




International Conference on the Employability of Science Graduates in the Developing World

Department of Geographical and Life Sciences
Canterbury Christ Church University

14th and 15th February 2011

Conference PowerPoints

 <p>BIS Department for Business Innovation & Skills</p> <p>Employability of Science Graduates in the Developing World</p> <p>Canterbury Christ Church University, 14th-15th February, 2011</p>  <p>14 February 2011 David Andrews, Canterbury Christ Church University</p>	 <p>The Background</p> <ul style="list-style-type: none"> Similar difficulties experienced by science departments in Africa <ul style="list-style-type: none"> Lack of resources, brain drain, etc. Little communication between departments in neighbouring countries. <ul style="list-style-type: none"> Travel is expensive. Limited opportunities for science graduates. <ul style="list-style-type: none"> Few industries requiring scientists Difficult for entrepreneurs to start their own companies
 <p>The Project</p> <ul style="list-style-type: none"> The Establishment of a Network of University Science Departments in Southern and Eastern Africa <ul style="list-style-type: none"> University of Zambia (UNZA), Lusaka, Zambia University of Dar Es Salaam (UDSM), Tanzania Chancellor College, University of Malawi, Zomba, Malawi Canterbury Christ Church University (CCCU), Canterbury, UK Funded by Education Partnerships in Africa (EPA) <ul style="list-style-type: none"> Funded by Department of Business, Innovation and Skills Administered by the British Council 	 <p>Map of area</p> 
 <p>The Universities</p> 	 <p>Aims of Project</p> <ul style="list-style-type: none"> Establish ways of improving the employment prospects of science graduates in the three African countries Increase co-operation between the members of the science departments in the four universities Establish a continuing network of science departments Investigate expanding the network to other countries
 <p>Achievements of Project</p> <ul style="list-style-type: none"> The establishment of a network of science departments <ul style="list-style-type: none"> New friendships and associations Three very successful workshops in Zambia, Tanzania and Malawi <ul style="list-style-type: none"> Discussions on increasing the employability Website set up for communication <ul style="list-style-type: none"> Useful for publicising new grants, etc. This conference <ul style="list-style-type: none"> Bringing the ideas together 	 <p>The Workshops</p> 




Future of Network

- ▶ Continue work on employment
 - ▶ Keep website going
 - ▶ More consultation with employers
- ▶ Look for more funding
 - ▶ Possibility of EU grant
 - ▶ Money for equipment?
- ▶ Expand the network
 - ▶ Possibly Makerere University & University of Zimbabwe
- ▶ Research cooperation


This conference

- ▶ Discuss problems of employability of science graduates in developing world
 - ▶ Bring ideas from workshops and elsewhere in developing world
- ▶ Compare with the situation here
 - ▶ Careers advisers, employers, new graduates, entrepreneurs etc.
- ▶ Exchange ideas on improving the employability
 - ▶ Bring new approaches to helping science graduates

The Department of Geographical and Life Sciences – Professor Peter Vujakovic, Head of Department

International Conference on the Employability of Science Graduates in the Developing World
The Department of Geographical and Life Sciences
 Prof. Peter Vujakovic
 Geographical and Life Sciences



Geographical and Life Sciences


- Why is STEM important to the region?
- Science at Canterbury Christ Church University: the student experience and employment
- STEM Initiatives: research informed teaching (RIT)

Why training in STEM matters more than ever!
The economy and the intellectual life of the region

- Pfizer (Sandwich)
- Wye College (Imperial College)
- Shell Research, Sittingbourne

Why choose a degree in the Geographical and Life Sciences?

- Relevant Degree Programmes:
varied and practical courses in applied disciplines
- Skills development:
science technologies and skills, team-work, field-experience, problem solving, and the development of key employment skills
- Varied career opportunities:
e.g. in Biosciences, ecology, engineering, Town and Country Planning, Geographic Information Systems (GIS), environmental management, teaching...

