



Science Education in the Muslim World

Conference Room 1, College of Islamic Studies

Hamad Bin Khalifa University, Doha

9-10 December 2017

Saturday December 9, 2017

9.30 -10.30 AM: INTRODUCTORY SESSION

Q NRF Representative

Emad Shahin (CIS-HBKU Dean)

Anila Asghar (Co-Director of the McGill Center for Islam and Science)

Alexandre Caeiro (CIS-HBKU)

10.30 AM – 12.30 PM: PANEL 1, DAY 1: Islam and Science: Historical Perspectives

Sally Ragep (McGill): An Historical Overview of Science Education in the Islamic World

Ayman Shabana (SFS Georgetown – Qatar): Science and Religion in Modern Works of *Tafsīr*

Salman Hameed (Hampshire College): Sayyid Ahmad Khan's conception of Science & Religion and his accommodation of Biological Evolution

12.30 – 1.30 PM: Lunch Break

1.30-3.30 PM: PANEL 2, DAY 1: International Perspectives on Science Education

Souma BouJaoude (AUB): Educational, Cultural, and Religious Factors Influencing Science Education in Arab States

Zoubeida Dagher (Delaware): Proposing a Framework to Navigate Tensions between Science and Religion in Science Education

Nasser Mansour (University of Exeter): Science, religion, scientists and pedagogy: The teachers' perspectives vs. the Islamic Perspective

3.30 – 4 PM: Coffee Break

4-6 PM: PANEL 3, DAY 1 (OR DAY 2): The State of Science Education in the Muslim World

Anila Asghar (McGill): Research on Current Issues in Science Education in Muslim Countries

İhsan Fazlıoğlu (İstanbul Medeniyet Üniversitesi) History as a understanding of the future: On the historical experience of science education in Turkey

Mustafa Yavuz (İstanbul Medeniyet University): An Overview on History of Science Education in Turkey

7 PM: Conference Dinner (participants only)

Sunday December 10, 2017

10.30 -12.30: PANEL 4, DAY 2: Scientific Practices and Debates in and around the Gulf

Jörg Matthias Determann (VCU-Qatar): Rentier Science in the Gulf

Mohammed Ghaly (HBKU): Islam and Science in Contemporary Fatwas: Bioethical Deliberations in Collective Ijtihad

Tanya Kane (Qatar University): Grafting Religion onto Medicine

12.30 – 2.00 PM: Lunch Break

2-4 PM: PANEL 5, DAY 2: Science Education in the Gulf

Ahmad Shallal Alshammari (College of Basic Education, Kuwait): The Socio-Cultural Contexts of Science Curriculum Reform in the State of Kuwait

Ziad Said (College of North Atlantic - Qatar): Science Education Reform in Qatar: Progress and Challenges

Sara Al Ansari, Aisha Al Qadi and Jemina Legaspi and Anto Mohsin (Northwestern University – Qatar): “Examination of Qatar’s Science Majlis as an Informal Site of Science Education”

7– 9 PM: PUBLIC LECTURE (Auditorium)

Jamil Ragep (McGill): Golden Age Redux: Can the Past Inform the Present?

ABSTRACTS (in alphabetical order)

SARA AL-ANSARI, AISHA AL-QADI, JEMINA LEGASPI & ANTO MOHSIN (Northwestern U - Qatar)

Examination of Qatar's Science Majlis as an Informal Site of Science Education

The Science Majlis is one of the few public gatherings in Qatar organized to discuss various scientific and technological topics among the Qatari publics (professionals, students, scientists). The Qatar Environment and Energy Research Institute (QEERI) organized the gatherings from April 2015 until November 2016. Throughout this time, the Science Majlis events were held at Fouj Café in downtown Doha on every third Wednesday evening of the month. The topics discussed at the event mostly revolve around issues of energy and environment, especially about water resources and solar energy. But occasionally another topic such as astronomy was included. The discussions were conducted in English, but speakers of Arabic were given a chance to ask questions, to comment, and even to respond in Arabic whenever they would like to. The forum welcomed participants of different age groups, educational backgrounds, professions, nationalities, and genders since one of its goals was to engage non-professional scientists to talk about QEERI-related issues. In every event, a discussion leader, typically a QEERI scientist, started a discussion by giving a 10-minute talk on a topic before opening up the Majlis for a sustained discussion for about an hour. Everyone, including school-age children, could and did participate. A moderator strove to ensure that the discussions remain accessible by asking newly introduced terms be explained and balanced by avoiding that the conversation to be dominated by a specific group.

