Workshop Report

Toward a collaborative, collective and integrative international CBRN security education[1]

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Summary

Although the need for biosecurity education has been regularly discussed in relation to the Biological and Toxin Weapons Convention (BTWC), there is a lack of global coordination between the different stakeholders involved. This lack of coordination prevents biosecurity education being part of an efficient global prevention of the malign use of research. In this report, we discuss the conclusions of a high-profile workshop titled 'Toward a collaborative, collective and integrative international CBRN security education: Coordination of International Policy Initiatives on Biosecurity Education' organised by the London Metropolitan University Biological Security Research Centre.

This workshop report contains the following three sections. Section 1 explains the main objective of the workshop and introduces the context of the event. Section 2 gives an in-depth analysis of global efforts in biosecurity education. This section is divided into five sub-categories, emphasising the current efforts in biosecurity education from the London Metropolitan University Biological Security Research Centre, other ongoing initiatives, efforts from International Organisations and the approaches of regional actors. It also raises the challenges faced by these actors in implementing biosecurity education. The last section highlights the urgent need for global coordination in biosecurity education and the significance of the International Biological Security Education Network.

1. Overview

Special appreciations were made to the Joseph Rowntree Charitable Trust (JRCT), Research England, the Policy Support Fund (PSF), and London Metropolitan University which supported this high-profile workshop titled: 'Toward a collaborative, collective and integrative international CBRN security education: Coordination of International Policy Initiatives on Biosecurity Education'. The workshop was held on 16 March 2024 by the Biological Security Research Centre (London Metropolitan University) at the Leonardo Royal Hotel St. Pauls, London. The one-day hybrid workshop organised by Professor Lijun Shang, Professor Malcolm Dando, Miss Iris Magne, and Miss Olivia Ibbotson brought together 17 invited national and international experts from academic institutions, civil society, and international

organisations. The workshop emphasised the importance of coordinating efforts and integrating holistic initiatives in a timely manner regarding biosecurity education. The workshop also aimed to discuss means of implementing the International Biological Security Education Network (IBSEN) in preparation for the BTWC 2024 Meeting of State Parties. The workshop was held under Chatham House Rules, and this report was compiled from PowerPoint slides presented at the workshop and written notes taken by Miss Iris Magne and Miss Olivia Ibbotson. The Workshop Report is the sole responsibility of the report authors and may not reflect a consensus of the workshop.

The main focus of this policy workshop was to discuss the development of CBRN (Chemical, Biological, Radiological, and Nuclear) security education after the foundation of the International Biological Security Education Network (IBSEN) one month earlier. Although biosecurity education has been regularly advocated as a contribution to strengthening the BTWC, there is a lack of global coordination between the different stakeholders. The establishment of the IBSEN and the creation of new educational resources through publication of the book *Essentials of Biological Security: A Global Perspective* (Shang, Zhang and Dando, 2024) represent a pivotal moment for biosecurity education.

2. Global efforts in biosecurity education

2.1 Introduction of the London Metropolitan University Biological Security Research Centre

The Biological Security Research Centre as an education hub to coordinate international efforts in biosecurity education Professor Lijun Shang opened the workshop by explaining the work of the Biological Security Research Centre (BSRC) at the London Metropolitan University. He highlighted the history of the BSRC and its role in developing an education hub for biosecurity. To do so, the BSRC continuously seeks funds to support its work, including recent two awards from by the Joseph Rowntree Charitable Trust (JRCT) and the British Academy (BA) fund. Publishing the book *Essentials of Biological Security: A Global Perspective* (Shang, Zhang and Dando, 2024) is part of the effort of the Centre to design relevant resources for biosecurity education for life scientists. This is complementary to other resources previously developed by the Centre, such as academic articles on strengthening the

Biological Weapons Convention and dual-use research. The BSRC aims to further contribute to global biosecurity education with long-term projects such as building the International Biological Security Education Network (IBSEN).

2.2 Overview of historical and modern initiatives of biosecurity and education

This section covers 3 presentations discussing biosecurity educations from its history to recent initiatives, publications, and methodologies.