Programmes

- BSc Geography and Cert. in GIS
- BSc Urban and Regional Studies

BSc Programmes: Sciences Framework

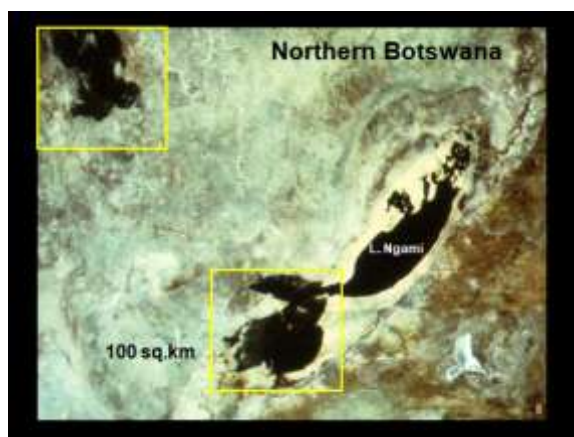
- Animal Science
- Biosciences
- Ecology and Conservation
- Environmental Biology
- Integrated Science
- Environmental Science
- Plant Science

Science with Secondary Education (QTS)
 MPhil/PhDs in Biological Sciences and Geography

New technologies: data collection and problem-solving

- Biosciences: molecular and microbiology
- Bioinformatics
- Geographical information systems (GIS)
- Environmental monitoring





Application of key skills to environmental management



Kathryn Pike, BSc Geography

I now work in the field of flood risk management as a Development Control Officer for the Environment Agency... There are close links between my work and topics studied for my degree.

I use GIS to help analyse flooding data and draw on my technical knowledge of the interaction between climate, the hydrological cycle and the built environment... finally, as I need to visit development sites as part of my work, the field working skills developed through the degree have given me the confidence to undertake the dynamic risk assessments that are needed for every site visit.

Application of key skills pharmaceutical sciences



Tony Manning, BSc Biosciences

After completing my Biosciences degree I worked for a small pharmaceutical company in Sittingbourne as a Formulation Scientist researching and developing new medicines and manufacturing drugs for clinical trials.

After just over a year I started to look around for a new challenge and now work for Pfizer in Sandwich as a Formulation Scientist in their Drug Safety Research and Development department.

Many thanks for everything that Christ Church did for my education, without it I certainly wouldn't be where I am now.

Application of key skills to environmental/engineering services



I am working within the Ecology department of Jacobs Engineering as a GIS Graduate Engineer. Jacobs is one of the world's largest and most diverse providers of professional and technical services.

I am currently making use of ESRI GIS systems to locate possible sites for wind farms within Northern Ireland.

The skills and techniques learnt through the geography course at Canterbury Christ Church University have given me a sound base knowledge on which to build my career.

Pat Rickerby, BSc Geography

The student experience and league tables: e.g. The National Student Survey (NSS)



BE HEARD
www.thestudent survey.com



CCCU - only UK geography programme* to get 100% overall satisfaction rating from its students 3 years in a row

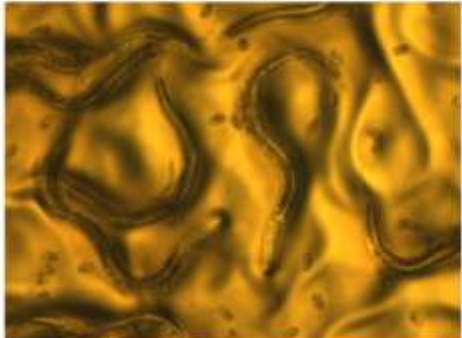


*2007, 2008, 2009 - Human and Social Geography - see unistats.com


Guardian Universities league table - Biosciences: best result in CCCU 75.6 out of 100 (2010)

RIT project: e-learning to support development of an undergraduate research culture in Sciences

- enhance students' understanding of the role of research in science disciplines,
- develop their ability to carry out research as part of a community, and
- make explicit the benefits of engaging in research activities, particularly how it can improve their employability prospects.



