lead to the success of science communication activities in three parts.

The first part explores about factors affecting the success of each activity, stressing the importance of good collaboration, participation, mutual benefit, and evaluation. Many examples of activities are used to elaborate the importance of each factor. Other factors that can also affect the success of an activity such as topic, timing, advertising, communication channel, etc. are also dealt with.

The second part focuses on the sustainability of each activity. Improvement, adaptation, extension, and popularization are the keywords discussed in this section.

This presentation ends with a suggestion based on NSM's experience in developing science communication projects in which participants from every country can join hands and work closely together to achieve the goal of this workshop.

Keywords: science communication activities, success factors, sustainability, collaboration, participation, mutual benefit, evaluation.


Lessons learned and a success story of science communication
Aphiya Hathayatham
Director of Information Technology Museum
National Science Museum, Thailand
อพวช.
NSM


NSM
National Science Museum, Thailand
Ministry of Science and Technology

National Science Museum

Established by the Royal Decree on January 30, 1995

Status : State Enterprise Under the Ministry of Science and Technology

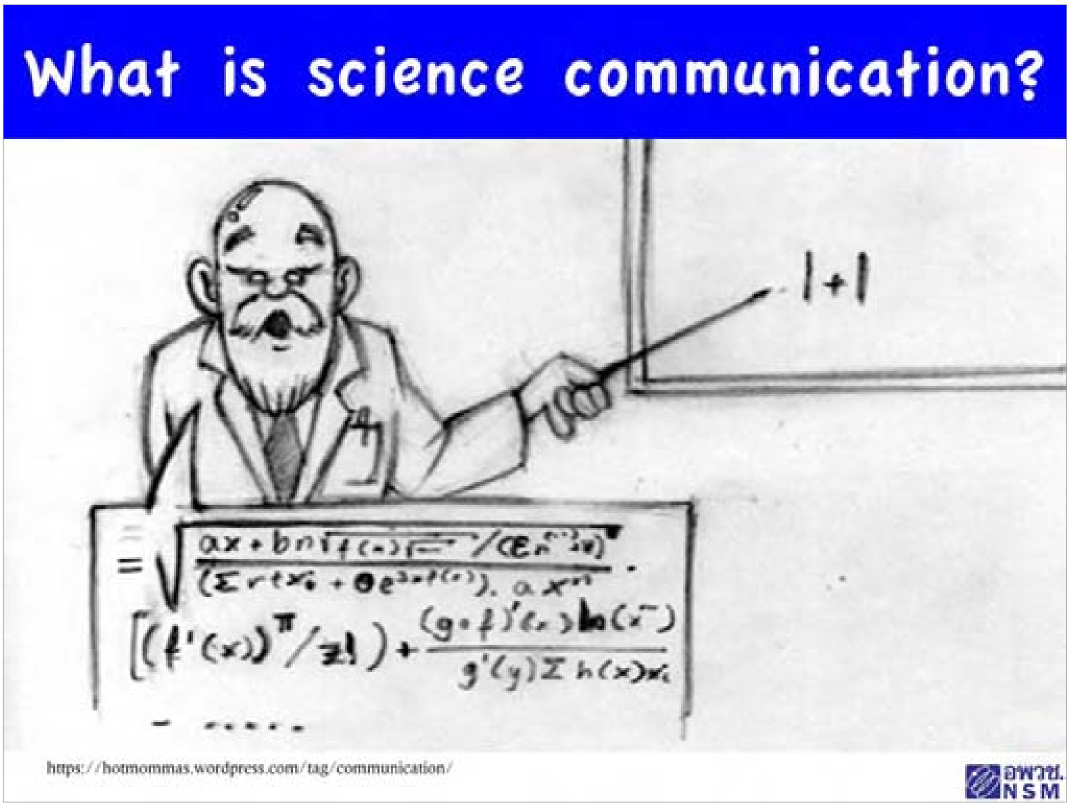
Officially opened to the public in **June 2000**

3

อพวช. NSM

NSM's Mission

- To make reliable information in science and technology available to the public.
- To raise public awareness of science and technology in Thai society.
- To conduct research on biodiversity and science communication


What is science communication?
1+1
https://hotmommas.wordpress.com/tag/communication/
อพวช.
NSM


Successful Science Communication
Telling It Like It Is
Science Communication
A PRACTICAL GUIDE FOR SCIENTISTS
THE HANDS-ON GUIDE FOR SCIENCE COMMUNICATORS
SCIENCE COMMUNICATION IN THEORY AND PRACTICE
INTRODUCING science COMMUNICATION
SCIENCE IN PUBLIC
Communication, Culture, and Credibility
HANDBOOK OF SCIENCE COMMUNICATION
Science Communication in the World
SCIENCE COMMUNICATION
CLEAR AND CONCISE COMMUNICATIONS FOR SCIENTISTS AND ENGINEERS
THE CHICAGO GUIDE TO COMMUNICATING SCIENCE
SCOTT L. MONTGOMERY
Communicating Biological Sciences
THE CHICAGO GUIDE TO COMMUNICATING SCIENCE
SCOTT L. MONTGOMERY
The Art of Science Communication
EFFECTIVE SCIENCE COMMUNICATION
Going Beyond Words to Reach Audiences
อพวช.

SESSION 5

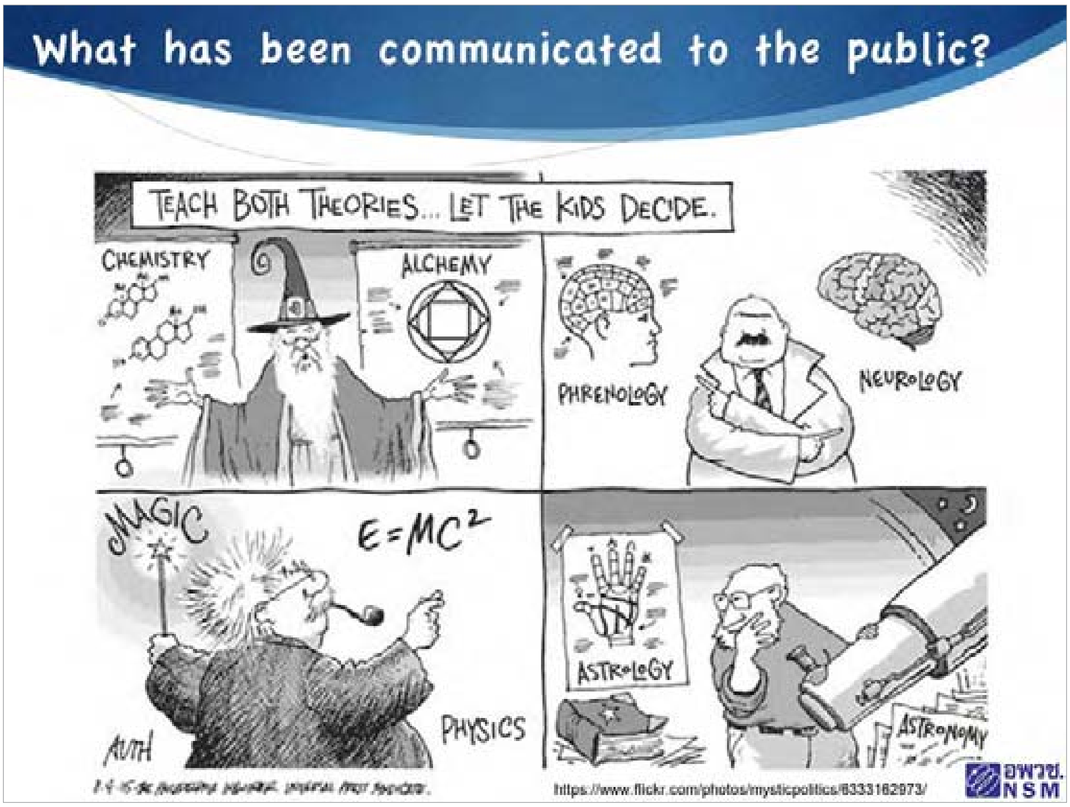

"Science is not finished
until it is
communicated,"
Mark Walport
Science Communication is
"successful dissemination of knowledge with a wide range of audiences including non-scientists".
University of Maryland, Centre for Environmental Science
อพวช. NSM

