Science Diplomacy in Fostering Responsible Conduct of Research: Bridging the Trust Deficit in Science in the New Normal

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The COVID-19 pandemic has increased the expectation of scientists as solution providers. There is a greater urgency for the scientific community to answer important research questions, accelerate the rate of translation of scientific discoveries into tangible solutions and provide actionable and accurate science advice to various stakeholders. Although there has been a heightened appreciation for the role of science, there appears to be growing disenchantment in the capacity of the scientific ecosystem to rise to the occasion. This sentiment is epitomised by the erosion of trust in science in the public discourse; where scientific evidence, traditionally thought to be robust, is now frequently challenged. The polarising discourse on the safety of vaccines, pandemic origins and preventative strategies such as face masks and lock-down mandates exemplify the mistrust that exists between scientists and the public – including leaders and politicians around the world who question the validity and integrity of science.[1]

While political ideology, religiosity, morality and scientific literacy may play a role in influencing science scepticism at an individual level, the society's composite response is both heterogenous and multifactorial in nature.[2] The internet, in particular social media has exacerbated this chaos through the pervasive nature of misinformation and fake news.[3] The scientific community has a role to bridge this trust deficit through more effective science communication, advice and engagement with different stakeholders that also include policymakers. This approach also includes shedding the 'ivory towers' mentality, being more relevant to society and providing a rationalisation for the kind of research questions under investigation. The rising retractions of publications[4], the high-profile reports of research misconduct[5,6] and the cut-throat self-serving academic environment have further eroded trust in science. Greater awareness of the potential risks of some advancing technologies, accompanied by open science[7-9] has further cast a spotlight on the need for introspection and self-governance within the scientific enterprise. Hence, there is a need to calibrate how

future scientists are trained. We need a new generation of relevant and socially responsible scientists who are able to meet multi-stakeholder expectations and uphold the integrity of science. The global character of the scientific enterprise provides a natural vehicle for both diplomacy and security assurances.

A number of relevant international frameworks exist on research governance and integrity. For example, in the arms control arena, the Biological and Toxin Weapons Convention (BWC)[10] and the Chemical Weapons Convention (CWC)[11] both contribute to norms associated with responsible science. In particular, the Organisation for the Prohibition of Chemical Weapons (OPCW), the implementation arm of the CWC, answered a call from the States Parties to address the issue of responsible conduct of the chemical sciences. Two workshops in 2015 led to the drafting of the Hague Ethical Guidelines. The core of the document maintains that "achievements in the field of chemistry should be used to benefit humankind and the environment".[12] The dissemination of the guidelines is an important part of the process as described in the release statement by the OPCW Director-General in the opening remarks to the 80th session of the Executive Council: "The Hague Ethical Guidelines have been made available on the OPCW public website. I encourage all States Parties to share the guidelines with their National Authorities, Ministries of Education, educational institutions, scientific communities and other stakeholders to advance understanding of the importance of nurturing responsible and ethical scientific development among chemistry professionals".[13]

There are no similar guidelines associated with the BWC yet, although efforts are underway. Nevertheless, the yearly meetings of the BWC have activities "on the margins" that bring NGOs and other sub-national players together to discuss ethical concerns related to the advances in the life sciences. A second model document is the "Statement on Biosecurity" by the InterAcademy Partnership (IAP), which was endorsed by 68 national academies of science.[14] The International Science Council (ISC), through its Committee on Freedom and Responsibility in the Conduct of Science, has organised various initiatives such as the World Conferences on Research Integrity to foster universal responsible conduct of research (RCR) dialogue and workshops on research assessment and quality in science. Various statements have also been declared to encourage the development of unified strategies and language to foster greater research integrity worldwide. Amongst these statements include the Singapore Statement on Research Integrity (2010), the Montreal Statement on Research Integrity in Cross-Boundary Research Collaborations (2013) and the Global Research Council's Statement of Principles of Research Integrity (2013).[15]

While legal frameworks and codes of conduct have their own function and value, ultimately, much like what the pandemic has revealed, effective and sustainable solutions can only be achieved through the fostering of a culture of responsibility at an individual and institutional level. As international research partnerships become increasingly essential, as seen in the global response to COVID-19, science diplomacy plays a role in harmonising the cross-border discourse on responsible conduct of science to ensure a common understanding of scientific integrity and responsibility.[16] As such, science academies are recognised as having crucial roles in the international arena of science diplomacy. While constitutionally independent, most are established to serve their nations by representing national perspectives and commitment to international issues.[17] National academies, by virtue of belonging to global networks such as the IAP and ISC, have been shown to be effective platforms for transboundary science diplomacy.[18]