<p style="text-align: center;">Research in the Department of Geographical and Life Sciences</p> <p style="text-align: center;">Dr Simon Harvey</p>	<p style="text-align: center;">Worms?</p> 
<p style="text-align: center;">Worms?</p> 	<p style="text-align: center;">Undergraduate Research in the Department of Geographical and Life Sciences</p> <p style="text-align: center;">Dr Simon Harvey</p>
<p style="text-align: center;">We've been doing this for a long time...</p> <p><i>J. Zool., Lond.</i> (1991) 225, 665–670</p> <p style="text-align: center;">The diet of <i>Pipistrellus pipistrellus</i> during the pre-hibernation period</p> <p style="text-align: center;">L. B. THORPE*, Department of Science, Christ Church College, Canterbury, Kent</p> <p style="text-align: center;"><i>Reproduction</i></p> <p>All British bats are insectivorous and insect abundance varies with, and depends on, climatic conditions. Scarcer densities of insects may provide sufficient food for bats and other insectivores, but in times of reduced densities in the pre-hibernation period, competition between bats and other</p> <p>*Present address: David H. Institute of Conservation and Ecology, The University, Canterbury, Kent CT3 7NK</p>	<p style="text-align: center;">We've been doing this for a long time...</p> <p><i>Animal Cells Tissues</i>, 2002, 28, 237–242</p> <p style="text-align: center;">Karyotype analysis of <i>Oreochromis mortimeri</i> (Trewavas) and <i>Sarotherodon melanotheron</i> (Rüppell)</p> <p>S.C. Harvey, S.F. Powell, H.H. Simons, B.J. McLachlan & D.J. Preece Institute of Ag</p> <p>Key words: chromosome evolution, chromosome fusion, hybridisation, cytoplasmic conflict, Tilapia</p>
<p style="text-align: center;">and we're good at it...</p> 	<p style="text-align: center;">Research in the Department</p>

<p style="text-align: center;">Research in the Department</p> <ul style="list-style-type: none"> • Research active in both science and education 	
<p style="text-align: center;">Research in the Department</p> <ul style="list-style-type: none"> • Research active in both science and education • Strong links between our research and our teaching 	<p style="text-align: center;">Research in the Department</p> <ul style="list-style-type: none"> • Research active in both science and education • Strong links between our research and our teaching • Strong links to external collaborators e.g. British Cartographic Society, Natural History Museum, Kew Gardens, Natural England, Bristol University, Wageningen University, University of Campinas, Wildwood, Howletts and Port Lympne
<p style="text-align: center;">Why does this matter?</p>	<p style="text-align: center;">Why does this matter?</p> <ul style="list-style-type: none"> • Research and inquiry are central to science
<p style="text-align: center;">Why does this matter?</p> <ul style="list-style-type: none"> • Research and inquiry are central to science • All students need to develop core research skills • Most able students can be stretched <ul style="list-style-type: none"> - Benefits to students - Benefits to staff 	<p style="text-align: center;">Individual study</p> <ul style="list-style-type: none"> • Compulsory for all single honours students <ul style="list-style-type: none"> - Timing - Format

Individual study

- Compulsory for all single honours students
 - Timing
 - Format
- This gives students opportunities
 - Presenting
 - Publishing
 - Contacts
 - Groundwork

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Presenting

- James Green, Simon Harvey . Population growth and dauer larvae development in *Caenorhabditis elegans*. Evolutionary Biology of *Caenorhabditis* and other nematodes meeting, 5-8 June 2010, Hinxton, Cambridge, UK.
- Oliver George, David Lisgarten, Joanna Fell, Emilia Bertolo, Extraction and Purification of *Eranthis hyemalis* (Winter Aconite) Tuber Lectin using Thiourea as an Antioxidant. Chemistry and Biology of Peptides 2009 Symposium, organised by the Royal Society of Chemistry Protein and Peptide Science Group, 9 July 2009, Oxford.
- Ruth Shave, Samantha Dunn, Mark Kingston Jones & Rena Boothe. Investigation into the effect of feeding enrichment on *Presbytis comata*. Presented at: The Ninth International Conference on Environmental Enrichment held at Paignton Zoo, UK, 31 May 2009.

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Publishing

- Ruth Clarke (in press) Hydroseral habitat requirement of *Segmentina nitida* (O.F. Muller, 1774) the Shining Ramshorn Snail- an endangered British species - *Bioscience Horizons*
- Lucy A. George, Emilia Bertolo and Carlos Lodeiro (2010) N,N'-(1,3-Phenylenebis[methyleneoxy-2,1-phenylene(Z)methylidene)]bis[1-(1-naphthyl)methanamine], *Molbank* 2010(4), M702, doi:10.3390/M702.