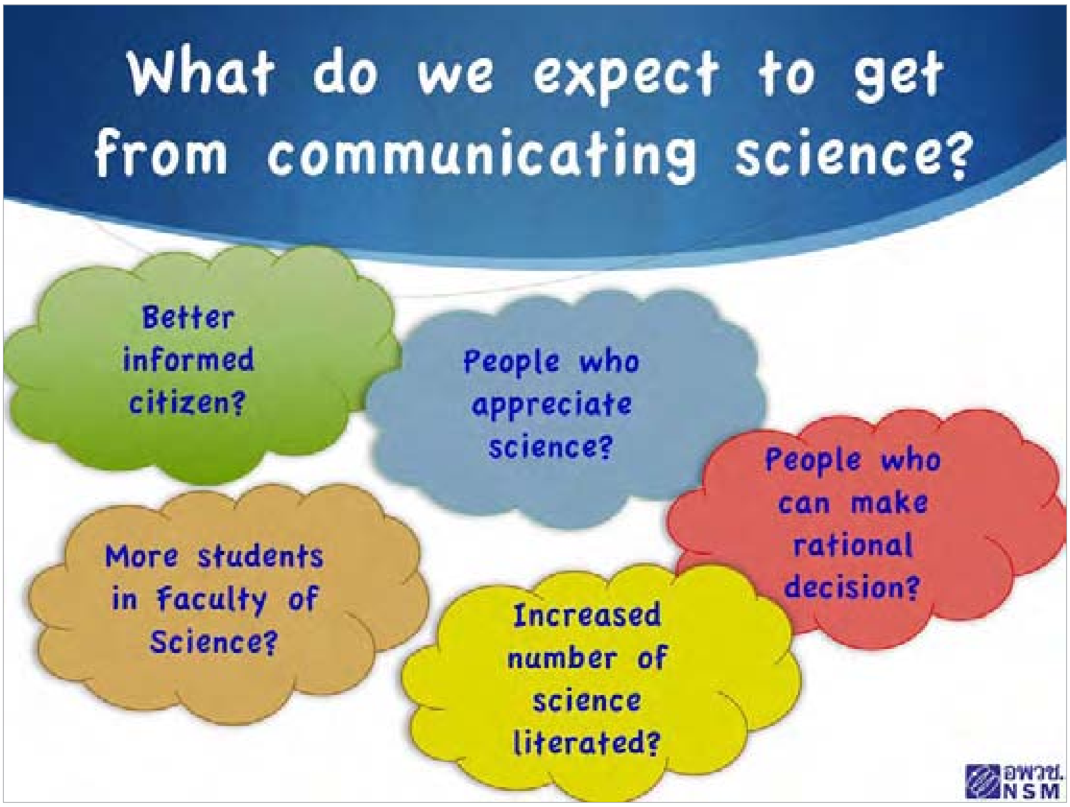

Where do we communicate Science ?
อพวช. NSM

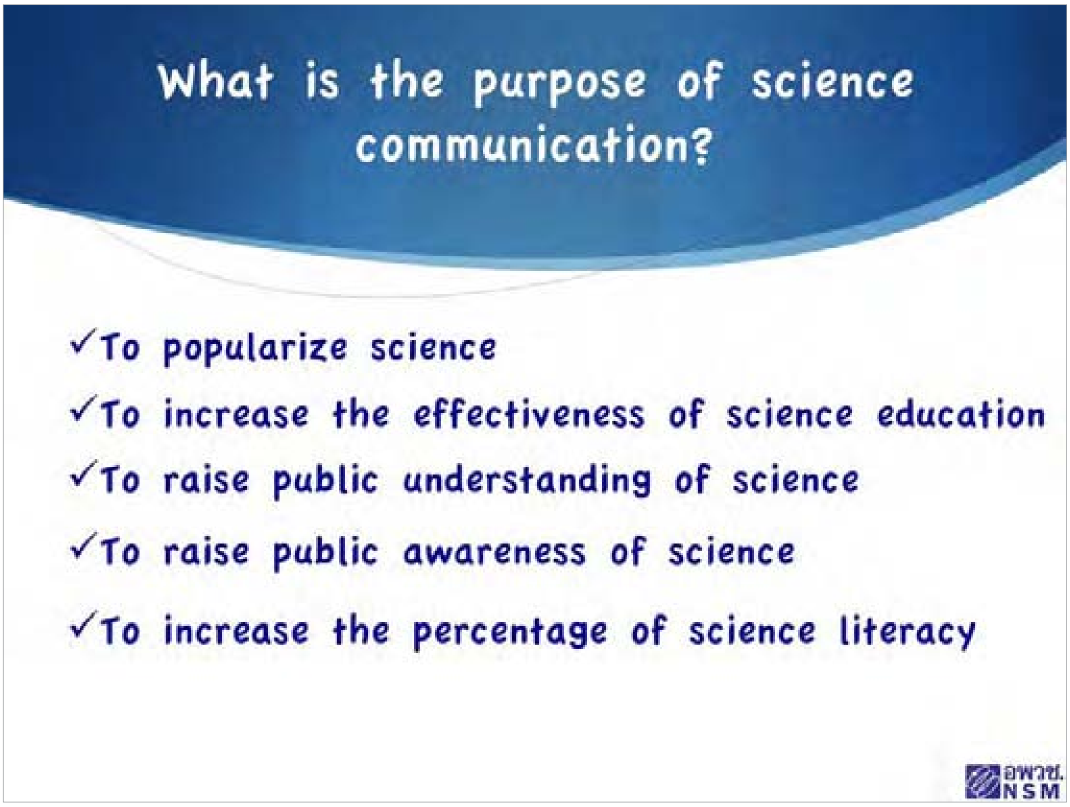

How do we communicate science?
Science SHOW
Science Talk
Changing Notions of Science in American Culture
DANIEL PATRICK THURS
Science Exhibition
Science Workshops
for 4 - 12 years old
THE RISKS & REWARDS OF SCIENCE COMMUNICATION
Discovery + Imagination = Fun
SCIENCE CAMP
อพวช.
NSM

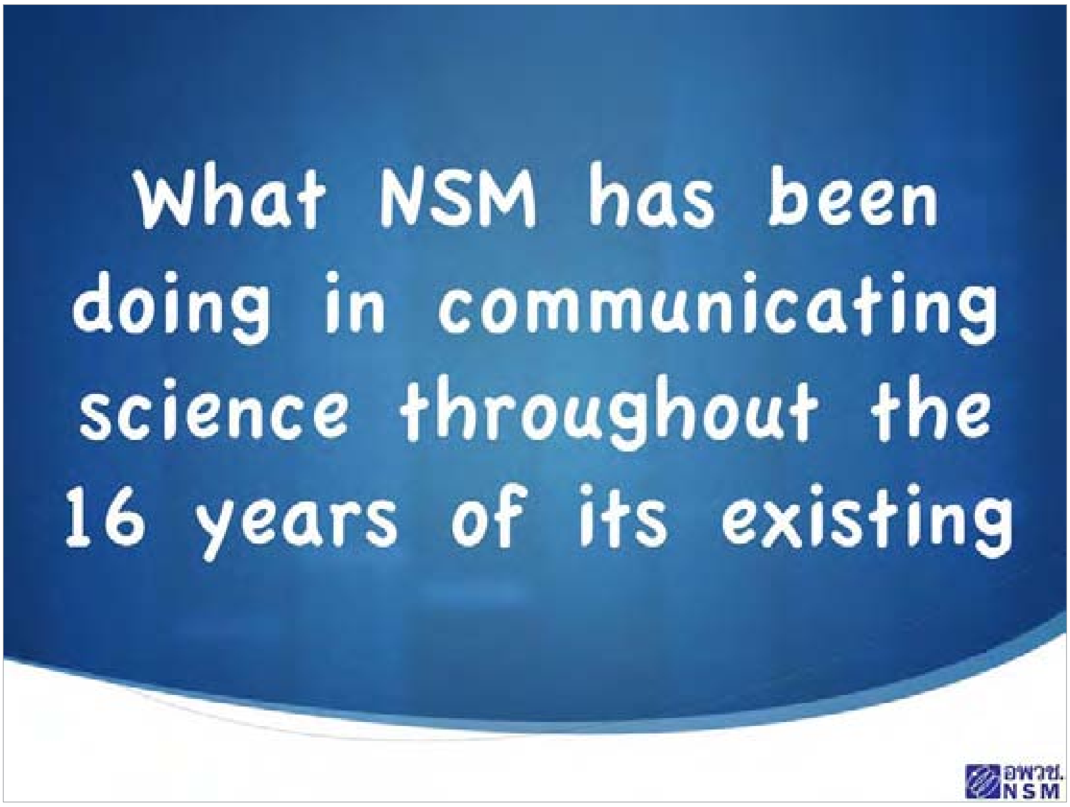

Who are science communicators?
Science Class
"No Unpleasant After-taste"
Always Buy CHESTERFIELD
SCIENCE NEWS
echoes of a strange star
Scientific tests prove Lucky Strike milder than any other principal brand!
Science Communication Conference 2011
อพวช.
NSM

SESSION 5


What has been communicated to the public?
TEACH BOTH THEORIES... LET THE KIDS DECIDE.
CHEMISTRY
ALCHEMY
PHRENOLOGY
NEUROLOGY
MAGIC
$E=MC^2$
PHYSICS
ASTROLOGY
ASTRONOMY
AUTH
https://www.flickr.com/photos/mysticpolitics/6333162973/
อพวช.
NSM


What do we expect to get from communicating science?
Better informed citizen?
People who appreciate science?
People who can make rational decision?
More students in Faculty of Science?
Increased number of science literated?
อพวช.
NSM


What is the purpose of science communication?
✓To popularize science
✓To increase the effectiveness of science education
✓To raise public understanding of science
✓To raise public awareness of science
✓To increase the percentage of science literacy
อพวช.
NSM


What NSM has been doing in communicating science throughout the 16 years of its existing
อพวช.
NSM

National Science week

SCIENCE MUSEUM

- Open since June 2000
- Exhibition Area 10,000 sq.m.

18

อพวช. NSM


NATURAL HISTORY MUSEUM
Open Since June 2003
Exhibition Area 3,000 sq.m.
19
อพวช.
NSM


INFORMATION TECHNOLOGY MUSEUM
Soft opening since May 2012
Exhibition Area 9,000 sq.m.
20
อพวช.
NSM


Outreach programs


Sience Caravan
คาราวานวิทยาศาสตร์
Science Caravan
22
อพวช.
NSM


อพวช.
NSM


SCIENCE FESTIVAL
08/04/2006
08/04/2006
Mobile activities
อพวช.
NSM

Science Caravan to Laos

อพวช.
NSM

Professional Development


Science communication workshop
อพวช.
NSM


Teacher training

Teacher training
29
อพวช.
NSM

การสัมมนาเชิงปฏิบัติการ
เรื่อง "การจัดการพิพิธภัณฑ์"
Workshop- Museum management

Workshop – NSM & Heureka Finland

Contest and Competition

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Apacer
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NSM
S&T Competition
อพวช.
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อพวช.
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Water Rocket Competition
อพวช.
NSM


Competition - science drawing
อพวช.
NSM


MOVE AND PLAY!
Special Event and Exhibition
อพวช.
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Dialogue in the Dark
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อพวช.
NSM


Science Camps


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"Thai Science Camp"
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Young Thai Science Ambassador
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อพวช.
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Science Show
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Science Laboratory
อพวช.
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Kid's activities
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อพวช.
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National Events

National Science and Technology Fair

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National Science and Technology Fair


National Science and Technology Fair
FORESTRY PAVILION
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อพวช.
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National Science week
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National Children's Day
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International Activities

INTERNATIONAL CONFERENCE

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Cross Country Science Camp

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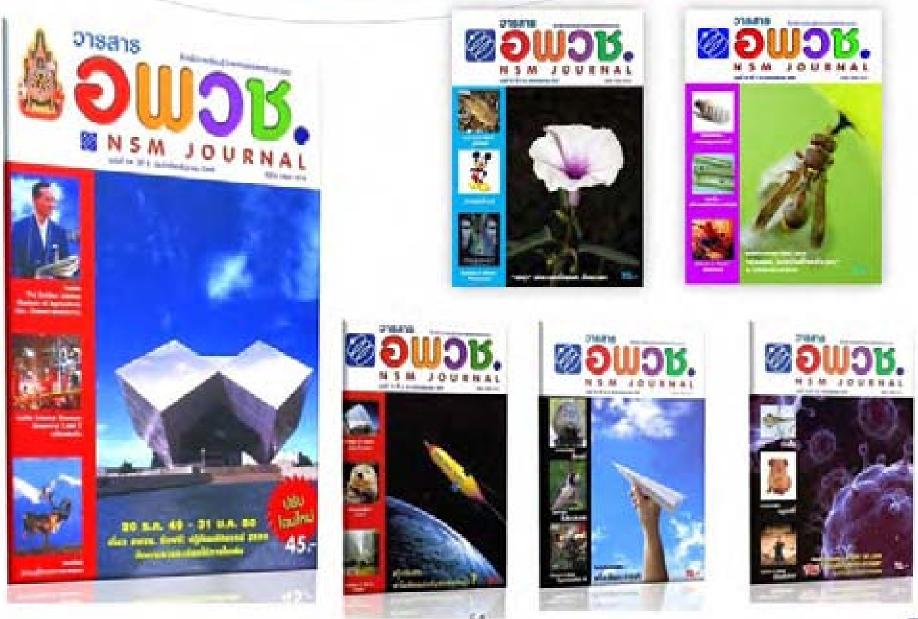
Science Media