History, Education and Biological Weapons arms control The speaker began by highlighting the importance of addressing the historical context in which arms control was formed, noting the significance history plays on modern day arms control development. The speaker discussed the historical context which led to the formation of the BTWC. The speaker then questioned what constructive and practical conclusions may be drawn from historical studies of security and arms control for policymakers, thus, questioning the limits of the utilisation of history to modern day.

Analysis of the history of arms control development permits the visualisation of past rejected polices and may allow a 'voice' for alternative or silenced perspectives. Historical contexts illustrate the policy-making process in action and thus provides a greater general understanding. Work of the UK Parliamentary Office of Science and Technology demonstrates this via 'Lessons from History'. The presentation then progressed to how we may use/need history, such as for treaty interpretation, to address current policy issues and to understand contemporary proliferation and disarmament issues.

The importance and use of history as a 'template for action' was further discussed. The speed at which science and technology progress compared to societal change was explored. Questioning if science is progressing at a greater speed than law and proposing that it is not law and policy which has failed to progress but society. There are, however, instances in which society has anticipated technical changes in law and ethics, such as the General-Purpose Criterion of the BTWC and CWC, in which effectively future proof both treaties.

The speaker then delved into anti-CBW campaigns of the 20th century, noting the different sectors involved and how these compared to the 'loud' non-proliferation of nuclear weapons campaign. Dr Gertrud Woker's quote of 'I could but not shudder and think here science was digging its own grave' (Woker, 1924) is expressive of the feelings and tensions at the time. The Women's International League for Peace and Freedom (WILPF), founded in 1915, played an active role in campaigning against biological, chemical, and nuclear weapons. WILPF emphasized on educating and creating awareness of the threat and consequences of these weapons to the 'ordinary public'. The speaker then discussed the Church's involvement into arms treaties in the 1960s, specifically non-proliferation of nuclear weapons rallies. Canon John Collins in '*Faith Under Fire'* may be quoted 'there are, or ever could be, circumstances which would justify Christians inflicting indiscriminately unlimited pain and suffering upon their fellow men'. Canon John Collins later expanded that those churches in their silence on said topics indirectly supported the use of nuclear and biological weapons (*Faith Under Fire,* p280). Furthermore, Bishop William Greer of Manchester at the Lambeth Conference of 1968 was quoted as saying that it was not the 'retention' of said weapons but 'the use of the weapons and let us condemn them'. The speaker highlighted the active role that churches and religious leaders have played in campaigns against biological, chemical, and nuclear weapons.

The speaker concluded that 1960s anti-CBW protests were comprised of various loosely allied and networked groups, which struggled to raise the profile of CBW disarmament above the 'loud noise' of the nuclear debate. The anti-CBW campaign was overshadowed by the non-proliferation of nuclear weapons campaign. The protests of the 1960s illustrated different goals and means of achieving said goals, such as disarmament *vs* non-use, differing tactics, and epistemic resources.

The presentation discussed the levels of active involvement of scientists in nuclear and CBW histories. It was suggested that society is slower at dealing with changes, whether that be advancements in technology/weaponry or in policy and law. It is therefore vital to learn from our history and take inspiration from what was impactful and develop law alongside or ahead of science.

A cross-temporal perspective to biosecurity education The speaker introduced the context in which the book *Essentials of Biological Security: A Global Perspective* (Shang, Zhang and Dando, 2024) was written, highlighting past projects and future goals. The book is designed to

be accessible with twenty short chapters which can be easily translated. The global perspective is also significant in the structure of the book. Looking at past initiatives, the speaker recalled that the issue of lack of biosecurity education for life scientists was highlighted by the WHO Global Framework, the 2005 BTWC record and the Tianjin guidelines. To answer these different calls for developing biosecurity education, future projects such as the IBSEN are necessary. The network represents a new effort in biosecurity education and is the basis for the overall endeavour. As demonstrated with the cartoon project conducted by the BSRC and the IBSEN future projects cannot only be done in English but must be translated into different languages. Furthermore, more thought must be given to the methodology to efficiently strengthen knowledge on biosecurity. The speaker then addressed questions asking for more information on methodology and assessment mechanisms. The speaker explained the role of Team-Base-Learning as a new methodology and the difficulty of defining 'success' in the implementation of biosecurity education. The speaker also insisted on the need to find solutions regarding sustainable funding for biosecurity education.

