Gulf Research Centre Cambridge
Knowledge for All

Workshop 9

Science & Technology Education, Research and Innovation in GCC Countries (Sponsored by Kuwait Foundation for the Advancement of Sciences)

Workshop Directors:

Afreen Siddiqi
Kennedy School of Government
Harvard University
United States of America
Email: afreen_siddiqi@hks.harvard.edu

Laura D. Anadon
Kennedy School of Government
Harvard University
United States of America
Email: laura_diaz_anadon@harvard.edu

David P. Hajjar
Weill Medical College &
Graduate School of Medical Sciences
Cornell University,
United States of America
Email: dphajjar@med.cornell.edu

Abstract

This workshop will provide a forum for discussing how science and engineering education, research, and innovation can be strengthened in the GCC countries. The participants will review its existing status, identify emerging challenges and opportunities, and discuss how both policy and private enterprise may be leveraged for seeding and sustaining effective initiatives. The workshop will focus on exploring the role and impact of international partnerships, opportunities for regional cooperation

within GCC, and strategies for local capacity building in science and technology research and innovation.

Workshop Rationale

Science and engineering education, research, and development are recognized as important drivers for economic progress, national competitiveness, and societal well-being. Policy makers in the GCC countries have noted the need for diversifying their economies in order to prepare for a future where earnings from fossil fuel exports may decline (Saadi 2012). A key element of a broader strategy for future economic diversification includes development of local capacity in science, technology and innovation (STI) to help address regional challenges in sustainable use of resources – related to energy, water, and food security (Siddiqi and Anadon 2011) – and to create new employment opportunities.

It is recognised by regional leaders that financial support alone is not sufficient for strengthening STI (Zewail and Zewail 2013). While state support through strong financial resources and investment is an important element towards promoting STI, other important factors such as economic and market forces and social incentives for participation also play pivotal roles in sustaining and advancing national STI. Furthermore, different elements of learning (education), knowledge creation (research), invention, entrepreneurship, and societal adoption and use need to systemically come together to form an eco-system (Berger 2013) wherein STI can function and provide its desired benefits of economic development, job creation, and societal welfare.

Starting from the previous decade, in the GCC countries, new institutions have been established, existing institutions have initiated structural and strategic reforms, and education and research institutions have drafted new visions and plans. Some recent examples of such institutions and initiatives include King Abdullah University of Science and Technology (KAUST) in Saudi Arabia, Masdar Institute in UAE, Education City in Qatar, and Sabah Al-Salem University City – of Kuwait University – in Kuwait.

This workshop aims to provide a forum for academic researchers, practitioners, and policy makers for discussion and debate geared towards two complementary goals: First, to examine the current state and existing challenges in local science, technology, and innovation (STI); second, to identify opportunities and pathways (that include both policy and private initiatives) for future improvement in building local capacity in STI. This workshop will thus seek to build a systemic understanding of education, research, and national innovation systems in the GCC countries, as well as to identify strategic options, sensitive to local needs, for policy makers to advance STI in the region.

Workshop Description

We will focus the workshop on areas of inquiry that are unique and relevant to the GCC region. Some of the primary topics that we seek to explore in detail are: 1) the role of international partnerships in research and higher education in the GCC, 2) improvement

of regional cooperation among the GCC states, and 3) incentives for enhancing local participation in STI.
International collaborations are recognised as an important new phase in scientific research (Adams 2013). All GCC countries have sought to establish partnerships at various levels with foreign institutions in education and research over the past several years. The collaborative engagements consist of different types, including establishment of foreign campuses of universities based in the US and Europe, joint-degree programmes and research centres, and exchange programmes of students and researchers (Hajjar and Gotto 2013). In this workshop, we will seek to discuss the unique regional context and its implications on the structure and nature of international partnerships. A special focus will be on identifying models of collaboration, and discussion of why some have performed better, and how others may be improved. The discussion will seek to elicit lessons learned from the past and existing programmes in the region to inform planning and design of future initiatives.