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TV programs for children
"Learning Science by Thinking and Observation"
Show times: Every Friday 16.30 – 17.00hrs.
Every Saturday 09.00 – 09.30hrs.
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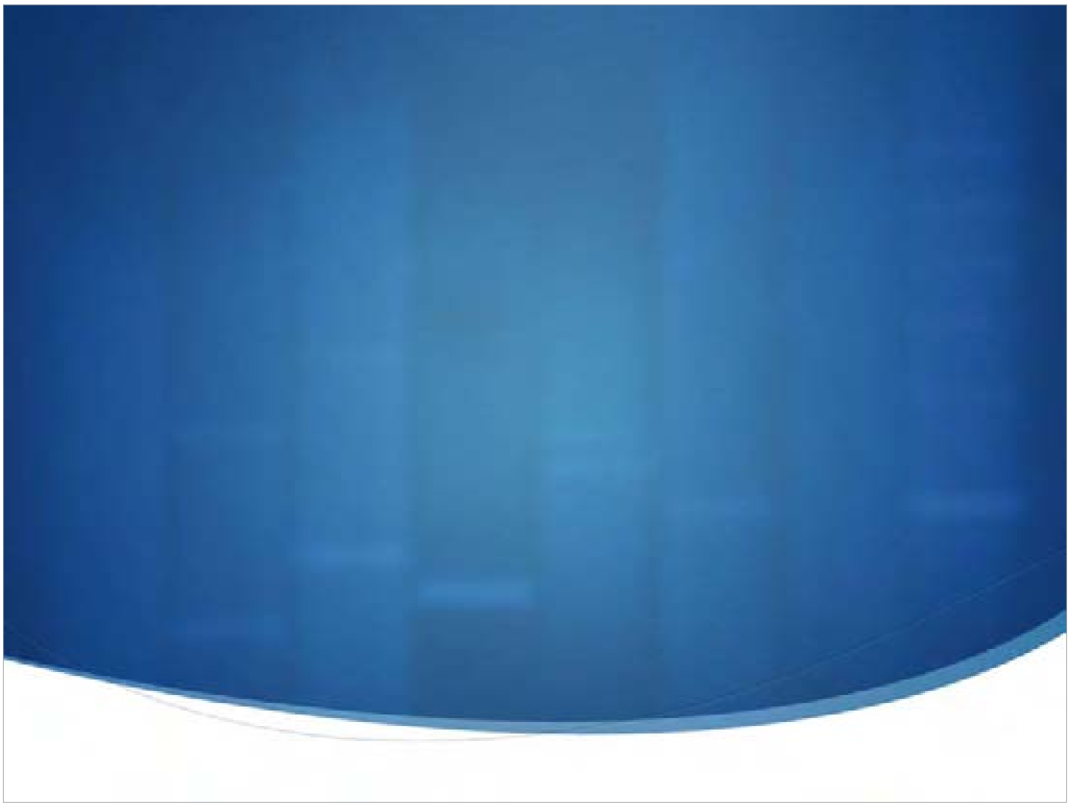
NSM website
www.nsm.or.th

SESSION 5



What people like and Don't like

- people do not like to read
- they have very short concentration
- they like to see and to do things
- they like to be surprised
- they like new technologies
- they like to be entertained

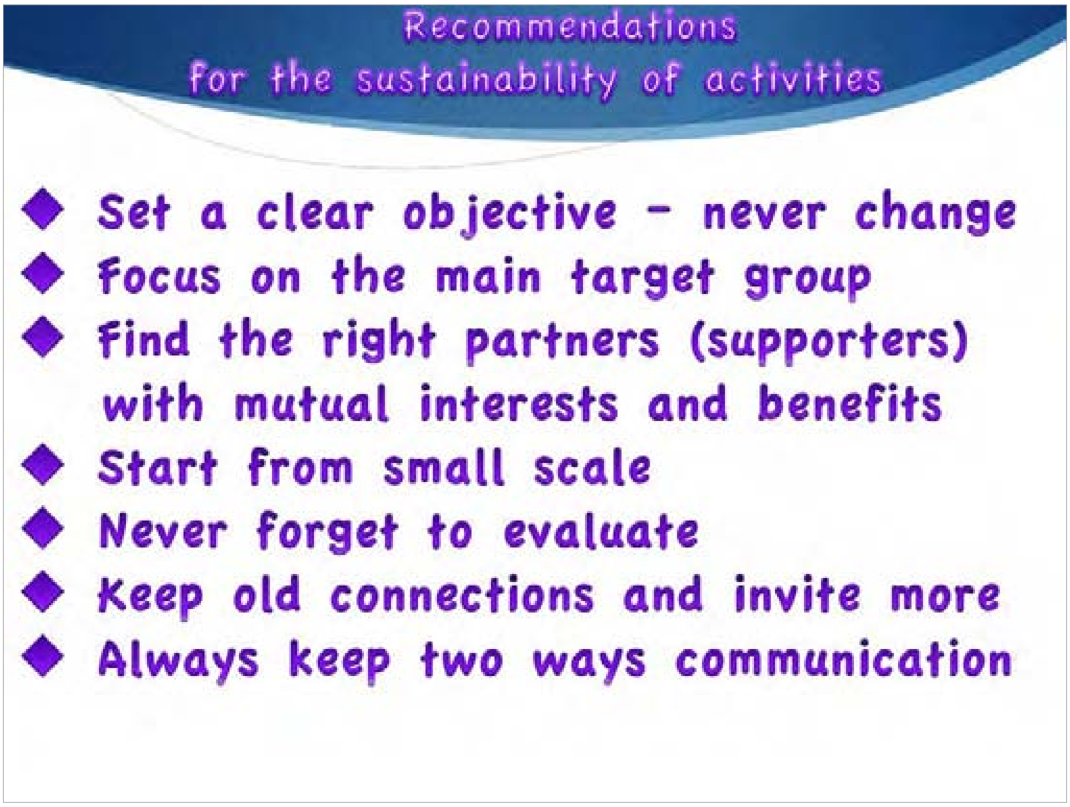

Example of success science communication activities
• Teacher training (1997 to present)
• Water Rocket Competition (2001 to present)
• Young Thai Science Ambassador (2003 to present)
• National Science and Technology Fair (2004 to present)
• Science Caravan (2005 to present)

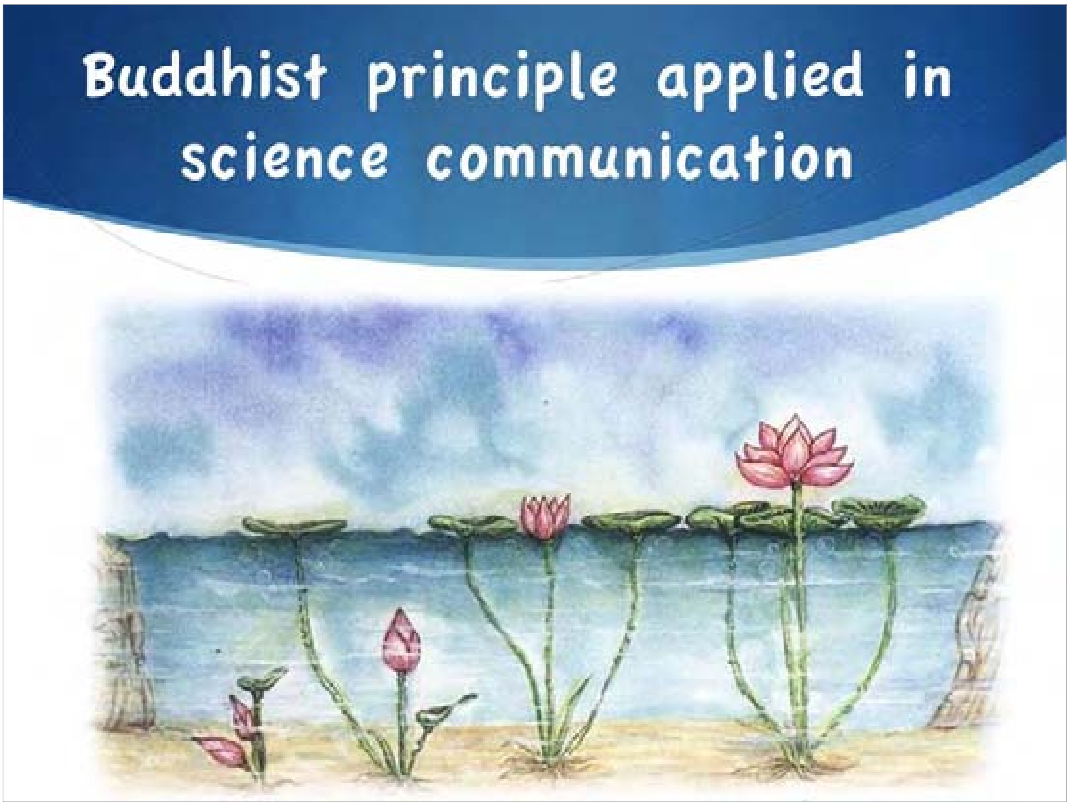

Factors affecting the success of science activities
collaboration
participation
evaluation
mutual benefit


What purpose each activity has serves
• Teacher training - science education
• Water Rocket Competition education, understanding, awareness, literacy
• Young Thai Science Ambassador science awareness
• National Science and Technology Fair popularization of S&T
• Science Caravan popularization of S&T, science education


Recommendations
Do not set many objectives
Make it simple - not too complicate
Do not work alone
Do not change objective
Set the right timing
Evaluation is a must
Pay attention to all feedback
Remember - nothing is perfect everything can be improved.


Sustainability of each activity
Evaluation
Improvement
Adaptation
Extension
Popularization


Recommendations
for the sustainability of activities
Set a clear objective - never change
Focus on the main target group
Find the right partners (supporters)
with mutual interests and benefits
Start from small scale
Never forget to evaluate
Keep old connections and invite more
Always keep two ways communication


Buddhist principle applied in science communication


Thank you
(Regional Young Thai Science Ambassadors 2006 Camp)

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Creating Scientific Society for the Sustainable Development of the Nation

Thank you

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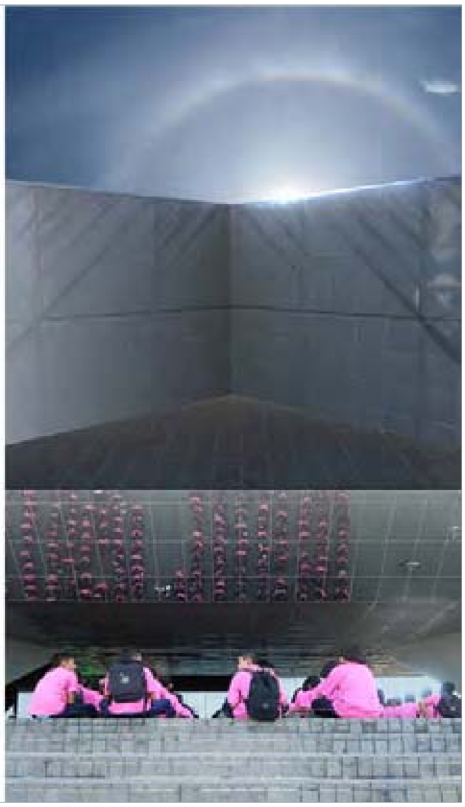

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

SESSION 5

SH GAUHAR RAZA & DR SURJIT SINGH

CSIR-National Institute of Science Communication and Information Resources
Dr K S Krishnan Marg, New Delhi 110012 INDIA
gauhar raza@yahoo.com , ssdabas@yahoo.com

SH GAUHAR RAZA is a Scientist and Head, Science Communication through Multimedia (SCM) Division, at National Institute of Science Communication And Information Resources (NISCAIR, CSIR), New Delhi. He was member of the core team that conceived and planned Bharat Jan Vigyan Jatha in India. During the past twenty years, he has administered many large-scale survey studies on public understanding of science, in India and abroad. His current interests include methodological questions that researchers face in the area of public understanding of science, especially in the third world. Raza has worked on issues related to Indigenous Knowledge Systems and cultural aspects of public understanding of science. He has also produced a number of documentary films on various topics of science and technology. He has authored and co-authored many books and research papers on varied subjects. He produced the first science serial for TV in Hindi language, in India.

DR SURJIT SINGH is a Researcher and member of the core team conducting research on the issues of public understanding of science (PUS) at National Institute of Science Communication And Information Resources (NISCAIR, CSIR), New Delhi. He has been involved in large scale survey studies on public understanding of science, especially in collecting time-series data on PUS during Kumbh and Ardh-Kumbh Melas. He is also interested in science popularization activities, especially among children and also involved in HIV/AIDS awareness programmes. He also participated in Bharat Jan Vigyan Jatha (Campaign for taking science to the public) in 1987, the campaign which was an attempt to take science to the public. He is also involved in making documentary film on science & technology and scientists. He has authored many research papers and books based on the research work.