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Individual study

- Compulsory for all single honours students
 - Timing
 - Format
- This gives students opportunities
 - Presenting
 - Publishing
 - Contacts
 - Groundwork
- Assessment is very differentiated

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Undergraduate research is important and valuable...

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Undergraduate research is important and valuable...

Thanks to Staff and Students of the Department and apologies to those whose work I have not mentioned.

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 <p>University of Dar es Salaam</p> <h2>SCIENCE EMPLOYMENT IN TANZANIA AND THE DAR ES SALAAM WORKSHOP</h2> <p>Dr James Mdoe and Dr Cuthbert Nahonyo, University of Dar es Salaam, Tanzania</p> <p>Paper Presented at the International Conference on the Employability of Science Graduates in the Developing World</p> <p>Tuesday, February 21, 2018</p>	<h3>Location</h3> 
<h3>INTRODUCTION</h3> <ul style="list-style-type: none"> □ Tz recognizes the role of science as a powerful instrument for socioeconomic development. □ Science has made major contributions, including: <ul style="list-style-type: none"> • Increasing productivity thru improved methods of production. • Boosting exports by improving quality of products and reducing costs of production • Improving food security thru reliable markets for their products. <p>Tuesday, February 21, 2018</p>	<h3>INTRODUCTION</h3> <ul style="list-style-type: none"> • Increasing income generating opportunities for small entrepreneurs in rural and urban areas. • Improving conservation techniques for sustainable utilisation of natural resources and environment, etc. <p>To this end, Tz has thus put in place policies, regulatory and institutional frameworks for oversight and development of science.</p> <p>Tuesday, February 21, 2018</p>
<h3>INTRODUCTION</h3> <h4>Policy/Regulatory/Institutional Frameworks</h4> <ol style="list-style-type: none"> 1. National Science and Technology Policy (1985; Revised in 1995) <ul style="list-style-type: none"> □ Major objectives of STP: <ul style="list-style-type: none"> • Determine strategies for application of S & T development in Tz. • Promote S&T as tools for: <ul style="list-style-type: none"> □ Economic development, □ Improvement of physical and socioeconomic livelihoods. <p>Tuesday, February 21, 2018</p>	<h3>INTRODUCTION</h3> <ul style="list-style-type: none"> • Promote S&T self-reliance in support of economic activities thru improved research capabilities. • Promote and encourage public/private sectors in developing S&T. • Promote active participation of women in S&T. • Establish and/or strengthen national S&T institutions <ol style="list-style-type: none"> 2. Higher Education Policy (HEP) (1998) <ul style="list-style-type: none"> • Gender imbalance in education: science vs liberal arts • Under-funding and poor provision of key inputs • Expanding university enrolment; • Being responsive to market demands in training enterprise; • Improving coordination and rationalization of programmes and enrolment. <p>Tuesday, February 21, 2018</p>
<h3>INTRODUCTION</h3> <ol style="list-style-type: none"> 3. Regulatory Frameworks <ul style="list-style-type: none"> □ Scientific and Technical Advisory Committee on S&T to advise President □ Investment Promotion and Protection Act of 1990. □ Commission for Science and Technology (COSTECH) Act No. 7 of 1986 w/h provides for establishment of National Centre for Development and Transfer of Technology (NCDTT) <ul style="list-style-type: none"> • NCDTT tasked with establishing modalities for rationalising acquisition, evaluation, choice, coordination, and development of technology. <p>Tuesday, February 21, 2018</p>	<h3>INTRODUCTION</h3> <ul style="list-style-type: none"> □ Plans put in place to achieve national goal as S&T as per: <ul style="list-style-type: none"> • Vision 2025 • MDGs • National Strategy for Growth and Reduction of Poverty (NSGRP) <p>Tuesday, February 21, 2018</p>

INTRODUCTION

4. Institutional Framework

- Ministry of Communication, Science and Technology (2008) (formerly Ministry of Higher Education, Science and Technology-1992) established to oversee matters related to S&T.
- COSTECH established in 1986 to oversee matters related to scientific research and innovation
 - More Universities
 - Technology Institutes

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INTRODUCTION

- Various Centres of Research and Service
- Professional Associations
 - Enhancing scientific culture, public awareness and overall progress in S&T.
 - Taking active role in popularising science through seminars, workshops, lectures, films and publications.