Between January and May 2017, the Science Majlis events were organized by Hamad Bin Khalifa University in Education. The new choice of location opened up the Science Majlis sessions to a different group of attendees, some of whom did not get a chance to participate in the previous Science Majlis gatherings. This include students from Education City universities and HBKU graduate students. At the same time, the change of venue seems to dissuade some previous regular attendees to come to the events. HBKU has also been leveraging the resources it has at its disposal by broadening the topic of discussion to include a health-related issue. It manages to do this since it can tap the resources of not just QEERI, but also from one of its two other research institutes: Qatar Biomedical Research Institute (QBRI) and Qatar Computing Research Institute (QCRI).

Using qualitative data gathered from our participant observations and interviews with some of the Majlis participants, we will present three things about the Science Majlis gatherings and discussions: rhetorical strategies used by the speakers to communicate and disseminate information on scientific topics, gender disparity among discussion leaders and participants, and qualitatively different understanding between the Majlis speakers and attendees. Our findings inform how informal science education functions in Qatar including some ways these gatherings benefit certain participants and some suggestions to improve the creation and organization of similar forums in the future.

AHMAD SHALLAL ALSHAMMARI (College of Basic Education, Kuwait)

The Socio-Cultural Contexts of Science Curriculum Reform in the State of Kuwait

In 2008 the Ministry of Education (MoE) in Kuwait began the reform of the science curriculum in schools at all academic stages: primary (grades 1-5), intermediate (6-9) and secondary (10-12). The new science curriculum was adapted from an original curriculum which had been designed and published by the US company Pearson-Scott Foreman. This paper aims to investigate the process of the reform and the phases which were taken to reform the science curriculum in Kuwait's schools through the socio-cultural context, and the science teachers' and students' role in this reform process.

This study used a multi-method design, with both quantitative and qualitative methods to collect the data: science teachers' and students' questionnaires; interviews with science teachers, students and science curriculum reformers; and classroom observations.

The findings of this study indicated the generally negative views of most of the science teachers and students about the new science curriculum. Most of them noted that the content of the new curriculum does not relate very well to Kuwaiti social-culture and the Islamic religion and the curriculum objectives need to be more clear and achievable. The findings showed that science curriculum reform process was centralised by the Ministry of Education and the teachers and students did not participate in any step of this reform process.

This study recommends reviewing the new science curriculum (now currently in use) and taking into account the perspectives of the teachers and students about this curriculum. Developing and adapting the new science curriculum took place without taking into consideration the socio-culture and Islamic religion of Kuwaiti students. The MoE should provide the instructional tools and more professional development programmes for teachers to improve their teaching skills, and deal with the relationship between science and culture and between science and religion, integrating more relevant science into the curriculum.

ANILA ASHGAR (McGill)

Research on Current Issues in Science Education in Muslim Countries

This presentation will discuss the international discourses on science education reform to illuminate the key developments in the vision, goals, curricula, and assessment approaches. In particular, we will look at the role of science in developing 21st century citizens. Current developments and issues in science education in Muslim countries will also be discussed.

SAOUMA BOUJAOUDE (American University of Beirut)

Educational, Cultural, and Religious Factors Influencing Science Education in Arab States

Enhancing the quality of education in general and science education more specifically in the Arab states is one of the most pressing issues facing these states now. Recent reports on the status of education in the Arab states have established that access to education has improved

significantly in the past few decades and that there are serious attempts to reform pre-college education in many of these states. However, indicators of student achievement in science and math, especially in international comparisons, still show that students in many of these countries score below international averages while other indicators show that Arab students are not being prepared for the 21st century world of work. Within this context, it is imperative that causes for these results be investigated. One of the possible approaches to start understanding the current situation is to analyze the reform attempts and resulting curricula to find out whether or not they have the potential to improve student achievement especially in science and prepare students to live and work in the 21st of the Arab states by considering the cultural and religious contexts of these states. Consequently, the purpose of this paper is to analyze the reform efforts and curricula of a number of Arab states by using a framework that incorporates educational, cultural and religious factors associated with the teaching and learning of science.

