ISLAMIC CONTRIBUTIONS TO THE INTERNATIONAL ORGANIZATION FOR SCIENCE AND TECHNOLOGY EDUCATION (IOSTE)

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Abstract
This presentation introduces the International Organization for Science and Technology Education (IOSTE), outlining its history, structure, principles and activities. It discusses the role of IOSTE as a values-oriented STE research organization established in response to cold war ideologies with the aim of encouraging dialogue and academic exchange. The presentation then highlights the recent engagement of IOSTE with STE in predominantly Muslim countries. It examines quantitatively and qualitatively the increasing contributions from researchers in these countries, and outlines possible future engagements which could lead to closer research collaborations and relationships between STE academics in Muslim and non-Muslim countries.

1 THE ORIGINS OF IOSTE
The idea of an international organization for science and technology education emerged more than three decades ago out of a desire by some science and technology education (STE) researchers to overcome Cold War barriers and realize the ‘potential value of improved STE contacts between west and east, north and south’ (McFadden, 2006). It was an innovative and somewhat counter-cultural idea in a time of disquiet and one that has led to today’s vibrant IOSTE community of scholars and educators across the globe.

As we know, the ideological divide of the late 1970s bred suspicion and mistrust on both sides. Science and technology in particular were closely guarded during the Cold War, and the normal lifeblood of science – the critical examination and discussion between peers around the world – was obstructed. To a lesser extent this was also the case for science and technology education. In 1979 a group of science and technology educators met in Halifax, Canada to consider ways of bridging this divide and encouraging greater dialogue between STE academics in different countries. This was the origin of the International Organization for Science and Technology Education (IOSTE), a name officially adopted at the Brisbane symposium in 1984.

International and regional symposia are the milestones of IOSTE. The diversity of IOSTE’s leadership and activities is reflected in the locations of the fourteen international symposia from 1979 to 2010, which have been hosted on every continent except Antarctica. The last five international symposia, for example, were convened in Brazil, Poland, Malaysia, Turkey and Slovenia respectively. The XVth International Symposium will be held in Tunisia in 2012. Each symposium adds to the richness and diversity of our membership and our shared understanding of STE.

2 THE STRUCTURE OF IOSTE
IOSTE is most ‘international’ of the science and technology education (STE) organizations and is not dominated by, or located in, any particular part of the world. Today its members come from over 40 countries, grouped into 15 regions. At international symposia, members from each region elect a representative to serve on the IOSTE board until the next symposium, usually in two years. The current board is led by Dr Moyra Keane from South Africa, assisted by members from
Australia, Brazil, the Czech Republic, France, Ghana, India, Iran, South Korea, Malaysia, Slovenia, Sweden, the UK, Lithuania, South Africa, Tunisia and the USA.

3 PRINCIPLES OF IOSTE

From the start, IOSTE has been an organization valuing global rather than partisan perspectives, collegiality rather than competition, and commonalities rather than differences. IOSTE distinguishes itself from its sister organizations through its explicit concern for the social and cultural dimensions of science and technology education. Members of IOSTE share a belief that STE should:

1. highlight education for citizenship and for informed, critical and active participation in democracy;
2. stress the relationship between science, technology and society;
3. emphasize the cultural and human values of S&T;
4. promote equity in S&T and STE;
5. work for a just and sustainable development and consider how STE can contribute to the fight against poverty, discrimination and injustice;
6. encourage the peaceful and ethical use of S&T in the service of humankind;
7. encourage cultural diversity and international understanding;
8. stimulate international collaboration in research and development and promote cooperation with other international organizations.

These principles are reflected in the themes and sub-themes of our international and regional symposia, which regularly include cultural diversity in STE, human values, socio-scientific studies and sustainable development. Such themes show a willingness to reflect on the wider social implications of STE, and provide a landscape within which to situate the more specific presentations on curricular and pedagogical issues.

4 ISLAMIC CONTRIBUTIONS TO IOSTE

Despite its comparatively long history and cross-cultural aspirations, IOSTE has only recently included significant representation from STE academics in predominantly Muslim countries. Analyses of the participants and papers from the first seven international symposia (1979-1993) shows that of the 852 total participants, only 22 (2.6%) were from Muslim countries. While the language barrier may have played a part in this very low representation, it does not account for it entirely. Neither can it be explained by socio-economic factors, since IOSTE particularly encouraged participation from developing countries, and around 35-40% of participants at these symposia originated from such countries (McFadden, 1997). Regardless of the reasons, one consequence was that this low representation was reflected in the leadership of IOSTE. Between 1979 and 1996 the six executive Boards included only five members in total from predominantly Muslim countries. By comparison, the current board includes members from Malaysia, Iran, and Tunisia.