While international links are growing in the GCC, there are indications of low and in some cases non-existent collaboration between regional institutions. A key focus in the workshop will be to explore how regional cooperation between institutions located in the GCC countries can be enhanced so that common important issues of sustainability, societal welfare, and economic diversification are better addressed. The workshop will seek to identify the causes for the current state (of lack of interactions), and to investigate how scientific and technological cooperation can be increased so that shared learning and enterprise can spur research and innovation in the region for all partners.

Another key topic that we aim to discuss in the workshop is the level of participation of local (citizens) in programmes of higher scientific and technical education, research, innovation and entrepreneurship. A critical mass of locally trained and high quality students, faculty, innovators and entrepreneurs is needed to sustain and advance STI in the region (Adams et. al. 2011). Some of the areas we seek to investigate include identifying existing barriers for local participation in STI, incentive structures for attracting local talent, mechanisms for increasing women's participation in STI beyond education, and strategies for promoting societal appreciation and recognition of the role of STI in national development and progress.

Anticipated Papers

The research literature on science, technology, and innovation is largely focused on Western and East Asian regions. There is a dearth of systemic understanding of the existing state of STI in the Middle East as well as a need for investigating how STI can be initiated and sustained in the region with its particular historical, geographical, cultural, social, and environmental context. Through this workshop, we aim to contribute towards increasing the understanding of the unique challenges and opportunities in STI in the GCC countries in the realms of both policy and practice.

Some specific areas in which we will anticipate papers include (but are not limited to):

1. Assessment of education and science policies in the GCC states and their impacts on local STI

2. Role of international research collaborations in initiating and advancing education and research in the GCC

3. Lessons learnt from international education and research partnerships in the GCC

4. Challenges and opportunities in regional cooperation within the GCC in science and technology education, research, and innovation

5. Socio-cultural incentives, barriers, and opportunities for local capacity building in STI

6. Role and impact of digital learning and online education in improving access and quality of engineering, mathematics, and science education in the GCC

7. Technological innovation and entrepreneurship challenges and opportunities in the GCC

Workshop Director Profiles

Dr. David P. Hajjar received his Ph.D. in 1978 from the University of New Hampshire, and then became a post-doctoral fellow at both Cornell University Medical College and the Rockefeller University. In 1981, he joined the Medical College faculty, and was appointed a full tenured professor in 1989 – one of the youngest in the history of the Medical College. In 1997, he was appointed Dean of the Cornell University Graduate School of Medical Sciences and was the H. T. Rhodes Distinguished Professor of Biochemistry and Genetics. At that time, he became a member of Cornell Medical College's Board of Overseers. In 2000, he was appointed Vice Provost of the Faculty. In 2003, he was appointed Executive Vice Dean at the Medical College, and in 2007, Executive Vice Provost.

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Dr. Hajjar is a Fellow of the Royal Society of Medicine and a Fellow of the AAAS. Dr. Hajjar has received the prestigious Federation of American Societies of Experimental Biology (FASEB)'s Warner Lambert/Parke Davis Award in 1991 for his discoveries on the role of herpes viruses in the pathogenesis of vascular disease. In 2003, Dr. Hajjar received the Chugai Award, which is presented to a member of the American Society of Pathologists (FASEB) who has a distinguished scientific career, who exhibits both excellence in mentoring and education and outstanding research achievements in experimental and investigative pathology. Dr. Hajjar has trained over 30 students and postdoctoral fellows. He has also been the recipient of several other awards from the American Chemical Society, the American Heart Association, and the Andrew Mellon Foundation.

In February 2011, the Fulbright Commission, with approval of the US State Department, named Dr. Hajjar to one of its premier senior scholarship programmes – the Fulbright Specialist Program. As a Fulbright awardee, Dr. Hajjar worked in Qatar in concert with

the dean of Weill Cornell Medical College–Qatar, and the dean of the College of Arts and Sciences of Qatar University, to strengthen the biomedical research and educational enterprise of Qatar University's College of Arts and Sciences and to develop opportunities for collaborations between Weill Cornell Medical College–Qatar and Qatar University. In 2013, he accepted a position as a senior fellow at the Harvard-Kennedy School of Government to study diplomacy in the science, technology, and public policy programmes in order to further his work on higher education in the Middle East.