ZOUBEIDA DAGHER (University of Delaware)

Proposing a Framework to Navigate Tensions between Science and Religion in Science Education

The manner in which the nature of science and nature of religion are conceptualized play a significant role in shaping the dialog between science and religion in the public sphere. Such dialog impacts the educational realm in terms of influencing what scientific knowledge is included in the curriculum and whether it gets taught or ignored in practice. One recent conceptualization of nature of science, namely, the expanded family resemblance approach (Erduran & Dagher, 2014) provides anchoring points for clarifying curriculum goals and instructional practices in science education. It gives reformers, curriculum designers and classroom teachers access to the cognitive, epistemic and social-institutional aspects of the scientific enterprise in the context of the larger society. By offering detailed justifications and a set of practical tools and generative images, this framework invites the exploration of similarities and differences among the different science domains and allows for a better understanding of distinctions between scientific and non-scientific fields. The presentation will illustrate the fruitfulness of this framework in navigating traditional tensions between science and religion, point out potential limitations, and propose productive pathways for promoting harmonious science education.

J. MATTHIAS DETERMANN (Virginia Commonwealth University School of the Arts in Qatar)

Rentier Science in the Gulf

Science in the Arab states of the Gulf has taken place within a rentier environment since the middle of the twentieth century. This is an environment that is shaped by the allocation of money derived from the possession of natural resources, primarily oil and gas. Governments in the region have used this money to fund two different kinds of scientific institutions. The first one is integrated into the state bureaucracy and often part of, or under the direct control of, a ministry. The second kind of institution operates outside the state bureaucracy and is under the

patronage of a senior member of the ruling family. Bureaucratic institutions, such as many state universities, are often more firmly established and longer lasting. However, they are also more prone to inefficiencies and to cultural and religious constraints on research and teaching. Faculty may be encouraged to work in Arabic and to avoid taboo subjects, such as evolution. In comparison, institutions that are dependent on individual patrons and their foundations are more precarious. On the other hand, and perhaps paradoxically, such institutions tend to be more agile and have greater autonomy and greater freedom to research and teach sensitive topics.

IHSAN FAZLIOGLU (İstanbul Medeniyet Üniversitesi)

History as a understanding of the future: On the historical experience of science education in Turkey

In his *al-Muqaddima*, Ibn Haldūn states: "The past resembles the future more than water resembles water." With this justification, when taking the subject of 'science education' of present Turkey, naturally we must ask how 'science education' was in the past. This sort of exploration doesn't only require the historical experience of the subject in Turkey. At the same time, it helps providing the 'historical genetics' of the present approaches and the issues regarding this subject. Without any doubt, this kind of detection makes it easier to solve the existing problems as well as strengthening our foresights regarding the future. We are interested in the past because we have plans for the future; again because we believe that history means running into the past in the future. In this presentation, the adventure of institutional 'science education' in pre-republican Turkey will be presented with historical examples within a theoretical framework.

MOHAMMED GHALY (HBKU)

Islam and Science in Contemporary Fatwas: Bioethical Deliberations in Collective Ijtihad

Modern advances in biomedical sciences have had far-reaching consequences outside the scope of these sciences. They introduced serious challenges for the pre-modern conception of certain basic concepts (e.g. health and sickness, life and death and even the very notion of humanness) through which we, as humans, try to makes sense of our life. In this presentation, we will examine how contemporary Muslim religious scholars responded to these challenges and how they tried to overcome the difficulties they encountered in this regard.

SALMAN HAMEED (Hampshire College, USA)

Sayyid Ahmad Khan's conception of Science & Religion and his accommodation of Biological Evolution

There were many Muslim scholars that responded to the challenge posed by European colonial powers in the late 19th century. One of them, Sayyid Ahmad Khan (1817-1898), made his mark

via the foundation of an influential college (and later a university) that imparted “modern” education to Muslims of India and that imagined their place in the modern world. Perhaps equally important (though less influential), he engaged with the interpretation of the Quran in light of modern science. In this work, Sayyid Ahmad Khan explored “cutting edge” scientific topics of his time, including paleontology, geology, age of the Earth, formation of the solar system, and evolution, including that of humans. He also wrestled with the relation of science and religion, and engaged with the nature of miracles mentioned in the Quran. Broadly speaking, his commentary of the Quran generated considerable controversy at the time and has been largely ignored in the broader discourse amongst Muslims in South Asia. Nevertheless, when we interviewed Pakistani physicians and medical students about Islam and biological evolution, we found resonance in their answers with the pragmatic approach of Sayyid Ahmad Khan. In this bicentennial year of his birth, I will explore Ahmad Khan’s conception of science & religion and its relevance for Pakistan and other contemporary Muslim societies.