The symposium which marked IOSTE’s first serious engagement with STE scholars from predominantly Muslim countries was IOSTE XII, held in Penang, Malaysia in 2006. Organised by the Universiti Sains Malaysia, this symposium attracted 45 authors from these countries, constituting around 20% of all authors. While most of these 45 were from Malaysia and neighbouring Indonesia, this nevertheless constituted a much closer match to the world population represented by Muslim countries. An analysis of the proceedings however shows that few if any papers at IOSTE XII addressed specific contextual or cultural aspects of education in Muslim countries. Topics generally addressed similar STE issues to papers from non-Muslim countries.

1 countries where more than 50% of the population is Muslim.
IOSTE XIII in Izmir, Turkey had the highest participation rate from Muslim countries. Of 209 presentations, 95 (45%) included a first author from a predominantly Muslim country. As expected, Turkey was the country with highest participation, though Malaysia, Iran, Pakistan and Tunisia were also represented. While most papers from these participants addressed similar pedagogical and curriculum issues to those from non-Muslim countries, of perhaps greater significance was that this symposium program included six papers with an explicit focus on Islamic cultural contexts or issues. For example, a paper by Kacem and Simonneaux (2008) on the teaching of socio-scientific issues clearly considered the Muslim context of the study and the influences of subjects' beliefs – both cultural and religious - on their responses. Another paper (Berger et al., 2008) concerned findings from a comparative study of health and sex education issues in Muslim and non-Muslim countries. This study was part of the Biology, Health and Environmental Education for better Citizenship (BIOHEAD – Citizen) project, which included many IOSTE researchers from European and North African countries. In 2007 IOSTE had helped sponsor a BIOHEAD Citizen meeting in Tunisia which focused on school science textbook representations of health, reproduction and environmental education in Muslim and non-Muslim countries. Several other IOSTE XIII papers concerned the BIOHEAD-Citizen study and included references to Muslim beliefs and attitudes to socio-scientific issues. The significance of these papers and presentations is that windows to Islamic culture and beliefs were being opened more widely among the IOSTE community, generating interest among members about how science and technology is taught in these countries. In some cases this interest led to research collaborations between European partners and academics from Turkey in particular, including potential FP7 project partnerships.

IOSTE XIV was held in Bled, Slovenia, so the Board was interested to see whether the academic representation from Muslim countries would continue. Fortunately, it did. Of the 235 presenters, 32 (14%) were from Muslim countries, including Turkey, Tunisia, Malaysia and a relatively large contingent from Iran. This is the highest representation of STE academics from Muslim countries ever to attend an IOSTE symposium in a non-Muslim country. Several papers and posters concerned perspectives of researchers, teachers and students in Muslim countries. For example, a paper discussing how the philosophy of curriculum in Iran is influenced by Islam (Niknam & Noaparast, 2010) provided a perspective with which IOSTE participants would not normally be able to engage. A paper from Tunisia (Mondher et al., 2010) presented a strategy for overcoming scientific, moral and cultural constraints in teaching about human reproduction in Muslim countries. This paper was very well received, particularly by non-Muslim audience members who were unaware of the sensitivities around such issues in many countries. This interaction provided the sort of cultural awareness often absent from scientific conferences.

One outcome of the greater interaction with Muslim STE academics and ideas is that non-Muslim members are more interested in including Muslim perspectives in their own research. One example of this was a paper by Sanders (2010) reporting on a South African study about the teaching of evolution in schools of different faiths. This very sensitive understand and model personal and ‘contextual factors affecting how teachers with firm religious beliefs cope with the potential controversy when teaching evolution’ (Sanders, 2010, p. 979).

A further outcome is the increasing interest from Muslim countries in hosting future IOSTE meetings. Of the three bids to host IOSTE XV, two were from predominantly Muslim countries – Tunisia and Morocco. The bid from Tunisia was successful and as IOSTE XV will be held there in 2012, we expect further high representation of STE academics from Muslim countries.

5 ISLAMIC REPRESENTATION WITHIN THE INTERNATIONAL SCIENCE EDUCATION RESEARCH COMMUNITY

Within some predominantly Muslim countries there has been a noticeable discrepancy between the high level of scientific research productivity and the relatively modest STE research productivity. With regard to the former, a recent Royal Society report identified Turkey, Iran and Tunisia as having recorded significant growth in internationally recognised scientific publication output and money spent on research and development. The report recognised Iran as “the fastest growing country in terms of numbers of scientific publications in the world” (The Royal Society, 2011, p. 21). It further noted that Turkey has quadrupled its science publication output between 1996 and 2008, while R&D as a percentage of GDP in Tunisia grew from 0.03% to 1.25% between 1996 and 2009. A Thompson Reuters report (Adams et al., 2011) confirms the
phenomenal growth in science publication output of Iran and Turkey, along with a number of smaller countries in the region such as United Arab Emirates, Kuwait and Lebanon.