Dr. Laura Diaz Anadon is Assistant Professor of Public Policy and Associate Director of the Science, Technology, and Public Policy Program in the Kennedy School of Government at Harvard University. She is also a member of the board of the Belfer Center for Science and International Affairs. Her research focuses on energy- and environment-oriented technological progress and seeks to: identify and quantify the diverse benefits that derive from policies designed to promote it; map the complex factors – — including but not limited to policies – that contribute to it; and create tools for policymakers and analysts to manage the systemic uncertainties that accompany it.

Dr. Anadon also studies the coupling between water and energy systems and its implications and the effectiveness of innovation institutions internationally. Laura is on the advisory board of the project on "Accelerating Energy Innovation" at the International Energy Agency and has worked as a consultant for various organisations (e.g., Climate Strategies on a World Bank project). In addition to her work on systems analysis in energy and technology policy, she has published in chemical engineering and nuclear magnetic resonance journals, carried out process engineering research projects at DuPont and Bayer Pharmaceuticals, collaborated extensively with Johnson Matthey Catalysts, and worked as a financial consultant for banks on credit risk models for financing technology projects. She holds a Ph.D. in Chemical Engineering from the Magnetic Resonance and Catalysis Group at the University of Cambridge (UK), a Master's in Public Policy from the Harvard Kennedy School, and a Master's in Chemical Engineering from the University of Manchester (UK). She has also studied and worked on research at the University of Stuttgart (Germany).

Dr. Afreen Siddiqi is a Visiting Scholar with the Science, Technology, and Public Policy Program at the Belfer Center for Science and International Affairs in the Kennedy School of Government, Harvard University. She is also a Research Scientist in the Engineering Systems Division at the Massachusetts Institute of Technology. Dr. Siddiqi received her Ph.D. in Aerospace systems, a Master's degree in Aeronautics and Astronautics, and a Bachelor's degree in Mechanical Engineering, all from the Massachusetts Institute of Technology. Her work is at the intersection of technology, management, and policy. Her research is centred on natural resources planning and education & human capacity building in transitioning economies.

Dr. Siddiqi's current research is on the technical and policy dimensions of global change driven by emerging challenges of education, research, and innovation capacity and issues of natural resource management for water, energy, and food security. She has been studying national systems of education, research, and innovation in Kuwait, UAE, Qatar,

and Saudi Arabia. Additionally, she is currently engaged in quantitative modeling and analysis of water sector planning in Jordan, hydropower development and agricultural production in Pakistan, and investigation of the water, energy, food nexus in the Middle East and North Africa (MENA) region.

Her past work has focused on modeling and analysis of system architecture, performance, management, and logistics of a wide range of complex socio-technical systems that include space exploration and urban infrastructure. She has authored over 45 publications in leading journals of policy, technology, and engineering. She has also taught at the undergraduate, graduate, and professional levels in the US and Switzerland, and has worked with major corporations (Schlumberger, National Instruments, BP, Aurora Flight Systems, Orbital Sciences) and government institutions (Jet Propulsion Lab, Draper Labs, Kennedy Space Center).

Selected Readings

Adams, J., K. Christopher, P. Pendlebury, D. Hook, and J. Wilson. "Exploring the Changing Landscape of Arabian, Persian, and Turkish Research." Global Research Report, Thomson Reuters, 2011.

Adams, J. "The Fourth Age of Research." Nature 497, May 30, 557-560.

Berger, S. Making in America: From Innovation to Market (Cambridge, USA: MIT Press, 2013).

Hajjar, D., and A.M. Gotto. "Launching of an American Medical College in the Middle East: Educational Challenges in a Multicultural Environment." International Journal of Higher Education, 2, no. 2 (2013): 67-75.

Saadi, D. "Gulf States Move to Diversify Income Sources." The New York Times, July 18, 2012. (Available at: http://www.nytimes.com/2012/07/19/world/middleeast/gulf-states-moveto- diversify-income-sources.html)

Siddiqi, A. and L.D. Anadon, L. D. "The Water-Energy Nexus in Middle East and North Africa." Energy Policy 39 (2011): 4529-4540.

Zewail, A. and M. Zewail. "Science for the 'Haves'," Angewandte Essays, 52 (2013): 108-111.