TANYA KANE (Qatar University)

Grafting Religion onto Medicine

Medical education in the Arab world is located within a unique constellation of academic, professional and ethical practices informed both by scientific and religious knowledge. Balancing societal norms and expectations alongside the knowledge and training that inhabit the highly circumscribed arena of medicine can be challenging for some. As students collate their new medical persona to longstanding identities shaped and disciplined by modes of Arab and Islamic morality, some physicians-in-training struggle to comprehend some of the material and modes of practice encountered during their medical training. Some students raised in the Sharia-compliant, gender-segregated community articulate concerns that some of the curricular content in their medical training contravenes their religion. This case study documents some cleavages that have arisen when using Euro-North American inspired curricular frameworks, pedagogy, textbooks and assessment tools (IFOM, USMLE).

Using vignettes from two nascent medical colleges (Weill Cornell Medical College-Qatar and the College of Medicine at Qatar University), the talk will demonstrate some of the barriers that were encountered and overcome. It will also underscore the importance of foregrounding Islamic and cultural underpinnings of medicine when teaching in the Gulf region.

NASSER MANSOUR (University of Exeter)

Science, religion, scientists and pedagogy: The teachers’ perspectives vs. the Islamic Perspective

The application of the modern natural sciences to everyday life experiences has a deep impact on how people in the Islamic world view science and its value and use to them on the one hand, and their culture’s intellectual, religious and scientific tradition on the other hand. In this context, this paper argues that the relationship between modern science and Islam needs to be distinguished from Muslim views and attitudes toward modern science and scientists. The former relationship [Islamic perspectives of science and scientists] is concerned with an explanation of metaphysical and ontological underpinnings of the enterprise of science in

modern times in the light of revelation; the latter relationship [Muslim views of science and scientists] reflects time-dependent, socially, culturally and historically constructed interactions between individuals belonging to a religious tradition and equally time-dependent human enterprise entrenched in social, political, and economic conditions. This paper will critically unpack these complex relationships and give empirical-based evidence through discussing these issues: Islamic perspectives of knowledge and science; Science teachers' cultural beliefs of Science, Religion and Scientists Vs. Islamic perspectives; The impact of these cultural beliefs on teachers' pedagogical practices and views of teaching science; How can professional learning programme respond to teachers' cultural beliefs and stereotypes of Science, Religion and Scientists?

JAMIL RAGEP (McGill University)

Golden Age Redux: Can the Past Inform the Present?

We are often reminded about the “Golden Age” of Arabic/Islamic science, its glories, liberal-minded scientists and philosophers, and what “might have been.” Equally, perhaps more so, we are confronted with the decline of that Golden Age and the narrative that goes with it: hostility, religious bigotry, and cultural incompatibility of Islam and rationality. There are any number of modern researchers, social commentators, and politicians who have weighed in on the decline of Islamic science. And many contemporary Muslim scientists and policy planners have sought to capture the essence of the Golden Age and somehow use it as an elixir to jump-start science in modern Muslim societies. But this has proved elusive, in large part because of a misreading of history. In this talk, we will explore some of recent research dealing with the Golden Age and decline, and reveal some of the very surprising results of that research.