Few of these countries have seen a corresponding increase in research activity and productivity by the science education researchers. One exception is Turkey. Between 2005 and 2011, Turkish membership in the European Science Education Research Education Association (ESERA) increased from 12 members (2.8% of total membership) to 169 members (14.8%). While it is acknowledged that the hosting of ESERA 2009 in Istanbul probably resulted in a spike in Turkish membership, numbers had been increasing steadily prior to this, with Turkish researchers already representing 8.6% of ESERA members in 2008. As mentioned above, a similar increase occurred in the Turkish membership of IOSTE. Furthermore, a number of science education research journals, including the International Journal of Science Education, now have Turkish representatives on their editorial boards, and Turkish authored or co-authored journal articles are now quite common. Several European FP7 science education projects also include Turkish researchers. A number of contextual factors have contributed to Turkey’s improved engagement in STE, including recent reforms of the school education and teacher education systems (Grossman, Onkol & Sands, 2007), its candidature for membership of the European Union, and the increased scientific activity mentioned above.

In contrast, other predominantly Muslim countries have not seen a comparable increase in the level of engagement in STE despite similar increases in their scientific publication output. Looking again at 2011 ESERA membership, for example, Iran currently has only three members and Tunisia two. Prior to 2009 there were no members from either of these countries (ESERA, 2009). A database search of three prominent STE research journals: Science Education, the International Journal of Science Education and Studies in Science Education reveals very few Iran-based first authors over the last three years. Clearly there is a disconnect between the high levels of international scientific productivity and that of STE research output.

6 TOWARDS IMPROVING STE RESEARCH COLLABORATION WITHIN AND AMONG ISLAMIC COUNTRIES

Recommending effective strategies for improving international collaboration between STE scholars in Islamic and non-Islamic countries is problematic on a number of counts. First, and most obviously, there are significant cultural and contextual differences between Islamic countries, so no recommendation will apply to all. For example, Turkey’s success in STE research activity is due primarily to an alignment between government policies, the prioritisation of science and technology, school curriculum reform and the aforementioned EU candidature, which encourages links between Turkey and many European countries (Grossman et al., 2007). This alignment of priorities and circumstances is not extant in all Muslim countries (or indeed in many non-Muslim countries) and so it is neither possible nor desirable to simply follow the Turkish model.

Second, it is difficult for outsiders to have a sufficient grasp of the context and influences within a country to be able to make recommendations. Practicalities such as resources, capacity and systems are often easier to understand than political, ideological and cultural influences. An article on educational research in Iran by Lotfabadi (2008) identified ideological problems as the biggest impediment to increasing the quality of education research. Even within Turkey there is robust debate about the direction of educational reforms (e.g. Guven, 2008).

Nevertheless there are pragmatic steps that can be taken to improve the quality and quantity of STE research output. One obvious strategy is to improve the quality of written English among STE academics to increase acceptance rates in international journals and conferences. A second strategy is to institute a system of financial incentives for acceptance in high quality journals, as is the case in Turkey. Academic exchanges and the funding of PhD students placed in English speaking countries are also obvious steps, though the latter should be bonded to avoid adding to the ‘brain drain’ from countries such as Iran. However, such strategies only work if there is motivation and funding at the ministerial and university levels. A recent paper by Dagher and BouJaoude (2011) called for the establishment of a regional science education research organisation to ‘establish collaborations across institutions and countries, promote rigorous research methods and inform policy decisions’. It may be that such an organisation is established from scratch, or that IOSTE or ICASE could adopt this role as a special initiative.
7 CHALLENGES FOR IOSTE

IOSTE has always been an organisation which recognises the cultural and social contexts of science education and welcomes discussions of ideological divides. While some of the old divisions between nations and cultures, such as the Iron Curtain, have been dismantled, new ones are being constructed. Like the old, such divides are breeding grounds for fear, suspicion and ignorance. There are forces at work today that seek to widen the gap between Muslim and non-Muslim countries, and between developed and developing countries. These divisions also hinder scholarly dialogue, academic collaboration and cultural understanding. It is as important today as it was in 1979 to seek ways to build bridges that enable contact and dialogue between science and technology educators. The challenge for IOSTE is to continue building and maintaining these bridges – to advocate understanding where there is ignorance and fear, and demonstrate tolerance where there is narrow-mindedness. What organisations like IOSTE can do is to provide a forum within which STE researchers from Muslim countries feel welcome, valued and free to engage in academic discourse. IOSTE can also offer opportunities for cultural and academic exchange, a forum for new ideas and an outlet for conference publications. This ICSTE meeting is a great example of the type of forum which can help us meet this challenge.

8 REFERENCES