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INTRODUCTION

Developing Science Career in Tz

- With such elaborate policy/regulatory/institutional framework backed by strong political will, still there are **WORRIES and CONCERNS** because of the
 - Declining students interest in science as reflected in low enrolment at secondary school and University levels.
 - Declining employment opportunities in public/private sectors despite expansion of the latter following liberalisation of trade and investment incentives
 - Declining standard of science teachers leading to poor performance in science subjects at national exams.
- Hence, this presentation attempts to examine issues in question, challenges of science as career and explore ways for mitigating the situation in Tz.

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STATUS OF SCIENCE AS A CAREER IN Tz

- There has been a general decline in employment opportunities due to:
 - Govt ban on recruitment in public institutions in 1990's. Despite lift of ban, situation has not improved significantly
 - General preference for recruiting graduates with experience and specialisations in certain fields, some of wh may not be offered by local institutions
 - Declining Govt funding for research/academic institutions, making it difficult to expand recruitment, produce adequately prepared scientists

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STATUS OF SCIENCE AS CAREER IN Tz

- Unfavourable employment conditions
 - Salary package/benefits
 - Working environment
 - Remoteness
 - Social services
 - Education
 - Recreation
 - Healthcare
 - Prospects for career advancement
 - Social issues
 - Lack of employment for spouses

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- In other words, why seek and pursue science career when there are more "lucrative" opportunities in job market, e.g.:

- Law
- Public/business administration
- Economics
- Sociology
- Politics

- Put otherwise, does pursuing science career pay in Tz? May be or may be not!
- But judging by numbers of PhD/MSc scientists opting for politics or civil service appointments, science career perhaps no longer pays.

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In general, science has lost its original prestige, w/h as trainers need to restore

Need to address following problems:

- Improve university curricula and programmes
- Improve gender balance in science
- Increase public expectations of science in improving their quality of life
- Promote synergies b/w researchers and education
- Promote political understanding of situation regarding scientists in Tz.
- Enhance strategic partnership b/w industry and academia
- Increase mutual trust b/w private sector and academia

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ADDRESSING CHALLENGES

- Breaking this vicious cycle requires:
 - More funding for teacher training at university and on job (e.g. STHEP).
 - Smaller classes (i.e. more funding for primary and secondary education (e.g. SEDP, HEDP).
 - More rigorous selection of students for B.Sc. (Ed.) with good grades;
 - Selection of undergraduate teachers, wh is not only based on grades obtained in final university exams but also on ability to transmit, mentor, and guide students. Science teachers at school should be best advocates of scientific career for their more gifted students.

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ADDRESSING CHALLENGES

- Parents should also be involved by spending more time with their children particularly on activities related to science and technology.
- High school education should involve study of complex and interdisciplinary systems, with deeper understanding of concepts that are behind them.
- Experimental work should be integral part of science education at all levels of basic education, with reasonably equipped laboratories.
- Making science education at school more interesting by inviting researchers from industry and academia to talk about their work.

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ADDRESSING CHALLENGES

Improving gender balance in science

- One key challenge Tz faces is encouraging girls to major in science subjects. As technology continues to drive world of business, those challenged in science and mathematics will be left behind.
- Note: low representation of women in science majors at undergraduate level is inherited from secondary school level, where girls do not participate in science subjects and related activities as much as boys.

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ADDRESSING CHALLENGES

- To address gender imbalance: encouraging girls in pursuit of science career, teachers should:
 - Run well-equipped, organised and stimulating classes;
 - Use non-sexist language (e.g. giving examples of women scientists)
 - Stress creativity and basic skills;
 - Provide career information;

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ADDRESSING CHALLENGES

- Ask girls to assist with lab demonstration and not as mere observers.
- Concentrate on scientific applications, because girls generally do not use scientific gadgets, as boys do. Girls might become more interested and engaged when technology is discussed in terms of its usefulness for problem solving.

