Published in final edited form as:

Sci Eng Ethics. 2014 June ; 20(2): 445–467. doi:10.1007/s11948-013-9468-x.

Moving Life Science Ethics Debates Beyond National Borders: Some Empirical Observations

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Abstract

The life sciences are increasingly being called on to produce “socially robust” knowledge that honors the social contract between science and society. This has resulted in the emergence of a number of “broad social issues” that reflect the ethical tensions in these social contracts. These issues are framed in a variety of ways around the world, evidenced by differences in regulations addressing them. It is important to question whether these variations are simply regulatory variations or in fact reflect a contextual approach to ethics that brings into question the existence of a system of “global scientific ethics”. Nonetheless, within ethics education for scientists these broad social issues are often presented using this scheme of global ethics due to legacies of science ethics pedagogy. This paper suggests this may present barriers to fostering international discourse between communities of scientists, and may cause difficulties in harmonizing (and transporting) national regulations for the governance of these issues. Reinterpreting these variations according to how the *content* of ethical principles is attributed by communities is proposed as crucial for developing a robust international discourse. To illustrate this, the paper offers some empirical fieldwork data that considers how the concept of dual-use (as a broad social issue) was discussed within African and UK laboratories. Demonstrating that African scientists reshaped the concept of dual-use according to their own research environmental pressures and ascribed alternative content to the principles that underpin it, suggests that the limitations of a “global scientific ethics” system for these issues cannot be ignored.

Keywords

Ethics; Life sciences; Developing countries; Contextualization; Education; H. T. Engelhardt Jr.

Scientific research is increasingly becoming a global endeavor, and international movement and sharing of data, personnel and materials is a hallmark of modern science. Together with the unprecedented achievements of research in recent decades, this trend is forcing us to reconsider what is understood by scientific research and what responsibilities are attached to the production, distribution and reuse of knowledge.

In particular, life science ethics is increasingly being called upon to facilitate the conceptualization of a modern, global life science community that is engaged in responsible research. How ethics is to achieve this goal, however, remains a topic of considerable debate. While there has been considerable endorsement for developing a “global system of ethics for the life sciences”, there are rising concerns that the use of such systems marginalizes certain communities of scientists from international discussion—particularly those in developing countries—through lack of sensitivity to issues of contextuality in ethical discourse.

It is particularly these concerns that this paper examines. By making use of the topic of dual-use as a focalizing example it critically examines whether current trends that make use of a “global science ethics” rhetoric to introduce the issues of responsibility and awareness may in fact alienate developing country scientists from the debate. Instead, this paper questions whether an increased sensitivity is needed in life science ethics discourse that recognizes the influence of contextuality on the development of ethical debates. In order to examine these controversial issues, this paper makes use of considerable comparative fieldwork that was conducted in African and UK laboratories where scientists were asked to discuss their perceptions of dual-use.

This paper begins, however, by examining the development of global ethics as applied to the practice of investigations that expand the scope of science—how it has come to play an important role in life science ethics, and what problems there are with uncritically applying such a system to all aspects of scientific research.

Endorsing the Idea of a “Global System of Ethics for the Life Sciences”

Before presenting the empirical investigation into these issues, it is important to properly elucidate the concerns about promoting systems of “global ethics” within the life sciences. These are detailed below in this section by considering why we talk of global ethics, how we do so, and what implications this might have on building an international culture of awareness and responsibility amongst scientists.

Why Talk About a “Global System of Ethics for the Life Sciences”?

Science ethics, as a unified field, has been highly influenced by the development of human rights and protection rhetoric that arose out of the atrocities of World War Two (Evers 2001). Concerns about the misuse of study participants in medical research and the evolution of the field of medical/bioethics had considerable impact on how scientific research was perceived and discussed. As bioethics has for many years championed a “principalist” approach that promotes global norms for addressing ethical issues, it is unsurprising that this legacy has—at least in part—had a strong influence on the developing field of life science ethics.