Team-Based-Learning and the significance of methodology in biosecurity education The speaker presented Team-Based-Learning (TBL) as an efficient methodological tool for biosecurity education. As part of its biological security awareness-raising, education and training initiative, the University of Bradford trained more than 50 life scientists in cooperation with funds generously provided by the Government of Canada, the US State Department and the United Kingdom Ministry of Defence. The speaker therefore identified the projects conducted by the University of Bradford and the London Metropolitan University as examples of good practices. Although students who have completed the course developed a high biosecurity knowledge, their expertise was limited to local practices. The speaker also identified the characteristics of threshold concepts of biosecurity education: transformative, troublesome, irreversible, integrative, bounded, discursive, reconstitutive and liminality. The speaker concluded by supporting the need for the implementation of the Tianjin guidelines to ensure that the BTWC remains robust.

2.3 Initiatives from International Organisations

This section includes five presentations summarising various initiatives from international organisations and the implementation for biosecurity education.

The International Nuclear Security Education Network (INSEN) as a model for IBSEN The discussion shifted to an overview of initiatives from international organisations. This section started with the outline of the International Nuclear Security Education Network (INSEN) and its implications for IBSEN. The speaker provided an analysis of the international context preceding the foundation of the INSEN in 2010. The 'gift basket diplomacy' of the United States with the speech of Prague in 2009 of President Obama brought to the forefront the need for nuclear security education. The International Atomic Energy Agency (IAEA) triggered the formation of the Network with the publication of the *Nuclear Security Series No 12-Educational Programme in Nuclear Security* which described the curriculum of a MSc and certificate program. Following this publication, the INSEN was formed as a partnership with institutions delivering nuclear security education.

Describing the structure of the Network, the speaker explained that INSEN is formed of three working groups with a specific focus: Working Group I on educational materials (developing presentations, textbooks), Working Group II on the exchange with staff and faculty, and Working Group III on knowledge management and the promotion of nuclear security culture. Within this structure, the IAEA provides the NUSEC portal, which gathers the resources developed by the Network and its members and represents one of the main assets of the Network. The organisation is also involved in the designation of the INSEN Chairs and working groups.

One of the training opportunities mentioned by the speaker is the International School on Nuclear Security organised in collaboration with the International Centre for Theoretical Physics. This two-week summer school is one of the regional schools run in different languages. This training opportunity enables fostering the new generation of security-aware nuclear scientists and professionals. Collaborative efforts in nuclear security education, like in biosecurity education, are necessary to improve national education patterns.

The mission of the Advisory Board on Education and Outreach of the Organisation for the Prohibition of Chemical Weapons in fostering responsible use of chemistry A presentation was given on the role of the Advisory Board on Education and Outreach (ABEO) in raising

awareness of the Organisation for the Prohibition of Chemical Weapons (OPCW), the CWC and fostering responsible use of chemistry. The ABEO was established in 2015 and is constituted of fifteen international experts that serve in their individual capacity and represent a wide range of expertise and covering all regions in the world. The ABEO provides advice on education and outreach matters to the OPCW Director-General, to the OPCW Policy-Making Organs and States Parties, upon their request.

Moving to the role of the ABEO in education, the speaker emphasised that the ABEO contributed to enhancing the e-Learning offering of the Secretariat, in line with the advice provided by the ABEO TWG on E-Learning, set up in September 2020 with a mandate of one year. This TWG recommended to set up a centralised digital strategy and to develop partnerships with academic institutions. The ABEO has provided its advice regarding translation and dissemination of educational resources and works to foster a culture of peaceful uses of chemistry/responsible knowledge of science.

The ABEO is now preparing an inventory of academic institutions worldwide with courses on the CWC and/or the OPCW. The ABEO has participated in meetings of National Authorities in the last few years and has set out strategies to reach out to different target audiences such as National Authorities, policymakers, chemical industry, and academia, among others.