SALLY RAGEP (McGill)

An Historical Overview of Science Education in the Islamic World

A prevalent view of pre-modern Islamic science is that its history is one of discrete, disconnected episodes; any scientific advancement becomes dependent in the main on individual initiatives and courtly patronage, i.e., outside the core institutional and pedagogical structures of Islamic society. My talk will challenge these prevailing assumptions, arguing that they can take us only so far in explaining the millennium-long tradition of Islamic science. In particular, the prevailing narrative cannot explain how scholars in these supposed temporal episodes materialized, nor how they came to be educated in the intricacies of difficult fields such as mathematical astronomy. To illustrate my points, I discuss the pedagogical tradition of an extremely popular introduction to Ptolemaic astronomy and its extensive commentary tradition. Composed in Arabic in the early 13th century, this elementary textbook was studied well into the nineteenth century throughout Islamic lands as a way to provide a general picture of God's creation, and it also was used as a propaedeutic for more advanced astronomical texts. Among the tens of thousands of extant Islamic scientific treatises currently located in repositories throughout the world, I have identified over 60 commentaries, super

commentaries, glosses written to elucidate the base text, and translations into Persian, Turkish, and Hebrew. Tracing the study of this scientific text and its various derivatives shows us how deeply rooted an Islamic scientific education was within the society. The various commentaries and glosses also indicate that the text was being used as an opportunity to introduce new ideas and teaching methods, including those that would later come from European sources.

ZIAD SAID (College of North Atlantic – Qatar)

Science Education Reform in Qatar: Progress and Challenges

Science education reform in Qatar has had some success as witnessed from international tests. In the Program for International Student Assessment (PISA), Qatari students have shown progress in science achievement, although they are still below the international average. In the Trends in International Mathematics and Science Study (TIMMS), Qatari 4th and 8th grade students have also shown progress in science achievement, but they remain significantly below the international average. In the latest cycle of PISA (2015) which assesses how students could use their knowledge and skills in real life, rather than just being able to repeat back facts and figures, Qatari students 15-year-olds scored an average of 418 points compared to international average of 493 points. This represents a 20% increase from the first cycle in which Qatar participated in 2006. Similar progress was also exhibited in the last cycle of TIMMS.

This presentation will highlight the main features of the progress achieved based on PISA and TIMMS results since Qatar started participation in these tests in 2006. In addition, to gain insight into what factors limit the students' science achievement, A School Science Teaching Inventory Questionnaire (SSTIQ) was administered to science coordinators and teachers in 24 schools in Qatar. The questionnaire results, in conjunction with interviews with students and teachers, indicated that science coordinators and teachers believed that a set of factors was responsible, and that low student motivation was the major factor that was most responsible. Low student motivation was due, in part, to textbooks being overemphasized, and inquiry-based and problem-based methods being underemphasized.

Analysis of results from recent questionnaires and interviews, for students, and administrators indicate further that other factors (other than interest and attitude) contribute to low students' motivation, and achievement. These factors are associated with teachers' skills and competency in delivering of science classes; school environment, and family role. Also recent research results, generated from application of inquiry based strategies, will be presented.

AYMAN SHABANA (Georgetown University's School of Foreign Service – Qatar)

Science and Religion in Modern Works of *Tafsīr*

One of the most important types of scholarly literature highlighting the contentious debate on the relationship between Islam and modern science has been modern commentary on the Qur'ān (*tafsīr*). This presentation/paper examines how modern commentators conceptualized the relationship between religion and science and how, in turn, this modern concern with

science led to the emergence of a new genre within the *tafsir* literature. The presentation explores the extent to which this new genre represents an extension to earlier forms of *tafsir* and how authors of this genre relate their work to the extended exegetical tradition. Special attention is devoted to *Tafsir al-Manār* by Muḥammad ‘Abduh and Rashīd Riḍā and its impact on subsequent works of *tafsir*, with a particular focus on *Tafsir al-Jawāhir* by Ṭanṭāwī Jawharī. The presentation aims to analyze the epistemic authority of science in these works and explore how this authority has been used for the construction of the divine text in light of modern knowledge and sensibilities.

MUSTAFA YAVUZ (İstanbul Medeniyet Üniversitesi)
An Overview on History of Science Education in Turkey

In this study, I will try to put forth that the new-established state “Republic of Turkey” has a government policy inherited from its predecessor, the Ottoman Empire. By giving some numerical data about educational institutions and their history, I will focus on a descriptive framework of Turkish National Education System, which has been shaped just after the proclamation of new governmental system in October 29th 1923. The legal base for National Education depends on a special law “Tevhid-i Tedrisat” accepted by the Turkish National Assembly on March 3rd, 1924 with Reg.No:430. This special law connects and unites every educational institution to the central authority, the Ministry of National Education. Since the very beginning, Turkish Republic has paid special attention to Science Education, which has been a contemporary prerequisite of post-imperial, national states in Europe.