The promotion of “global norms” and global “standards of behaviour” in discussions on the life sciences has subsequently proven particularly effective in the emerging field of research ethics. Widespread agreement on what constitutes misconduct in research¹ and consensus on minimum standards of behaviour has led to considerable unity and harmonization in many

areas of research ethics (Resnik 2009; Shamoo and Resnik 2009). It must also be noted that a large portion of discussion on life science ethics—particularly on broader issues—occurs predominantly in a small number of Western countries such as the USA and UK. Thus, key similarities in social priorities and ethical approaches have further decreased the need to address issues of a contextuality approach in many ethical discussions.

Due to these (and no doubt other) influences, discussing science ethics in “global” terms has become a common style of argumentation. Without properly interrogating the implications of promoting a “global science ethics”, many discussions have nonetheless become characterized by their attempts to identify “globally applicable duties” for the generalized “global science community”. These discussions usually have a number of identifiable similarities that are detailed below.

What Does a “Global System of Ethics for the Life Sciences” Look Like?

As the name would suggest, approaches to “global science ethics” may be understood as strongly deontological and/or principlist approaches that attempt to identify norms and duties that are globally applicable regardless of the context in which they are applied. Although it is generally agreed that the context may have considerable influences on the behaviour of an individual, because of the universal nature of the duties the context is not assumed to alter the duties in any way or influence the manner in which ethical norms in some of the introductory studies are interpreted.

This approach has had considerable influence on life science ethics pedagogy. Within many pedagogical initiatives, ethics is presented to life scientists as grounded in a number of globally applicable ethical norms² that are understood to inform duties and behavioural requirements for scientists often linked to important regulations or legislation. In these models there is usually little discussion of the practical implementation of duties in daily research, or the possible influence of the research environment on ethical behaviour. Nor, it must be added, are the variations in national approaches to science governance (as evidenced by national legislation and regulations) given much coverage. Due to these issues, I propose that contextuality is not highly discussed within current “global science ethics” approaches.

What Problems Have “Global Science Ethics” Become Associated With?

Within the broader ethics community global ethical approaches are increasingly coming under fire. Academics are increasingly beginning to question how unified ethical systems can be justified without an overarching figure of authority—such as God. Thus, it is increasingly being questioned how can notions of a “global ethics” be understood in a modern, secularized world?

There has recently been considerable support for alternative systems that take into account contextual interpretations of ethical principles. Ranging from virtue ethics to “contextually sensitive” principlism, these systems suggest that modern society be understood in terms of

¹Such as, for instance, the “FFP” misconducts of falsification, fabrication and plagiarism.

²These norms are also often listed in codes of conduct or codes of practice.

“moral communities” of individuals who are united by contextually informed understandings of ethics. Scholars such as H. Tristram Engelhardt Jr have been influential in offering alternatives that relate to the latter. Indeed, Engelhardt’s two-tiered system of ethical principles involving *content-poor* versions which have the ability to span numerous, divergent moral communities,³ and a *content-full* versions which refer to a particular community’s interpretation of the principle in reference to their understanding of the “good life” (Engelhardt 1985: 52) provide an important alternative to a global secular ethical system.⁴

Despite these challenges to “global secular ethics”, such concerns have not gained much attention within life science ethics. As mentioned above, this may be in part due to research ethics being able to circumvent many of these problems due to high degrees of international agreement on certain ethical issues (such as the treatment of human subjects) that are underpinned by global treaties (such as the Helsinki declaration).⁵ For many other areas of science ethics, however, this may not be the case and it is important that these challenges be properly considered.