The Strategic Plan of the ABEO reflects priorities in education, such as the ChemTech Centre's "bluebook" to promote the CCT. It also sets out the best strategies to reach out to diverse audiences. The ABEO Strategic Plan is currently being updated by the Board to adapt it to the new context following the complete destruction of all declared chemical weapons in July 2023. The role of the ABEO in raising awareness of the CWC among civil society, academia, and young professionals is key to foster engagement with non-proliferation and disarmament architecture.

The speaker concluded that there are substances that are regulated by both the CWC and the BWC such as ricin, and that fostering a culture of responsible knowledge in science/peaceful uses in chemistry can be achieved with the collaboration with relevant international organisations and academia. The role of the Board is key to preventing the re-emergence of chemical weapons.

The educational tools used by the Biological Weapons Convention Implementation Support Unit (BWC ISU) to promote the Convention The speaker introduced the role of the Implementation Support Unit in supporting the Biological and Toxin Weapons Convention regarding education and outreach. The speaker explained the background of the ISU mandate and particularly the consideration of implementation measures as part of the Eight Review Conference in 2016. The BTWC implementation guide also indicates the value of education and outreach. This is illustrated by measures such as the Youth for Biosecurity Initiative (Y4B) which aims to train scientists from the Global South. One of the successful examples of this initiative is the creation of a handbook on biosecurity and biosafety for high schools by in Nigeria by Y4B alumni.

Regarding the organisation of practical training, member states such as Cuba, the Russian Federation, and the US have submitted education and training offers. Other actors, such as the European Union Council, also supports the development and implementation of educational and awareness-raising tools for the BTWC. The pillar 5 of the EU Council Decision 'Enabling tools for outreach, education and engagement' focuses on these goals. This is also emphasised in the Disarmament Education Strategy of the United Nations Office for Disarmament Affairs. These initiatives demonstrate that there is a significant demand for assistance in biosecurity education. However, there are little to no funding to satisfy these demands. The speaker concluded by highlighting the importance of biosecurity education within the framework of Article X and the fact that countries increasingly understand the urgent needs to operationalize it.

Overview of the United Nations Institute for Disarmament Research's (UNIDIR) Current Work on Biosecurity Education. The speaker presented an overview of UNIDIR's current work on biosecurity education, and specifically on two workstreams of relevance. The first is the BTWC National Implementation Measure (NIM) Database. The BWC NIM database, funded by the United States, is designed to strengthen the implementation of the BWC, allowing States and other stakeholders to better understand different approaches to national implementation – broadly understood – from around the world. The database also serves as a confidence-building tool that seeks to promote trust, transparency, and cooperation in relation to the BWC. The database includes several filters, of particular interest to biosecurity education is "research on codes of conduct and guidelines" and "biosafety & biosecurity," where more details on – oversight of life-scientists dual-use research, training of personnel, cybersecurity

measures, biosafety/biosecurity associations, engagement with life scientists, codes of conduct or ethics for life scientists and guidelines on dual-use research for life-scientists – can be found. The database is an ongoing project, and as of March 2024, 35% of the States Parties to the BWC profiles are completed. By the end of 2024 the database should reaching completion.

The second UNIDIR workstream of relevance to biosecurity education is a report that specifically discusses education, as part of Effective Giving's funded bio-risks governance series. The report outlines seven general approaches to biosecurity education, namely: modules, specialized Workshops, translations, certification programmes, dedicated centres, networks, and online platforms. The speaker noted that this is neither a comprehensive nor a mutually exclusive list. Rather, outlining these approaches tries to provide an idea of what biosecurity education tends to look like and could entail. The speaker continued to present the report and the main questions and issues they address in this written piece, including on issues of sustainably and continuously engaging relevant stakeholders, ways to measure impact and the way forward.

Discussions following the presentation discussed the usefulness of database and settings. Issues of funding were addressed with IBSEN attempting to lobby government for funding on these issues. Difficulties of convincing ministries of education (top-down) of the importance and relevance of biosecurity education on curriculums were noted. The problem of insufficient biosecurity training of life-sciences leading to insurance concerns was also discussed.