ABSTRACT

25 years of research in public understanding of science in India: Empirical evidences from Kumbh Mela survey studies

Gauhar Raza and Surjit Singh
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The debate on 'Public Understanding of Science' or 'Scientific Literacy' that started in the mid 1980s has progressively become more intense (Shen, 1975). During the initial phase, marked by the large-scale national surveys, scholars focused on the development of framework, methodology, probing-tools and indicators for measuring 'Scientific Literacy' (Miller, 1998) (Bauer, Durant & Evans, 1991). The efforts were directed towards developing repository of indicators of Scientific Attitude, Perception, Information and Knowledge prevalent among the public (NRF Report, 2004). On the basis of information and knowledge the public was divided in two broad categories, 'Scientifically Literate' and 'Scientifically Illiterate'. On the basis of attitudes and perceptions people were categorised as 'positive' and 'negative' (Einsiedel, 1994). Most groups that administered survey studies and data analysis engaged themselves in identifying the areas of 'deficit' of scientific knowledge or attitude (Miller, 2001).

The outcome of these survey studies was three-fold. Firstly, the national level surveys that scanned citizens' level of scientific knowledge rang alarm bells. Surveys conducted in western countries showed low level of scientific literacy and, therefore, generated public debate. Secondly, the cross-national studies laid the foundation for comparison of the so-called 'scientific literacy levels' prevalent in various countries. However, policy makers and national leadership in the countries, where these surveys were carried out, did not take any serious note of the conclusions drawn from the data analysis. There is no evidence that in any of the countries a radical shift was brought about either in science teaching techniques, curriculum content, communication methods or an increase in expenditure on science and technology sector. Thirdly, the initial efforts led to establishment of a new legitimate area of research, which was yet to be designated in 1980s.

The second phase started during the first half of the 1990s. The warnings and cautionary notes implied in the conclusions drawn from the gathered data attracted attention of many experts working in various already established fields of investigations. Besides, experts working in conventional scientific areas like physics, chemistry (Hewitt, 1995) and biology or modern areas of science (Murriello, 2006) such as environmental science (Morgan & Keith, 1995), bio-technology (Rabino, 1994), experts working in apparently unrelated fields such as law, linguistics, political science (McAllister, 1991), sociology, cultural studies, philosophy, etc., started contributing to the debate. Each brought a fresh perspective and contributed to the academic enrichment process.

However, during this period the discourse was mainly centred around analytical models. The implicit and explicit objectives of survey studies, the methodologies, the research tools, the indicators and the conclusions drawn were intensely debated. Each component of the research being undertaken in the area of Public Understanding of Science came under the scanner. The issues and concerns raised during this period are still far from settled. Even the taxonomy is a contested arena. Attitudinal Research, Scientific Literacy, Public Understanding of Science (PUS), PCST, PUSET, and public engagement of science are but a few names that were suggested for this area of investigation.

Group of researchers working in India, were intensely involved in communication of science, therefore, realized, quite early, that percolation, propagation and acceptance of scientific ideas (laws, and methods) are particularly slow processes within different segments of a society (Raza, 2002). Scientific ideas such as heliocentricity of solar system, bacterial infection as a cause for health disorders, dehydration as a cause for death now accepted as commonsense have taken a few hundred years to become an integral component of the thought complex of a sizable population segment (Durant et al., 1992).

However, communication channels, during the latter half of the previous century, spread far and wide, their efficacy and efficiency increased, yet within the same segment some scientific ideas take longer to percolate and others spread comparatively faster. One of the issue that we are grappling with is 'Why does this happen?'. In other words, do only extrinsic factors, such as demographic ones, influence the propagation of scientific ideas or else are there determinants, intrinsic to scientific knowledge that impede or enhance communication of science?.

Another major question faced by researchers in the area of public understanding of science is that despite massive efforts at popularization of science by governmental and non-governmental agencies in the west, large-scale surveys administered in US and in several European countries reported only marginal increase in what is called 'scientific literacy'. Both who treat science as a saleable commodity and those who argue that communicating science is an imperative to enlighten masses find this a worrisome situation. The present article in addition to discussing these issues deals with the growth of research in India in the area of public understanding of science.

The papers, is part of on-going survey study, spread over past 25 years. The surveys were carried out by researchers working at CSIR, India, during Kumbh[1] and Ardh-Kumbh Melas held at Allahabad, Uattar Pradesh, a northern province. During the first face-to-face interviews based survey study, 3404 respondents were analysed in 1989 and since then every six years about 5000 respondents who come to participate in Kumbh and Ardh Kumbh Mela have been interviewed on same questions. The most recent survey study has been carried out in 2013 when more than 5000 respondents were interviewed. The core indicators developed in four areas of investigation i.e., Astronomy & Cosmology, Geography & Climate, Agriculture and Health & Hygiene were used in each round of survey, however, the topical scientific issues were dealt with by adding on the indicators developed for specific issues. In addition, the open-ended questionnaire contained personal information of each respondent such as age, gender, educational qualification, occupation, marital status, sources of information, etc.

[1] *Kumbh Mela, a religio-cultural festival is held after every twelve years, at the confluence of the Ganges and the Yamuna, two important rivers of the country. After every six years Ardh-Kumbh (Half Kumbh) is held at the same place.*

The article probes and seeks to answer some of the issues and questions raised in the above paragraphs by putting the time series data on the anvil of statistical tests. As opposed to the 'deficit model' the authors have used 'cultural distance model' for mapping the public understanding of scientific phenomena. The empirically measured cultural distance for five basic scientific concepts, related to astronomy and cosmology are reported along with the relative shifts that have taken place during this period. The observed aggregate cultural distance between science and the public in all four areas of scientific investigation, shows that the gap between science and the publics' cultural complex has consistently reduced.

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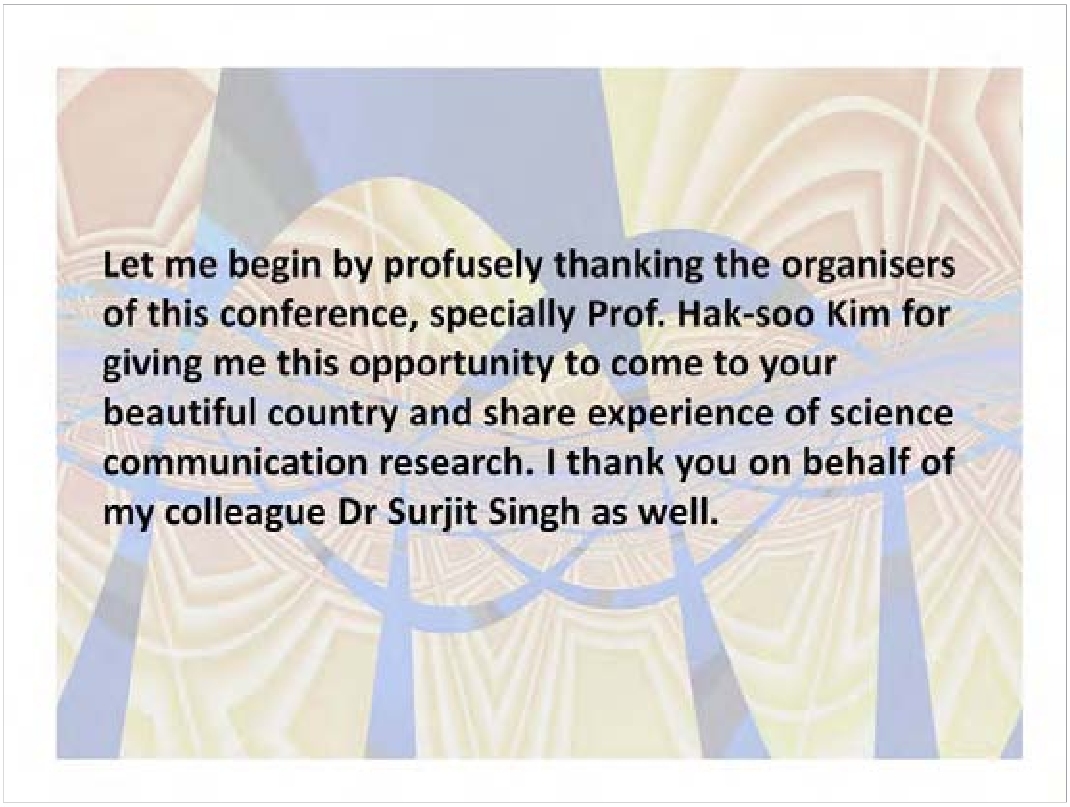
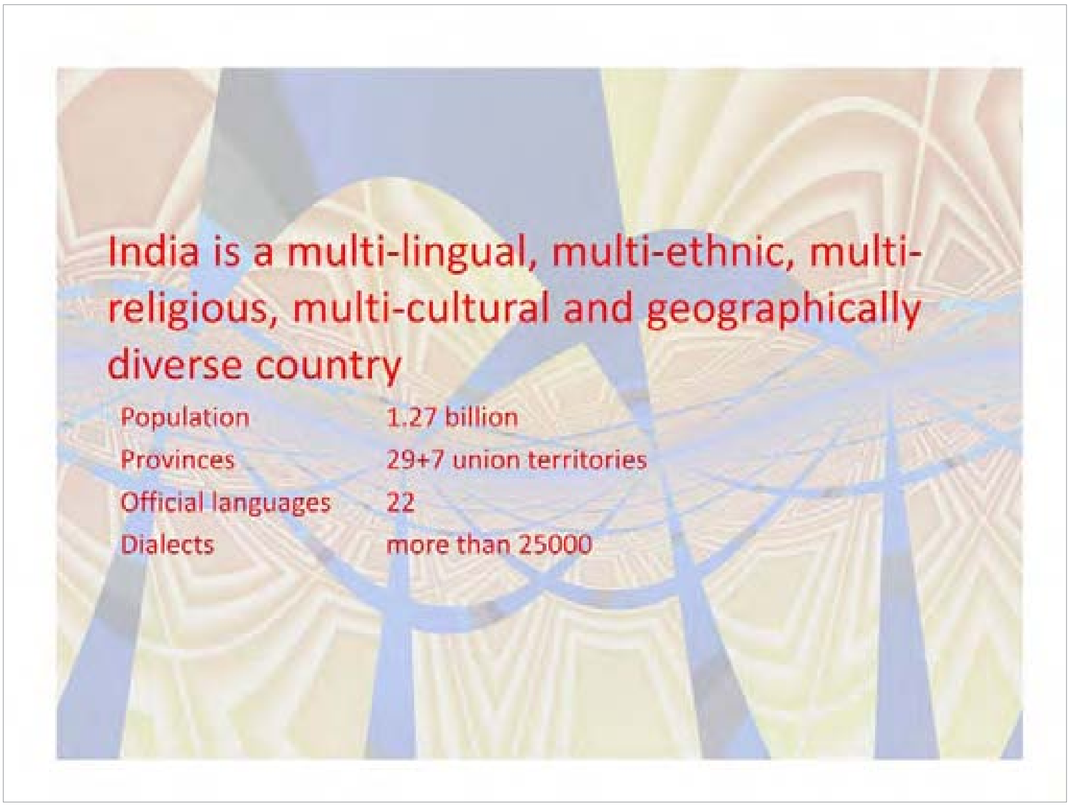
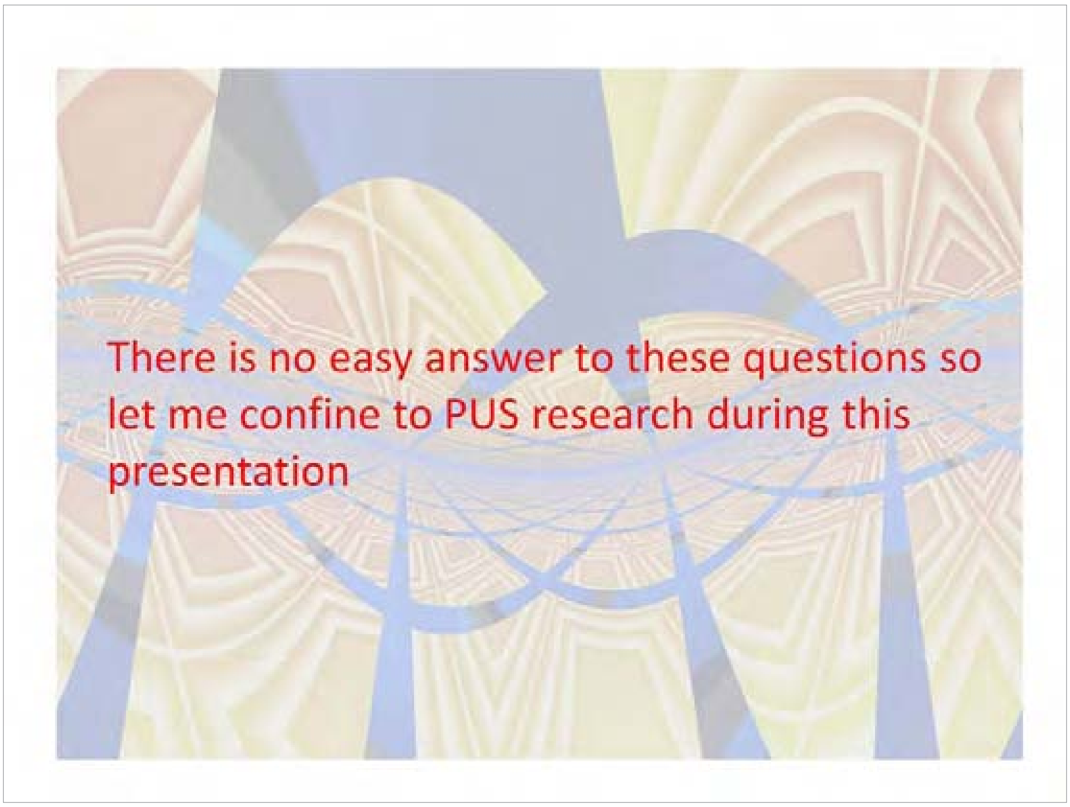
National Institute of Science Communication
and Information Resources, CSIR, India
25 years of Science
Communication In India
Lessons
From Kumbh Mela Studies
Gauhar Raza & Surjit Singh

