Invited Articles

Building a BTWC Education Module for Life Scientists

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The design of the online module on "The Dual-Use Dilemma in Biological Research" life scientists would constitute an introductory case study and five major elements. The problem of hostile misuse, The web of prevention, Regulation, Evaluation and assessment, Resources. In December 2006 the States Parties to the Biological and Toxin Weapons Convention (BTWC), in the *Final Document* of their Sixth Five-Year Review Conference, agreed, in regard to Article IV on National Implementation, that:¹

"The Conference urges the inclusion in medical, scientific and military educational materials and programmes of information on the Convention and the 1925 Geneva Protocol. The Conference urges States Parties to promote the development of training and educational programmes for those granted access to biological agents and toxins relevant to the Convention and for those with the knowledge or capacity to modify such agents and toxins, in order to raise awareness of the risks, as well as the obligations of States Parties under the Convention."

Unfortunately, despite similar sentiments being present in the *Final Documents* of the 1986, 1991 and 1996 Review Conferences, Australia noted at the 2005 Meeting on Codes of Conduct that:²

"Amongst the Australian scientific community, there is a low level of awareness of the risk of misuse of the biological sciences to assist in the development of biological or chemical weapons..." and that lack of awareness is widespread, as we have discovered in some 90 interactive seminars with life scientists in 13 different countries³.

As the revolution in the life sciences progresses and the potential impact of the hostile misuse of benignly-intended work grows there is an increasingly widespread perception of the need for educational materials to be developed in order to raise the awareness of life scientists. A two-day seminar in South Africa in late 2007 addressed this issue and the methodology used may be of interest to others focusing on the same problem.

The South African Institute for Security Studies (ISS) was interested in examining the possibility of developing an educational module for life scientists and arranged for some 16 participants to discuss how this might be done in a *Bio-Educational Module Workshop*. The South African participants were from a wide range of backgrounds including academia and industry and the overseas participants had been previously involved in developing educational material for life scientists.

Brian Rappert presented a review of the work he and I

had carried out in our interactive seminars and raised some of the issues that we had confronted in developing the seminars:⁴

- What should education entail by way of subject matter?
- Who needs to be educated?
- Who is the educator?
- What is the purpose of education?

He pointed out that the seminars had focused on the dual-use issue, had been for university staff and students and life scientists in public institutes, that the purpose had been to encourage deliberation and testing of assumptions and that both participants and presenters of the seminar had been involved in a learning process.

Megan Davidon then gave a review of the experiences researchers at the South East **Regional Center of Excellence for Biosecurity** (SERCEB) in the United States had in developing, using and evaluating an online module on "The Dual-Use Dilemma in Biological Research".⁵ Amongst the lessons learnt Megan highlighted the need for a wide range of expert reviewers of the module as it was developed and the great insight that could be gained from asking users of the module to provide an evaluation of their experience. What was particularly interesting was the careful use of case studies relevant to practising life scientists in order to convey the information required. The international context of the workshop was additionally filled out with a review of the WHO's work on Life Science Research and Global Health Security.⁶

Many different kinds of educational module could clearly be developed for various audiences and in different ways. So against this background of reviewing previous and ongoing work the ISS participants began to outline what they had in mind for their particular module. The participants in the workshop took care to examine these objectives in some detail and to not move on too quickly to the question of the content of the proposed module. This proved to be a useful approach and clarified some of the difficult questions that any module developer will have to confront.

There are many ways in which this discussion could be summarised, but it was clear that ISS was looking for a broad-based educational module. I summarised its objectives for myself as follows:

- "i) To inform life scientists of the dangers of the hostile misuse of their benignlyintended work; and
- ii) To enable life scientists to better take part in preventing the hostile misuse of their benignly-intended work."

It was also clear that ISS had in mind an internet-based, but simply constructed, core module that could be widely and easily used (appreciating, however, that at a later stage specialist additions might be required for some groups such as biosafety officers). They also wanted some kind of assessment, perhaps multiple choice, at the end of the module so that people could show that they had taken it.

Having cleared the ground in regard to objectives and general design the workshop turned its attention at the end of the first day to what major sections there should be in the module. What became apparent in this discussion, and more so as details were debated on the second day, was the consensus that a case study approach which focused on issues clearly relevant to practising scientists would be the best.

So without fixing on precisely what the case study (or studies) should be it was decided that an introduction to the module might usefully be constructed to raise particular issues that could be followed through in the rest of the module. The SERCEB module on the dual-use dilemma makes imaginative use of a case study of a scientist who unexpectedly finds a major journal expressing concerns about her work on the grounds of biosecurity, and it was felt that something similar might be constructed to bring out the broader issues envisaged for this module.