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ADDRESSING CHALLENGES

Improving University Curricula and Programmes to Attract Science Students

- Developing science education with emphasises teaching of scientific and technological developments in their cultural, economic, social and political contexts.
- Such contexts enable students engage in issues pertaining to impact of science on everyday life and make responsible decisions about how to address such issues

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ADDRESSING CHALLENGES

- At university level, promote careers in science with special focus on women who are currently under-represented in many areas.
- This requires:
 - Interdisciplinary approach to science, where there is integration of economic, ethical, social and political aspects of scientific and technological developments in science curriculum.
 - Engaging students in examining variety of real world issues and linking scientific knowledge in such realities with impact on society. E.g.

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ADDRESSING CHALLENGES

- Enabling students formulate critical understanding of relationship btwn science, society and technology.
- Developing students' capacity and confidence to make informed decisions, and to take responsible action to address issues arising from impact of science on their daily lives

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ADDRESSING CHALLENGES

- To broaden students understanding of science, and prepare them for active and responsible Tzns, scope of science has to go beyond learning about scientific theories, facts and technical skills.
- Hence, science must aim at equipping students with understanding and grounding scientific and technological developments in following contexts:
 - Cultural;
 - Environmental;
 - Economic;
 - Political; and
 - Social contexts

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ADDRESSING CHALLENGES

- Hence, science should aim at developing following skills and perspectives:
 - Social responsibility,
 - Critical thinking and decision making,
 - Ability to formulate sound ethical and moral decisions about issues arising from impact of science on our daily lives; and
 - Knowledge and confidence to debate, express opinions and take responsible action in addressing real world issues in science
- Need for degree of flexibility in integrating other curricular areas such as history, geography and sociology in science curricula:

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ADDRESSING CHALLENGES

Improving public expectations of science in bettering their quality of life

- Science has failed to demonstrate its expectations largely due to lack of effective communication b/w scientists and public, wh has resulted in ambivalent attitudes towards scientists in certain scientific areas.
 - Most of public admit that scientific progress and technological innovation generally increase their quality of life.
 - Thus, it is responsibility of scientists to explain to public, in simple language, what contribution science has made to many aspects of their daily life so that they do not take it for granted.

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ADDRESSING CHALLENGES

- Scientists ought to make it possible to communicate effectively with public. Society will not support scientific research unless it understands its importance. Pertinent questions include:
 - What is public perception concerning visibility and recognition of science career?
 - Is it associated with certain prestige and social standing?
 - Do scientists enjoy social acceptance and prestige?
 - Is scientific research divorced from public concern?

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ADDRESSING CHALLENGES

- Note that once upon time it was considered sensible to pursue scientific studies and research in applied fields, e.g.
 - Engineering, agriculture, medicine where potential usefulness and relevance of research results can be easily recognised by anybody with or without strong educational background.
- Does public understand that applied research is key to innovation and technological development, and their critical role fostering economy.

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CONCLUSION

- In order to improve status of science as career and thereby improve science employment, there is a need to address root causes of problems:
 - Improve university curricula and programmes
 - Restore public expectations of science in improving their quality of life
 - Promote reciprocal relationship b/w research and education
 - Promote political understanding of scientists and their role in society.
 - Enhance strategic partnership between industry and academia
 - Increase mutual trust b/w private sector and academia

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A Workshop on "Improvement of the Profile of Science as a Career" 26-27 July, 2010, University of Dar es Salaam, Tanzania



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Workshop Objectives

- To discuss and exchange experiences about the status of science as a career in our countries.
- To provide a forum for employers, employees and academicians to share their expectations, constraints and visions in the performance of science graduates at work places.
- To forge links between neighboring African institutions in finding ways of improving science teaching and increase its relevance to local conditions.

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Resolutions to the issues addressed in the workshop

- Education campaign to dispel the myth that science is difficult (scientists, parents, teachers)
- Increase investment in procurement and maintenance of scientific equipment and materials
- Enhance investment in human resource development i.e. Instructors and technicians
- Investment infrastructure to cater for increasingly large classes
- Improvement of conditions of service for scientists
- Lobby for special considerations in procurement and disposal of scientific materials, equipments and supplies
- Encourage regional networks of scientist

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