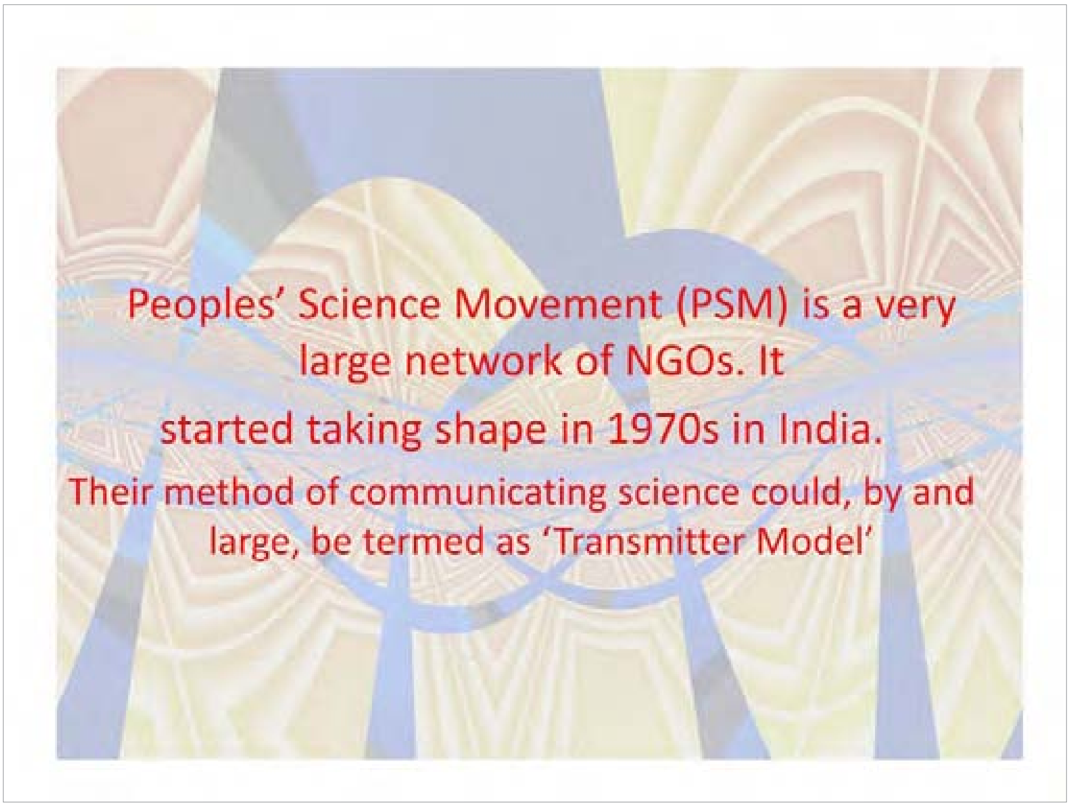

Let me begin by profusely thanking the organisers of this conference, specially Prof. Hak-soo Kim for giving me this opportunity to come to your beautiful country and share experience of science communication research. I thank you on behalf of my colleague Dr Surjit Singh as well.

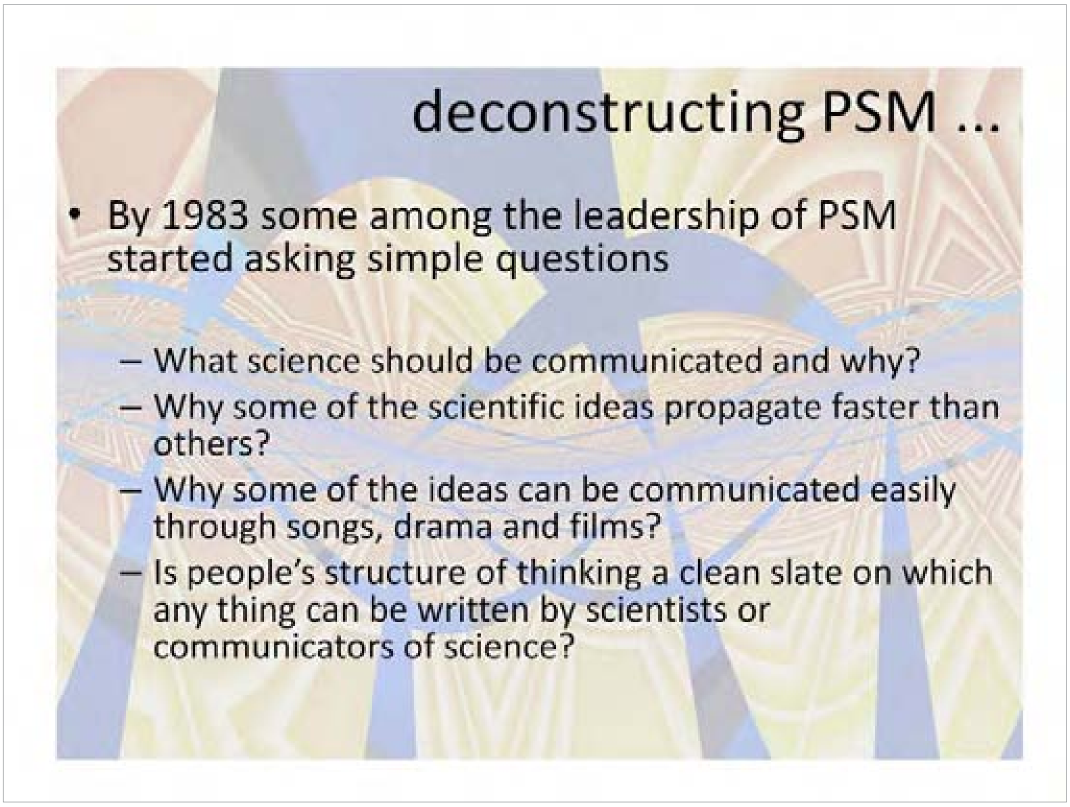

India is a multi-lingual, multi-ethnic, multi-religious, multi-cultural and geographically diverse country
Population 1.27 billion
Provinces 29+7 union territories
Official languages 22
Dialects more than 25000


1. What science communication activities are currently conducted in your country? How are you involved in these activities?
2. What plans are there for future science communication activities in your country?
3. What obstacles to effective science communication do you face in your country?
Thank you and I look forward to seeing you soon.
Sincerely,
Hak-Soo Kim
Chair, Organizing Committee


There is no easy answer to these questions so let me confine to PUS research during this presentation


In India the agents of Science Communication can be divided into four categories
– Government institutions
– NGOs specially Peoples' Science Movement
– Education system
– Media
Govt.
NGOs


Peoples' Science Movement (PSM) is a very
large network of NGOs. It
started taking shape in 1970s in India.
Their method of communicating science could, by and
large, be termed as 'Transmitter Model'

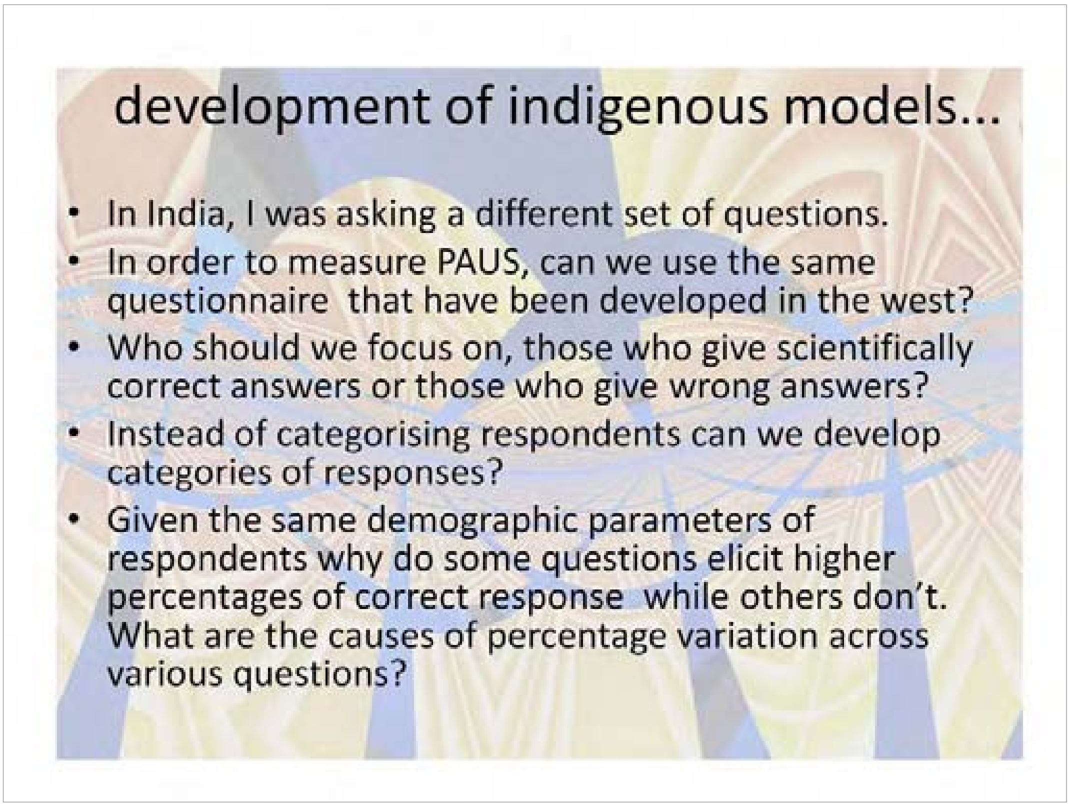

deconstructing PSM ...
• By 1983 some among the leadership of PSM started asking simple questions
– What science should be communicated and why?
– Why some of the scientific ideas propagate faster than others?
– Why some of the ideas can be communicated easily through songs, drama and films?
– Is people's structure of thinking a clean slate on which any thing can be written by scientists or communicators of science?