Such concerns are of particular importance for “broad social issues”⁶—the issues arising as a result of the social contract between scientists and societies. These broad social issues encapsulate the tension between society’s perceptions of the incredible benefits that scientific research and new technologies offer, and the considerable harm that can arise from their generation. Importantly, it must be recognized that within these issues the possibility of harm does not arise solely through misuse, but also by violating cultural perceptions of morality—an issue that has become pertinent in discussions on stem cell research and synthetic biology (Gibbons 1999). These issues reflect society’s growing concern with the downstream influence of scientific research on social morality, health and safety. In addressing these concerns, the integrity and responsibility of scientists thus necessarily extends beyond simply conducting credible research within an established social institution, but also requires critical reflection on what is the right thing to do for (and with) society (Gibbons 1999; Mitcham 2003).⁷ Thus, interpretations of these issues rely heavily on a contextual interpretation of key ethical concepts such as “good” and the “good life”.

³I.e. The principle of beneficence in its broadest sense is understood by different communities of scientists to play an important role in the interpretation of a broad social issue such as stem cell research.

⁴In offering this alternative Engelhardt emphasizes his perception that in the absence of a “higher deciding power”, such as God, it is impossible to construct an international system of ethics.

⁵The treatment of human subjects in life science research, for example, has been the topic of a number of international agreements such as the Nuremberg Code (1947) and the Declaration of Helsinki (1975) that have been widely endorsed internationally. The recent codification of the ethical principles underpinning international discussions in this area were identified in the UNESCO publication *Universal Declaration on Bioethics and Human Rights* (2005).

⁶I make the distinction between the *internal responsibilities* that scientists hold to their research and their colleagues to ensure that high quality data is produced with integrity, and the *broad social responsibilities* that reflect the social contract that scientists hold with society and their commitment to produce scientific research that will enhance and promote humanity in a manner that takes into consideration social priorities and norms.

⁷For example, in the last decade scientific and biotechnological advances such as “Dolly the sheep” the human genome project, human embryonic stem cells, gene transfer, transgenic animals, and the chimera hu-mouse have all raised serious concerns about the knowledge generated by the life sciences, while also offering significant opportunities for advancement (Jones 2007). These emerging technologies are not only challenging human imagination, but the speed of modern scientific research has also made it difficult for ethics to catch up. Increasingly, questions are being asked about the limits of scientific research—whether there is, in fact, some knowledge better left untouched. Science, together with associated fields such as computing, is increasingly being called upon to defend and redefine their social contract with society. In addressing this, the integrity and responsibility of scientists necessarily extends beyond simply conducting credible research within an established social institution, but should also include critical reflection on what is the right thing to do for (and with) society (Mitcham 2003).

In such cases it therefore becomes important to question whether the uncritical endorsement of global ethical approaches may become problematic. If the “good” of scientific research is not a globally standardized concept, but is rather a socially negotiated understanding, how can approaches that overlook contextual variations be useful? Over and above the impact that this might have on the development of life science ethics dialogue, such concerns are becoming increasingly pertinent due to the rising internationality of life science research. The life sciences are rapidly transcending national borders as data, materials and personnel move internationally. Therefore, there is a growing need to foster international discourse on these broad social issues—increasingly so as a slew of legislation emerges to address these issues. Although within policy communities, there is an increasing recognition that “one size cannot fit all,”⁸ it is as yet unclear how far such an observation should be extended. Are these variations in the legislation understood as differences in the *application* of globally applicable principles, or do they in fact reflect different contextual *interpretations* of these principles? Such distinctions must necessarily play an important role in fostering international discussion, and thus cannot be ignored.

These problems are exacerbated by the fact that broad social issues often form an “add-on” topic to the dominant research ethics (Mancini and Revill 2008), and are limited to discussions on differences in regulatory approaches.⁹ This tendency is exacerbated by lack of funding to develop and implement ethics curricula, overcrowded scientific curricula and the scarcity of qualified educators has made current ethics education amongst life scientists patchy and unstandardized (NRC 2011). In such situations, ethical principles are usually discussed in terms of a “global system of ethics for the life sciences” and rarely (if at all) are the possible alternative causes for differences in approaches probed in any meaningful manner. This state of affairs is no doubt furthered by the increasing bureaucratization of broad social issues through legislation and regulation, which provides a means of discussing variation according to regulatory differences only.

What Impact Could the Continued Use of a “Global System of Ethics for the Life Sciences” Have on Fostering International Dialogues of Responsibility?