It was not possible in a two-day workshop to agree exactly on nomenclature and so I will use mine here. However, there was agreement on what major sections were required to raise awareness. These were:

- the problem of hostile misuse of the life sciences;
- the web of integrated policies that could prevent hostile misuse;
- the dual-use dilemma;
- the country's regulatory system;
- evaluation and assessment; and
- resources

Whilst some participants thought that, ideally, people taking the module might be able to take these sections in any order, it was eventually concluded that it was best if they were taken sequentially by everyone.

Having progressed that far on the first day, the second day of the workshop began with a personal review of the main points of the first day by one participant and then discussion turned to what might go into each section of the module. Again it should be emphasised that different people stressed different aspects and used different terminology on occasion. However, I thought there was considerable agreement and noted the following possible elements to succeed the introductory case study.

A. The problem of hostile misuse

- Biological warfare to 1945
- Biological warfare from 1945 to the present
- Future biological warfare?

The Fink Report of the US National Academies.

The Lemon report of the US National Academies.

B. The web of prevention

- The idea of a web based on the international norm but including other elements
- The 1925 Geneva Protocol and the Biological and Toxin Weapons Convention
- The Chemical Weapons Convention
- The BTWC Intersessional Meetings

National implementation Codes of conduct and awareness raising

C. The dual-use issue

- The difficulty of defining dual-use
- Examples

Mousepox

Polio virus

1918 Spanish influenza

- Responses

Oversight systems such as NSABB in the USA Proposals by synthetic biologists

- Ethical issues

The Nixdorff/Bender system Medical ethics

D. Regulation

- Legislation to implement the CWC and BTWC
- Export controls
- Security and oversight of pathogens
- Enhancement of disease monitoring and response capabilities.

E. Evaluation and assessment

- Summary of main points of the module
- Frequently asked questions/ answers
- Assessment
- Open-ended evaluation by person taking the module

F. Resources

- A selection of key studies was envisaged

A recurring theme of the discussion was that this material should not be presented in a dry and boring manner. It has to be relevant to the practising scientist. It appeared possible to me that with care the initial case study might be revisited as each section of the module was encountered. Thus if the case study introduction had a scientist encountering a problem in his work the first section:

(A) would allow the reason for the problem to be elaborated, the second

- (B) to suggest that there was an international awareness and effort to deal with the issue, the third
- (C) to go into the detail and the fourth
- (D) to explain the specific legal regulation in that particular country. It might also be possible in the fifth summary section
- (E) to indicate various ways in which the initial problem could be resolved. However, a different approach might be to use different case studies at various points in the module

What then can be said about the utility of this international collaborative approach to dealing with the problem of awareness raising? I think it is fair to say that all participants were surprised at the amount of productive work that was done in the workshop. I felt that with a few more experimental modules undergoing test we might perhaps have an idea of 'best practice' developing.

Nevertheless, the workshop was only a starting point. Moving to writing the script of the modules, checking it with experts, turning it into a useable IT system and pilot testing will take some time. Yet here again there are groups with experience of doing just this from whom we can learn and borrow. Altogether then a good prelude for participants in 2008 when the BTWC meetings will, in part, deal with:⁷

"Oversight, education, awareness raising, and adoption and/or development of codes of conduct with the aim of preventing misuse in the context of advances in bio-science and biotechnology research with the potential of use for purposes prohibited by the Convention".

References

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- Australia Raising awareness: approaches and opportunities for outreach. BWC/MSP/2005/ MX/WP.29. United Nations, Geneva, June 2005.
- 3. United Nations *Statement* by Professor Malcolm R. Dando of the University of Bradford Department of Peace Studies to the Meeting in December 2007 of the States Parties to the Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction. United Nations, Geneva, December 10, 2007.
- 4. Rappert, B. Education and outreach to scientists in fostering a web of prevention: The case of dual-use research seminars. Presentation to a Dual-Use Educational Module Development Workshop, Cape Town, South Africa, November 29, 2007.
- 5. Davidson, M. The *dual-use dilemma in a biological research module*. Presentation to a Dual-Use Educational Module Development Workshop, Cape Town, South Africa, November 29, 2007.
- 6. Folb, P. *Life science research and global health security*. Presentation to a Dual-Use Educational Module Development Workshop, Cape Town, South Africa, November 29, 2007.
- 7. See reference 1.