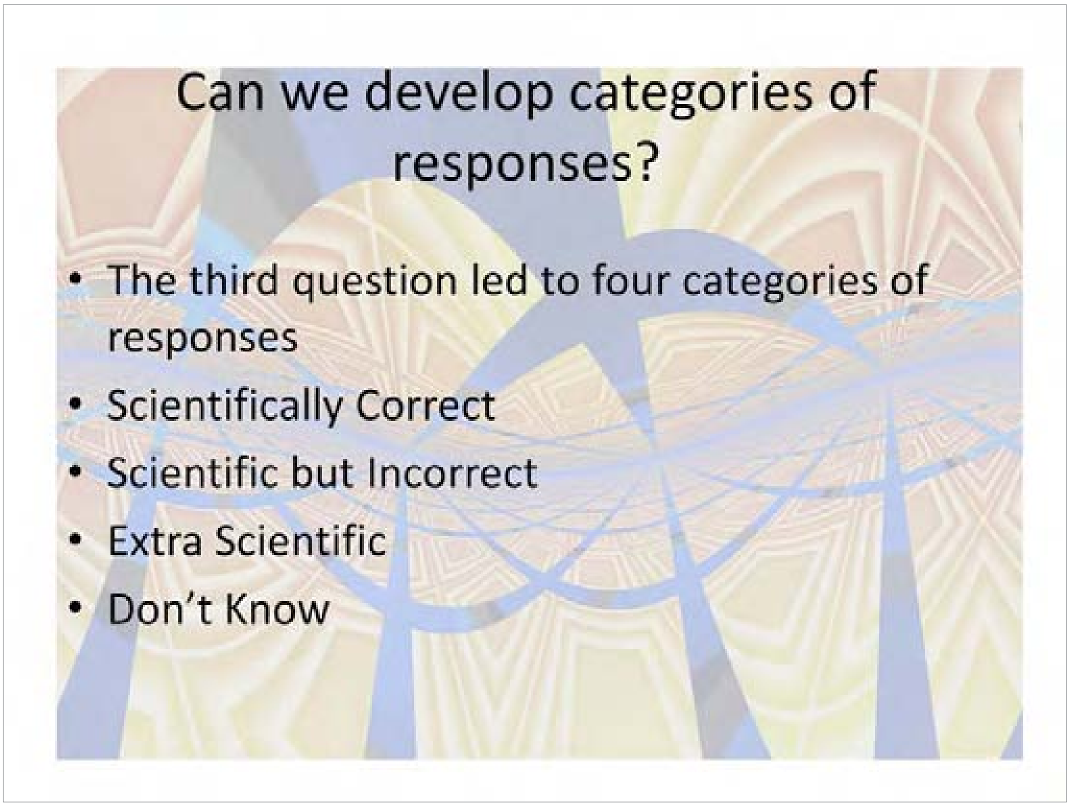
question of progress..

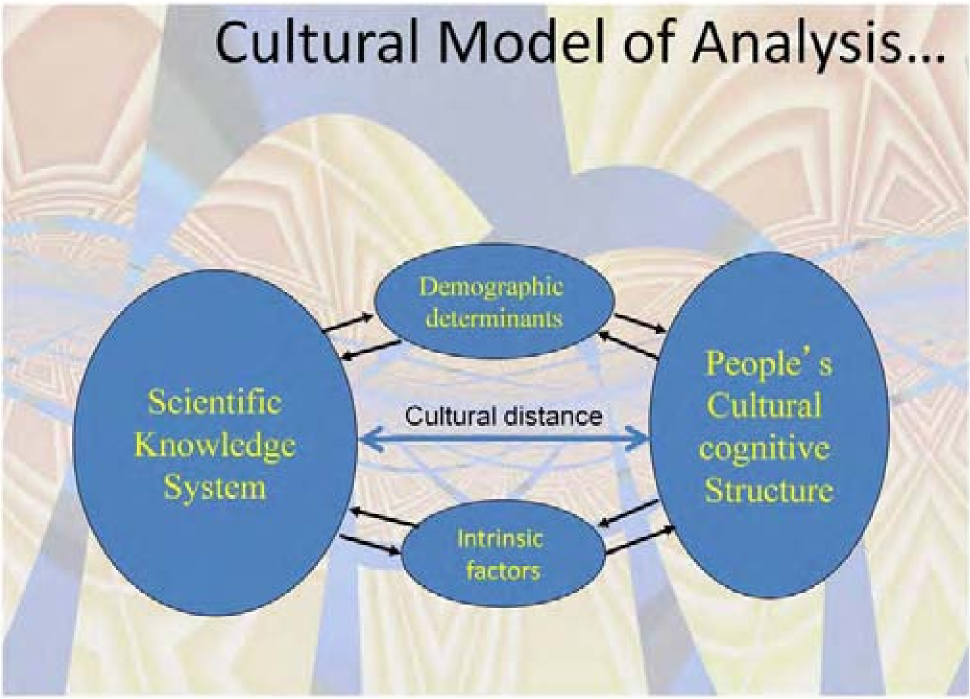
- These questions were not articulated as clearly as I have put them in the previous slide, but these issues did bother us in some form or the other

the 'deficit model'....

- The second half of the 1980s was the period when Jon Miller and many other colleagues were trying to probe the level of scientific literacy, in the western countries
- By mid 1990s Miller et al. developed categories of Scientific Literacy (civic, cultural, etc.)
- This led to categorisation of citizens in Scientifically literate and Scientifically illiterate

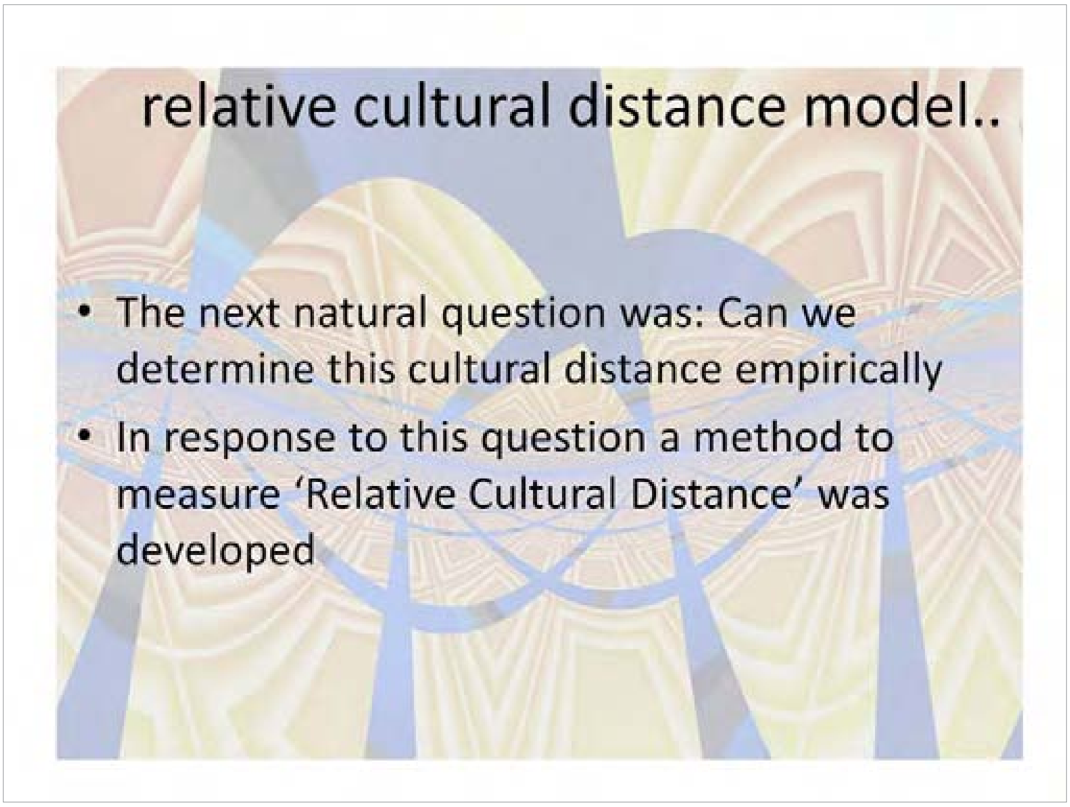

development of indigenous models...
• In India, I was asking a different set of questions.
• In order to measure PAUS, can we use the same questionnaire that have been developed in the west?
• Who should we focus on, those who give scientifically correct answers or those who give wrong answers?
• Instead of categorising respondents can we develop categories of responses?
• Given the same demographic parameters of respondents why do some questions elicit higher percentages of correct response while others don't. What are the causes of percentage variation across various questions?

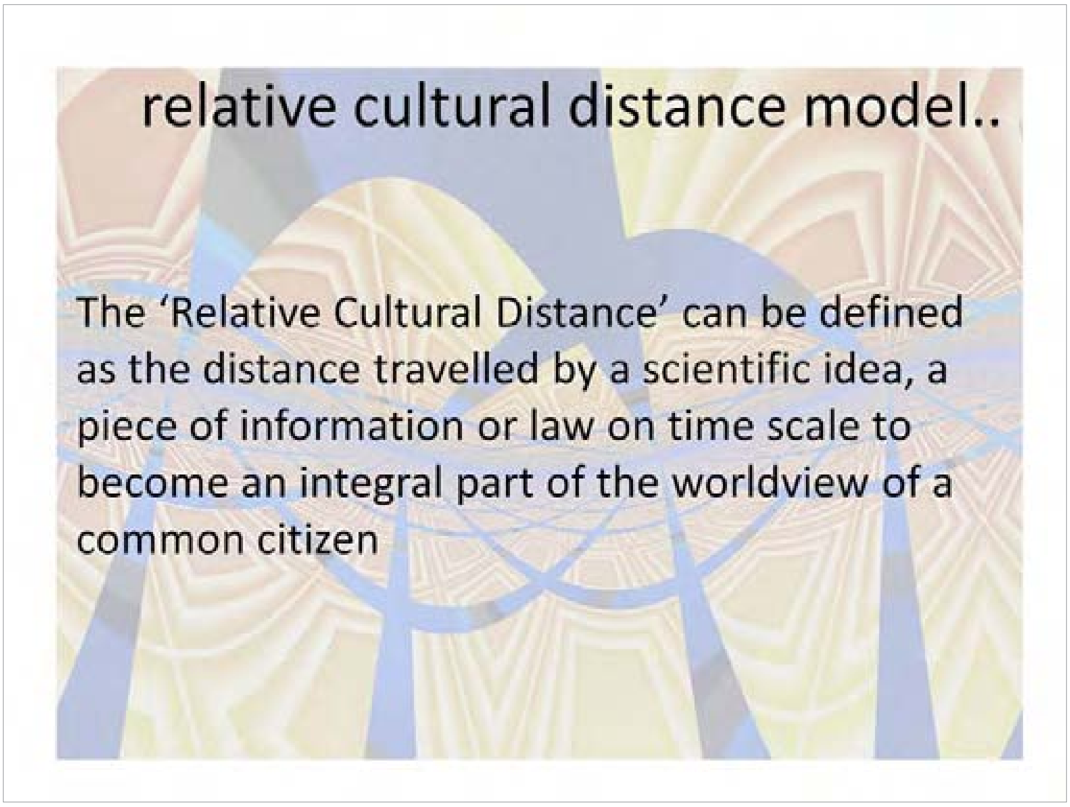

Can we develop categories of responses?
• The third question led to four categories of responses
• Scientifically Correct
• Scientific but Incorrect
• Extra Scientific
• Don't Know



parametrics of cultural distance...