Finding synergies and gaps across the various mandates for activities The speaker began the presentation by addressing the key role of individuals in creating awareness of biosecurity education. The speaker suggested that developing systems appropriate for each country is vital in creating a successful education or awareness system. Legal and cultural norms must be considered, and the practicality of activities must be assessed to suit each national context, for example, the utility of mobile phones is limited in some countries. The speaker highlighted the issues of duplicating activities regarding the individual requirements for each country and different characteristics of various audiences. The speaker emphasized the difficulties implementing holistic solutions and engaging academics, researchers, and policymakers. It was noted the specific challenges faced in attempting to engage young professionals and methods of engagement were brainstormed.

The speaker highlighted the responsibility of individuals, and the need to involve key individuals (researchers, policy makers etc) through greater activities and each step of the process. The speaker noted that this is a Convention of State Parties under which obligations as well as solutions to challenges apply across society and not just the government of the day. This may also influence the role of funders and expectations of collaboration. The roles of funders and sustainability was further discussed, noting the price of data transfers in some countries.

The speaker concluded that one needs to identify what constitutes a 'trigger' for any individual to begin researching theses specific questions, and how to inspire or identify the 'next champion' of biosecurity education and arms control policy.

2.4 Regional actors in biosecurity education

In this section, two specific examples of biosecurity education at different regions have been illustrated.

Fortifying Pakistan's Biological Security: Strengthening the International Education Network The speaker introduced the biosecurity concerns which Pakistan faces, addressing both natural and man-made threats. Biosecurity concerns include Infectious Diseases, Biological Terrorism, Zoonotic Diseases, Biosecurity Infrastructure and Dual-Use Research. The speaker noted the unstable political climate heightens Pakistan's vulnerability to biosecurity threats. The speaker discussed major activities in place to strengthen education network such as international liaison, policy suggestions to the government, use of traditional medicines and ethics for countering infodemics. The speaker highlighted the importance of inclusive participation, equitable collaboration, and the promotion of cognitive justice. The speaker also suggested the importance of acknowledging scientists limited interactions with the public.

The speaker presented the primary objectives of developing an international education network: Promoting Cultural Exchange, Facilitating Academic Collaboration, Enhancing Education Quality, Fostering Global Citizenship and Addressing Global Challenges. The

speaker stated that the international education network will serve as a catalyst for promoting collaboration, innovation, and mutual understanding in education, thus leading to the advancement of skills needed to address the complex challenges of the 21st century. The speaker then highlighted the risks of disinformation, drawing example from the 2020 COVID-19 pandemic. The speaker discussed the resurgence, normalization, and danger of the anti-vaccination movement, citing a 30% increase in measles cases sinch 2016. The dispersal of mis/disinformation via social media may lead to mistrust in governmental responses, stigmatization of those infected and exacerbation of existing political sentiments. The speaker then discussed the importance of understanding pathogen transmission, which is vital for public health management, vaccine development, economic impacts, and overall global health security. The speaker noted the importance of plans to implement biosecurity locally, nationally, and internationally, through workshops, conferences, symposiums, and global academic collaboration. The speaker identified key stakeholders in the international education network as follows: Government Agencies, Educational and Research Institutions, International Organisations, Non-Governmental Organisations, Industry Representatives, Community and Public Health Organisations, National and International Funding Agencies, Professional Associations in addition to Students and Trainees. The speaker presented the One-Health research programme in collaboration with the US National Academy of Sciences, with the first workshop held in Dubai (2016-2024).

To develop effective education programmes first an assessment of needs or gap analysis must take place. Programmes should be tailored, considering diverse learning styles, and forming collaborative learning environments. Programmes should focus on partnerships and collaboration with interdisciplinary training thus forming life-long learning resources (books, articles, online courses, and conferences). The speaker later discussed the role and importance of research and innovation in addressing biological security challenges, exampling One Health Approaches, CRISPR-based Diagnostics and Bradford & London Metropolitan Dual-Use Concerns projects. The requirement for robust policies/regulations and the need for international cooperation was then addressed in terms of implementing effective policies. The presentation concluded with the future directions and priorities required for fortifying Pakistan's biosecurity. Measures include but are not limited to enhancing biosafety and biosecurity infrastructure, the development of surveillance and early warning systems, improvement of disease diagnostics and responses, promoting research and innovation, strengthening regulatory frameworks, including legislation, fostering international

collaboration, addressing socioeconomic determinants of health, and raising public awareness and education. The speaker emphasized the opportunities for collaboration and innovation.