The prevalence of “global ethics” approaches within both life science ethics discourse and pedagogy has some important implications. First and foremost, and particularly due to the limited amount of time (if any) spent on ethics education for scientists, life science practitioners will often not be aware of (or capable of accessing) alternative systems of ethics. This raises the distinct possibility that they will be presented with a binary state of “agreeing or disagreeing” with ethics *as it is presented to them*—something that must be seen to be highly problematic for the analysis of culturally sensitive subjects such as broad social issues.

⁸Issues such as the regulation of stem cell research, for example, have had markedly disparate treatment in countries around the world. While some countries have developed considerably permissive laws regarding the generation and use of stem cells, others have banned the practice outright. These variations, it is important to note, are usually suggested to have arisen as a result of religion, political positions and other social factors (UNESCO 2001; DRZE 2011). Despite the international policy community having long recognized these variations, and the ethics community commenting widely on these variations, this has not (to my knowledge) however led to as much criticism of global system of ethics for the life sciences as might have been expected.

⁹It must be noted that the inclusion of these broad social issues in ethics education as “add ons” is at least in part due to broad social issues being newer for ethics education and thus often incorporated in preexisting structures—both of educational structures as well as the methods of teaching them.

Such a situation may also have considerable impact beyond the involvement of scientists in ethics discussions. A lack of discussion on the possibility that ethical norms may be *contextually interpreted* in contrast to *contextually applied* also has important consequences for how regulations are understood and endorsed. When as is increasingly the case, regulations are transported out of their original context due to international funding, publication requirements or collaboration activities they carry with them cultural constructions of ethics. Without an understanding of how ethical principles are contextually informed, such situations may prove highly problematic for scientists and result in regulations being misinterpreted or misapplied.

Furthermore, in attempts to increase international awareness, there are many bodies promoting the development of “international ethics modules” which may mean that a rising number of scientists are receiving ethics education from foreign sources that do not critically examine the issues of contextuality in life science ethics. Such oversight may significantly decrease the efficacy of these initiatives, as scientists may fail to truly grasp the pertinence of the ethical discussions if a (foreign) contextually informed ethics approach is presented to them as a “global approach”.

Ultimately, neglect of contextual matters in life science ethics may result in a potentially difficult situation where scientists may struggle to see value in the ethics regulations, funding requirements and conditions of collaboration that accompany the international elements of their research. In such cases, it is feasible to suggest that a failure to see value in ethical discussions and the demands they make may be detrimental to these scientists. Similarly, it is not unfeasible to suspect that they might experience ethical distress by not being able to fulfill the criteria, ethical dissociation by distancing themselves from the requirements, or anomie as they cease to see value in the ethics supposedly governing their research.

A brief review of such problems makes it important to ask the question: can a “global system of ethics for the life sciences” system sustain and foster international discussion on broad social issues within science, or are more contextually sensitive approaches necessary for establishing truly effective international discourse?

Setting the Scene for an Empirical Investigation: Is Contextuality Important in Life Science Ethics?

Such a question is, of course, highly contentious and contrasts considerably with the current approaches to life science ethics elaborated above. In order to examine these issues in further detail, an empirical research project was designed which would be comprised of comparative investigations of how scientists in a variety of research environments interacted with one broad social issue—the problems of dual-use in research. Dual-use will be discussed in the section below, however (briefly) it refers to the potential for beneficial scientific research to be misused by a third party for nefarious purposes.

Incorporating empirical investigations into a theoretical analysis of ethical issues echoes recent trends in bioethics scholarship that are starting to recognize the value of empirical

research (Frith 2012). Indeed, it is possible that utilizing a methodology that sees practice as informing theory just as theory informs practice has definite benefits for such areas of scholarship. By carefully employing social science methodologies, it has been proposed that “a middle ground between “traditional” applied ethics that builds on abstract, a priori ethical theory, and contextualist, relativist accounts that reject any form of theory” (Frith 2012) may be found. In short, a naturalized ethics that sees the importance of both ethical theory and practice, and one that appears ideally placed to address issues of contextuality within ethics.