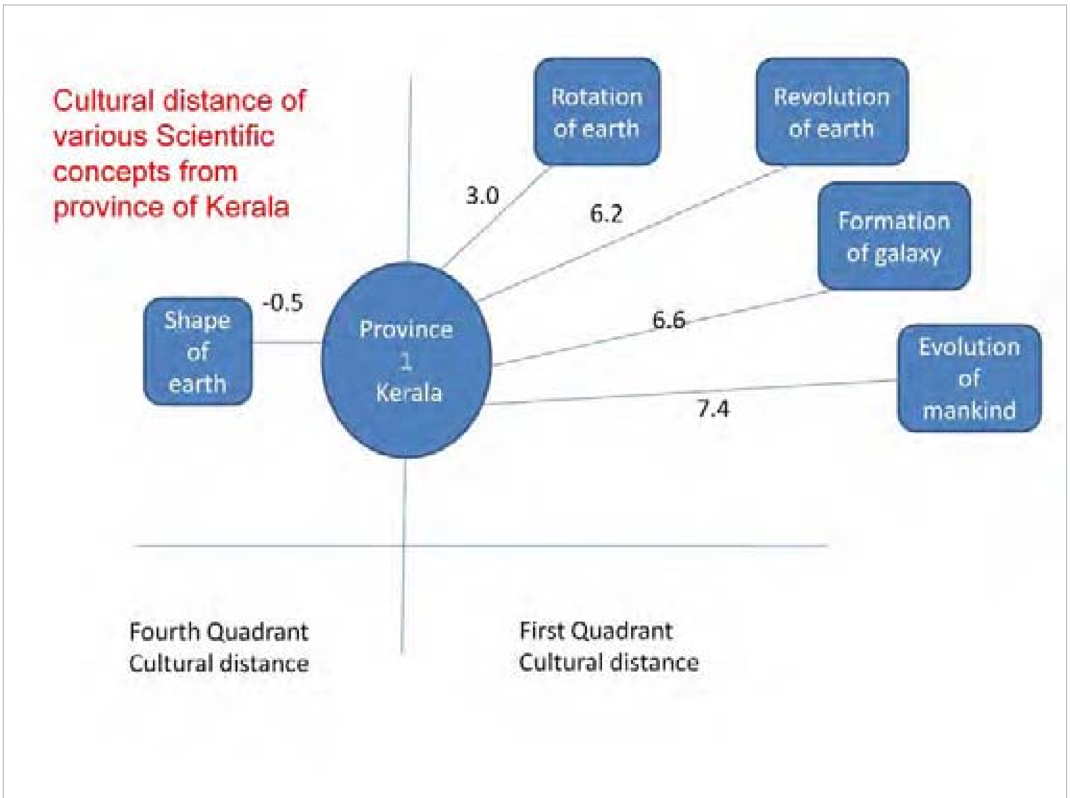
- Intrinsic factors
  - Complexity: involved in explaining a phenomenon
  - Control : Collective or individual
  - Intensity :of intervention in quotidian life of a citizens
  - Lifecycle: of a phenomenon

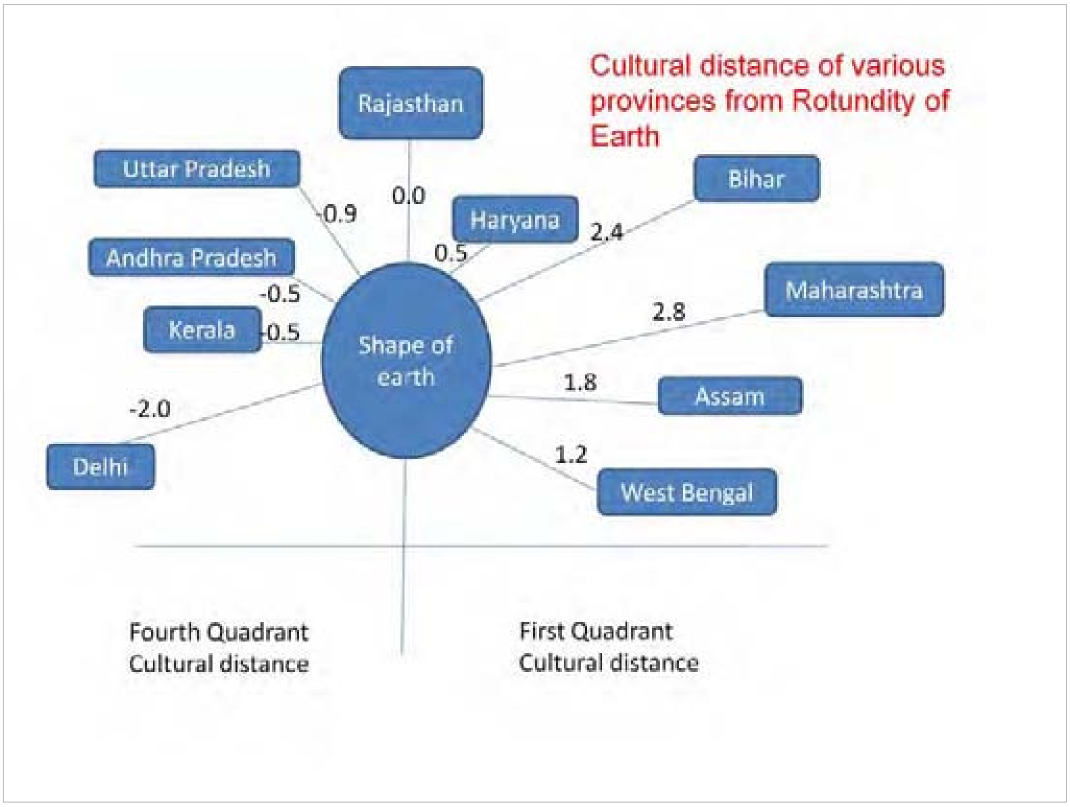

relative cultural distance model..
• The next natural question was: Can we determine this cultural distance empirically
• In response to this question a method to measure 'Relative Cultural Distance' was developed


relative cultural distance model..
The 'Relative Cultural Distance' can be defined as the distance travelled by a scientific idea, a piece of information or law on time scale to become an integral part of the worldview of a common citizen

SESSION 5

In 1989 the research team goes to Kumbh Mela, held at Allahabad, to administer a survey and collects data for the first time





Average Cultural Distance has reduced over the years...

Table 2 – Values of Cultural Distance computed for Indian populace

Concept	2001	2007	2013
x_{Ci1}	0.7	0.5	-0.07
x_{Ci2}	9.7	8.8	8.1
x_{Ci3}	10.4	10.8	9.8
x_{Ci4}	13.2	12.4	10.2
x_{Ci5}	19.3	19.5	20.5
x_{mean}	**10.6**	**10.4**	**9.7**

SESSION 5

Comparative Shift in Cultural Distance

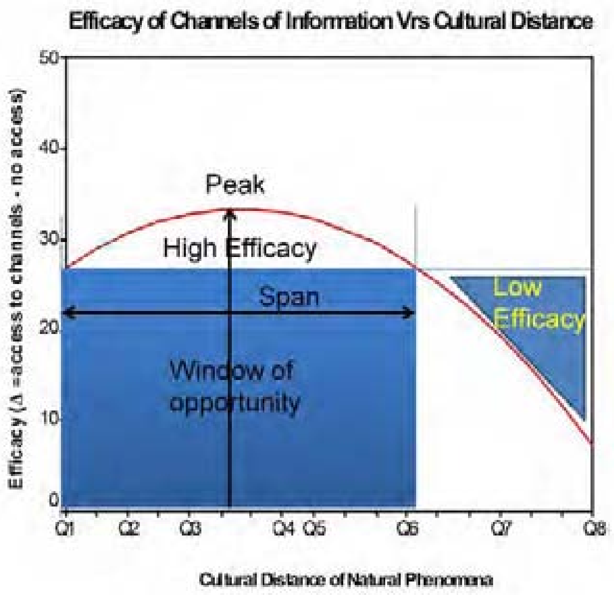
$$\Delta Xci = \sum Xcit_2 - \sum Xcit_1$$

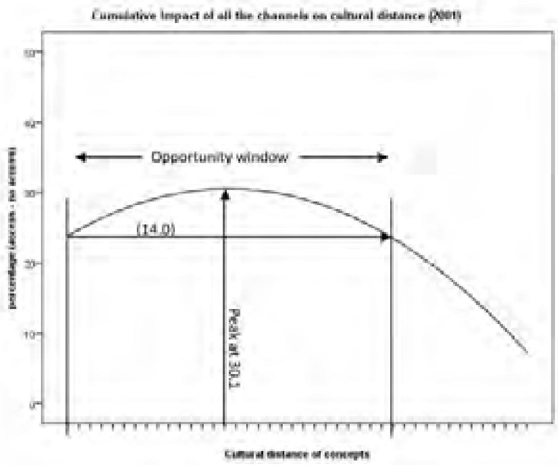
Where,

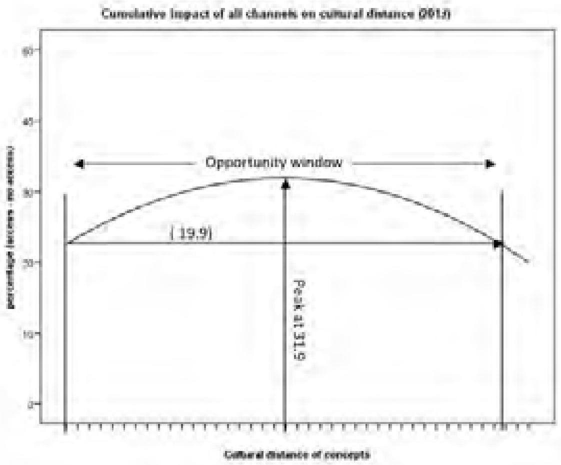
- Δ**X**ci: denotes the shift in cultural distance
- t_2: is the latest point of observation on time scale
- t_1: is the earliest point of observation on time scale

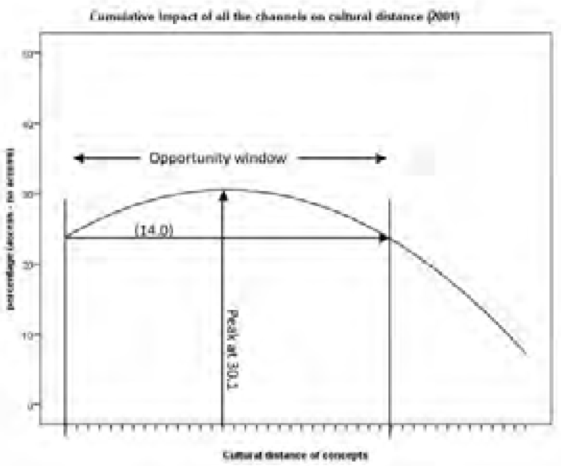
Shift in Cultural Distance in the past 12 years