Analysis of the situation in Latin America The speaker opened with an overview of the stark differences between countries in Latin America, despite the perception of Latin America as a homogenous region. Differences addressed included cultural heritage, governments, languages, national criminality, threat perception and regional and international integration. The speaker stated that the first step to a forming a biosecurity education curriculum is to clearly define what biosecurity is and what this concept would include. The speaker suggested that biosecurity education may be led and implemented Nationally or Internationally. It may be implemented nationally by individuals, universities, Non-Governmental Organisations (NGOs), professional associations, and other government branches. Internationally it may be implemented via NGOs or other international organisations. To effectively establish biosecurity education in Latin America the country's/regional situation must be accurately considered.

The speaker then presented research performed in Argentina in 2023. The research community had expressed great interest in biosecurity, biorisk management, and dual-use concerns. Research revealed that some professors had begun to present biosecurity concepts to students however this was in addition to the curriculum and not a formal part of the syllabus. CWC courses are already established at the University of Cordoba and at a Technical University in Bueno Aires (UTN). CWC courses in Cordoba are hybrid, aimed to target youth education and are currently only taught in Spanish. Workshops and courses organised by professional organisations and international NGOs help strengthen the national capacity. Despite efforts there is still a lack of collaboration regarding convergence and dual use in the hard sciences in Argentina.

The speaker highlighted the importance of interaction between different sectors, such as the application of research completed at universities applied to daily work in the medical field. The speaker addressed concerns in engaging young academics/researchers and suggested the use of new technologies such as educational biosecurity videogames. The speaker noted that a lack of formal governmental policy and articulation of the aforementioned activities weakens the initiatives and consequently they rely on personal commitment.

The speaker concluded that there is great professional interest in creating awareness and education on biosecurity, biorisk management and dual-use concerns and as such there is fertile ground for collaboration.

2.5 Challenges in global biosecurity education

The discussion was organised around three key aspects: coordination of initiatives, the obstacles faced by these initiatives and the development of the IBSEN.

A participant raised the question regarding how to design an effective national authority which would enable stakeholders to hold regular meetings at the national level. However, as organisations and institutions are leading different projects on biosecurity education, the priority would be the creation of a 'mapping' of already-existing projects. This survey of projects would enable the design of a clear roadmap for future initiatives. Going beyond the creation of educational material, some attendees highlighted that institutions and international organisations should also learn from each other regarding how to engage with the targeted audiences. Outreach is therefore directly linked to biosecurity education.

Specific attention was paid to methods of engaging young professionals and youth researchers at many levels including early career, postgraduate students (including doctoral students), bachelor and high school students. A 'bottom-up' approach was discussed, highlighting the benefits of early introduction to biosecurity concerns. Methods and activities to engage students such as seminars, team-based learning activities, video games, cartoons and the use of social media were all considered. Furthermore, great emphasis was placed on creating sustainable learning environments for all students from differing academic backgrounds (life sciences and social science).

The importance and use of history as a 'template for action' was further discussed. The speed at which science and technology progress compared to societal change was explored. Questioning if science is progressing at a greater speed than law and proposing that it is not law and policy which has failed to progress but society.

A common aspect of these initiatives discussed by the attendees was the lack of sustainable funding for biosecurity education. This project of international coordination would bring the opportunity to overcome these obstacles. Another attendee emphasised the necessity to clearly state the objectives, obstacles, and solutions of initiatives such as the IBSEN to reach policymakers, national governments and attract more funding opportunities. Sustainable funding is a key aspect to develop global biosecurity education and should not be overlooked.

3. Conclusion

The meeting concluded with widespread agreement that the workshop was useful and interesting as it brought together experts from various backgrounds. The speakers agreed that this type of dedicated workshop is important to strengthening global and regional chemical security and biosecurity education. They also stated that these meetings should be organised regularly as part of the projects initiated by the LMU BSRC such as the IBSEN.

The attendees also recognise the significance of the projects led by the BSRC and the necessity of a network dedicated to biosecurity education. Efforts in the field initiated by the civil society and supported by international organisations are necessary to strengthen biosecurity education.

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