In the 2011 workshop conducted by the US National Academy of Sciences, Engineering, and Medicine (NASEM) Committee on Global Science Policy and Science Diplomacy Development, Security, and Cooperation Policy and Global Affairs, RCR was highlighted as an essential area in which the international scientific community needs to collaborate for effective global science cooperation and science diplomacy would be the best tool to enable dialogues on RCR harmonisation and development of a uniform code of conduct to facilitate global research. RCR generally means good citizenship in research[19] that covers various topics in the research process such as conflicts of interest, human and animal subject research, mentoring, collaboration, peer review, data management, research misconduct, authorship and publication, social responsibility, financial responsibility, a culture of safety as well as contemporary topics such as big data, open science and use of statistics.[20]

The US NASEM has played a leading role in developing strategies to promote ethical behaviour and decision-making in science amongst researchers and policymakers.[21-24] In 2013, US NASEM, in collaboration

with the Academy of Sciences Malaysia (ASM), organised the first Educational Institute on Responsible Science in Kuala Lumpur. In this workshop, early- to mid-career researchers from Malaysia, India and Pakistan were introduced to the concept of RCR through a variety of active learning and assessment techniques to demonstrate the impact of active learning pedagogy in teaching RCR (Fig. 1). The ASM subsequently engaged the Young Scientists Network-Academy of Sciences Malaysia (YSN-ASM) (https://ysn-asm.org.my/) to develop a formal RCR programme in Malaysia in 2015. Since the inaugural US NASEM initiative in Kuala Lumpur in 2013, YSN-ASM has trained thousands of researchers in the country through the organisation of nationwide RCR workshops. The RCR programme highlights the value of engaging with policymakers, politicians, and top leaders of academic institutions, as well as in international collaboration with US NASEM in initiating RCR dialogues in the local as well as regional science community.[25] The increased awareness and discourse on RCR led to the development of the Malaysian Educational Module on RCR (https://issuu.com/asmpub/docs/rcr_module_readonly), the explicit inclusion of RCR education as a strategic initiative in the Malaysian National Policy on Science, Technology and Innovation 2021-2030[26] and the expansion of the programme to the ten member states of the Association of Southeast Asian Nations (ASEAN).



Figure 1. Participants of the Educational Institute of Responsible Science organised by the US NASEM and the Academy of Sciences Malaysia, in Kuala Lumpur

The establishment of the ASEAN RCR Project that leverages the collaborative network of emerging researchers in the region is science diplomacy in action. Modelled upon the US NASEM Educational Responsible Science Institute and supported by the International Science Council Regional Office for Asia and the Pacific (ISC-ROAP) and the International Network for Government Science Advice (INGSA), this 3-year project (2019-2021) aims to create awareness of RCR amongst researchers in the region, build capacity to champion RCR in the individual member states and formulate a regional strategic framework to cohesively foster RCR (Fig. 2). The collaborations between national young academies and scientific institutions in the region not only promote RCR but also enhance the capacity and trust to foster regional collaborations to enable an innovative, competitive, vibrant, sustainable and economically integrated region.[27] The interconnectivity between integrity, building trust and relationships and cross-boundary research collaborations reflect the interdependence between science and diplomacy.



Figure 2. Participants from the 10 ASEAN member states attended the ASEAN RCR Workshop in Malaysia on 10-13 December 2019

Whilst it is essential to engage scientists at the individual level as key drivers for successful implementation, institutions play a critical role in providing the platform for these cross-boundary initiatives.[28] A common challenge faced by individual bottom-up initiatives is the lack of political will to ensure the sustainability of efforts. Rising nationalism and unhealthy competition between countries may also hamper science diplomacy efforts. Therefore, the RCR experience in the Southeast Asian region has demonstrated the importance of national academies (both senior and young) that have well-established global networks (e.g. IAP, The World Academy of Sciences, Global Young Academy), international and regional organisations (e.g. ISC-ROAP, INGSA and ASEAN), and respective national policymakers (e.g. Ministries in charge of Science, Higher Education, Foreign Affairs etc.) in both the cross-boundary sharing of knowledge and experience as well as effective shaping of domestic foreign policies. Although the language of science is universal, there is greater diversity in the scientific ecosystems among countries and regions. While the principles of RCR are universal, the process by which it should be locally enculturated must take into consideration the socio-cultural-economic variations as well as the scale and capacity of the research ecosystems in each country.[29] Therefore, the scientific community should leverage on science diplomacy through national academies and international organisations to promote the development of locally-contextualised strategies to support a globally harmonised and unified RCR; satisfying a country's pragmatic needs while promoting the capacity for cross-border cooperation.[30] Ultimately, fostering a global responsible research ecosystem requires both top-down and bottom-up science diplomacy approaches. The ratification and declaration of

statements and cross-border agreements as well as national codes are essential in defining national policies within a uniform code of conduct but for these policies to be acted on locally and embraced pervasively, collaboration between the international scientific community is paramount. As the world comes to terms with the new normal and we deal with various grand challenges at a greater frequency than anticipated, the role of science diplomacy, particularly in promoting a responsible global research ecosystem will be more crucial than ever.

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