Concepts	India Shift ($\Delta \chi ci$) (2001-2007)	Shift ($\Delta \chi ci$) (2001-2013)
$\Delta \chi ci_{mean}$	**-0.2**	**-0.9**
What is the shape of Earth?	0.2	-1.4
How do day and night form?	-0.9	-1.6
What causes eclipse?	0.4	-0.6
What is Akaash Ganga (milky way)?	-0.8	-3.0
How did humans come to being?	0.2	1.2


Efficacy of Channels of Information Vrs Cultural Distance
Efficacy (Δ =access to channels - no access)
50
40
30
20
10
0
Peak
High Efficacy
Span
Window of opportunity
Low Efficacy
Q1
Q2
Q3
Q4 Q5
Q6
Q7
Q8
Cultural Distance of Natural Phenomena


Cumulative impact of all the channels on cultural distance (2001)
Opportunity window
(14.0)
Peak at 30.1
Cultural distance of concepts


Opportunity window
(19.9)
Peak at 31.9
Cultural distance of concepts


Cumulative impact of all the channels on cultural distance (2001)
Opportunity window
(14.0)
Peak at 30.1
Cultural distance of concepts

Comparative Efficacy of Media Channels

INFORMATION CHANNELS	2001			2013 shift in ()		
	Peak	Span	Origin	Peak	Span	Origin
Cumulative Efficacy of all the channels	30.1	14.0	0.5	31.9 (1.8)	19.9 (5.9)	-0.7 (1.2)
Efficacy of Newspaper	24.4	12.7	0.5	26.0 (1.6)	14.7 (2.0)	-0.7 (1.2)
Efficacy of Television	18.5	10.0	0.5	20.6 (2.1)	10.2 (0.2)	-0.7 (1.2)
Efficacy of Radio	18.3	8.8	0.5	20.8 (2.5)	15.2 (6.4)	-0.7 (1.2)

Thanks

KAST-ASM-IAP
INTERNATIONAL WORKSHOP

SCIENCE LITERACY: *Science Communication & Science Outreach*

JUNE 12 - 13, 2014

Magnolia Room, Hoam Faculty House,
Seoul National University

IAP / ASM Delegation

Professor Dr. Volker ter Meulen

Co-Chair, IAP – the global network of science academies
German National Academy of Sciences Leopoldina

Volker ter Meulen qualified as MD in 1960. He received his post-doctoral training in virology in the USA, at the Children's Hospital of Philadelphia. On returning to Germany in 1966 he specialised in paediatrics and was subsequently Visiting Scientist at the Wistar Institute for Anatomy and Biology in Philadelphia and at the Viral and Rickettsial Disease Laboratory in Berkeley, from 1969-1970. In 1975 he became a full professor and Chairman of the Institute of Virology and Immunobiology at the University of Würzburg. He retired in 2002, having twice been elected Dean of the Faculty of Medicine of Würzburg University. During his research career, ter Meulen worked on molecular and pathogenic aspects of viral infections in man and animals, in particular on infections of the central nervous system. Due to the recognition of his research achievements and his experience in heading a Medical Faculty, ter Meulen has on numerous occasions been invited to give policy advice on research matters to German research organisations and to state and federal ministries of science in Germany. Internationally, ter Meulen has served on a number of committees of organisations and scientific societies/unions in the area of virology and infectious diseases, covering a broad spectrum of important issues connected to human and animal pathogens. From 2003-2010, ter Meulen was President of the German Academy of Sciences Leopoldina. Under his leadership, the Leopoldina strengthened its international commitments in different inter-academic councils and was appointed National Academy of Sciences in 2008. From 2007-2010, he was President of the European Academies Science Advisory Council (EASAC), the association of the National Science Academies of the European Union, which is the IAP associated regional network for Europe. In 2013, ter Meulen was elected co-chair of IAP.

DATO' DR. Samsudin Tugiman

Secretary General, Academy of Sciences Malaysia (ASM)
Director, International, Science Technology and Innovation Centre (ISTIC)
samsudin@istic-unesco.org

EDUCATION

1950 - 1957	High School, Klang
1959 - 1962	College of Agriculture, Serdang, Selangor (Diploma in Agriculture)
1971	B.Sc. (Agronomy) Lousiana State University USA
1974	M.S. (Extention Education) Lousiana State University USA
1976	Ed.D (Doctor in Education) – Extension Lousiana State University USA
1981	Executive Management Course, Manchester Business School, UK

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

- Member of Agricu tura Institute of Ma aysia (AIM)
- Serve as Chairman of the RRIM Socio-Economic Laboratory Committee at Panti, Johor
- Served as Member of RISDA Board
- Served as A ternate Member of FELDA Board
- Served as Co-Chairman of the RISDA Board Techno ogy Transfer Committee
- Served as Venting Committee of PERTANIKA
- Member of Soi s Society Ma aysia
- Served as a Member of the Incorporated Society of P anters (Se angor Branch)
- Served as a Visiting Lecturer in Extension Education, Universiti Putra Ma aysia
- Served as a Member of the RRIM Senior Officers' Association
- Served as Member of IRPA Pane on Socia Sciences
- Fe ow of Academy of Sciences Ma aysia
- Secretary Genera of Academy of Sciences Ma aysia Counci

CAREER RESUME

1962	Rubber Instructor, RRIM
1967	Senior Rubber Instructor, RRIM
1971	Sma ho ders Advisory Officer, RRIM
1976	Head of Training Division, RRIM

1981	Assistant Director Genera , RRIM Department of Sma ho ders Extension and Deve opment (Grade JUSA C)
1989	Deputy Director Genera (Deve opment), RRIM (Grade JUSA B)
1989 - 2008	Executive Director of the Academy of Sciences
2008 - present	Ma aysia (Contract Officer on Grade JUSA C) Director of the Internationa Science, Techno ogy & Innovation Centre (ISTIC) (Grade JUSA C)

NATIONAL HONORS

2000	Darjah Sultan Salahuddin Abdul Aziz Shah (DSSA)
1998	Johan Setia Mahkota (JSM)

NOOR ASMALIZA BINTI ROMLEE

Programme Manager, Academy of Sciences Malaysia
asmaliza@akademisains.gov.my

QUALIFICATIONS

BSc Hons (Ecology & Biodiversity)
MSc (Science Communication)

Noor Asmaliza graduated with a Master of Science in Science Communication from Nationa University of Singapore and Austra ian Nationa University in 2012. She was a recipient of the NUS Graduate Scho arship for ASEAN Nationa s. She comp eted her fina research project at the Singapore Science Centre where she investigated pub ic's perceptions and understanding of their visit to a C imate Change Exhibition. She received her Bache or of Science Honours (2008) in Eco ogy and Biodiversity from the University of Ma aya, Kua a Lumpur.

Prior to her graduate study, she was a communication and marketing manager at Innovative Engineering Design Co ege (IEDC) in Kua a Lumpur, Ma aysia. She assisted with the co ege's start-up, management and deve opment of communication infrastructures, pub ic re ations activities, marketing initiatives, communications p ans, and corporate branding strategies.

Ear ier in her career, she worked for Academy of Sciences Ma aysia as a corporate communication officer (2009-2011). She managed the Academy's corporate communication and media p anning, inc uding oca and nationa programs such as Mahathir Science Award, Nationa Science Cha enge and Ma aysia Innovative Year (2010). She a so ed the Academy's re-branding initiative in promoting its growth and success as a think-tank organisation in science, engineering and techno ogy.

Before she joined the Academy, her first job was with an internationa nonprofit organization, Wor d Wi d ife Fund for Nature (WWF-Ma aysia). She was responsib e for pub ic re ations and communications activities regarding the Peninsu ar Ma aysia Forests Landscape Programme. She coordinated science communication activities such as pub ic exhibitions, science roadshows and awareness campaigns.

Fo owing the comp etion of her graduate studies, she joined back the Academy of Sciences Ma aysia (2013) but with a different portfo io. She is now a Programme Manager of Science Network. She eads three team members who are responsib e in internationa re ations matters and enhancing Ma aysia/s oca industria inkages at g oba eve .

Introduction

The Korean Academy of Science and Technology

http://www.kast.or.kr

The Korean Academy of Science and Technology (KAST) is a South Korea's most prestigious body of prominent scientists elected as Fellows in science and technology areas, and a highest advisory body to the government and science community on matters related to science and technology. It has the mandate to recognize outstanding achievements in science and technology made by Korean scientists in all fields of science. KAST was founded in 1994 and continues to stand today with firm resolve to faithfully pursue its vision of progress of Korea anchored on science. The Academy's missions are:

The Academy of Sciences Malaysia

http://www.akademisains.gov.my

The Academy of Sciences Malaysia (ASM) came into force on 1 February 1995 and was established under the Academy of Sciences Act 1994. ASM strives to be the 'Think Tank' of the nation for matters related to science, technology and innovation. ASM brings together the experts in all areas of scientific, engineering and technological endeavour to address issues of national and global importance. The crucial role of ASM extends beyond providing leadership in science and technology. ASM envisions that all levels of society reap the benefit of S&T and sustained national development.

IAP – the global network of science academies

http://www.interacademies.net

IAP is a global network of the world's science academies, launched in 1993. Its primary goal is to help member academies work together to advise citizens and public officials on the scientific aspects of critical global issues.

IAP is particularly interested in assisting young and small academies achieve these goals and, through the communication links and networks created by IAP activities, all academies will be able to raise both their public profile among citizens and their influence among policy makers.

The Association of Academies and Societies of Sciences in Asia

http://aassa.asia

The Association of Academies and Societies of Sciences in Asia (AASSA) was established in 2012 through the merger of the Association of Academies of Sciences in Asia (AASA) and the Federation of Asian Scientific Academies and Societies (FASAS) to promote solidarity and cooperation among the scientific and technological academies in Asia and Australasia and to play a central role in cooperative efforts for further developing the region through science and technology. AASSA currently has a total of 35 member academies representing 30 countries.

The International Science, Technology and Innovation Centre (ISTIC) for South-South Cooperation Under the Auspices of UNESCO

http://istic-unesco.org

The creation of the International Science, Technology and Innovation, Centre for South-South Cooperation under the auspices of UNESCO (ISTIC) is a follow up of the Doha Plan of Action which has been adopted by the head of States and Government of the Group of 77 and China, during the meeting in Doha, Qatar, from 12-16 June 2005 on the occasion of the Second South Summit of the Group of 77.

The Summit urged UNESCO to develop and implement a programme for South-South cooperation in science and technology with the objective of facilitating the integration of a developmental approach into national science and technology and innovation policies, capacity building in science and technology through providing policy advice and exchange of experience and best practices, and creating a problem solving network of centres of excellence in developing countries as well as supporting the exchange of students, researchers, scientists and technologists among developing countries.

ISTIC will act as an international platform for South-South cooperation in science, technology and innovation and make use of the network of the G77 plus China and the Organization of the Islamic Conference (OIC). The overall goal of ISTIC is to increase the capacity for management of science, technology and innovation throughout developing countries. ISTIC Secretariat is hosted by the Academy of Sciences Malaysia (ASM) for five years before making ISTIC an autonomous organization.

KAST-ASM-IAP INTERNATIONAL WORKSHOP

SCIENCE LITERACY: Science Communication & Science Outreach

June 12-13, 2014

Magnolia Room, Hoam Faculty House, Seoul National University

Seoul, Korea.