In keeping with this aim, a research plan was designed that made use of a comparative, multi-methodological approach. Four sub-Saharan African life science laboratories (two in South Africa and one each in Kenya and Uganda) and one in the UK were visited for 4–6 weeks, during which time laboratory staff and students were invited to participate in semi-structured interviews and focus groups. Embedded observations were also carried out by the author to better understand the research environment—both social and physical—of the laboratories, and identify any particular pressures that the staffs were working under.¹⁰ These laboratories were selected due to commonalities in their research focus and the methodologies being utilized, their size (above ten members per laboratory), and the combination of students and staff (all laboratories had postgraduate students).

The fieldwork at each laboratory was initiated by introducing the scientists in the laboratories to the concept of dual-use as it is currently presented in discussions and educational modules. As will be discussed in the coming section, dual-use education makes use of a “global system of ethics for the life sciences” approach and current dual-use ethics discourse strongly promotes the identification of specific duties for scientists to fulfill their responsibilities for the dual-use potential of their research. Scientists were introduced to the concept and the ethical discussions surrounding it through an introductory seminar and/or a detailed information sheet. Furthermore, a considerable amount of time was spent detailing the areas in which dual-use concerns were becoming part of daily scientific practices—through bureaucratic elements on funding obligations, publication requirements, export and import controls and so forth. The bureaucratization of dual-use was further discussed in terms of the motivation for the emerging regulations (i.e. control of possible terrorist misuse), emphasizing ways in which these issues would become part of the daily research life of the fieldwork participants.

The scientists were then, through interviews and focus groups, encouraged to discuss and explore their reaction to the concept as it was presented, and encouraged to make connections between their affirmation/rejection of dual-use and their perceptions of their social, regulatory and physical research environment. These transcripts were analyzed to determine the following: how the participants reacted to the concept of dual-use; how they rationalized their reactions; what personal, social and physical issues contributed to their reactions; and how these reactions reflected their perceptions of the underlying ethical concepts such as “beneficence”, “harm” and “responsibility”.

¹⁰These observations were possible due to the author’s previous background in life science research.

The interviews and focus groups were semi-structured in nature and allowed participants the freedom to develop their own narrative on dual-use. These narratives were initiated by asking the participants to discuss their own research and relate their reactions to the dual-use concept *in terms of their own research experiences and perceptions of their research environment*. The development of the narrative was broadly guided by key questions that allowed the participants the opportunity to discuss dual-use in their own terms, although clarification was requested by the interviewer when appropriate.

Analysis of the transcripts was conducted thematically using a number of broad themes—an approach that has previously been recognized to be well suited to semi-structured interviews and focus groups (Bryman 2008). Similar thematic analyses of field-participants' discourse on the dual-use concept had previously been used in related studies on dual-use (Rappert 2007), and proved a useful means of interpreting the data. Topics for analysis included the initial response to the concept of dual-use; the development of a justification for the response; how this justification contained interpretations of “harm”, “beneficence” and “responsibility”; and how these interpretations were linked to the participants' perceptions of their environment. Finally, these analyses were broadly assessed to determine whether there was any evidence of similarities in moral approaches between the laboratories visited.

In a comparable manner to these previous studies, the analysis below does not attempt to summarize “what happened” by providing statistics of how many times specific responses were made, but instead tries to tell a story using the analysis and quotes. This narrative focuses on how scientists in different laboratories interacted with the dual-use debate and how they created meaning out of the concept. In conducting this analysis I drew heavily on the work of H. T. Engelhardt Jr, who (as discussed above) suggested an alternative to “global secular ethics” by dividing inter-contextual ethical discussions on two levels: a content-poor level which transcends cultural boundaries and is comprised solely of broad ethical principles, and a content-full level in which communities ascribe contextually-informed content to these principles.

I approached the transcripts in a similar manner, asking whether the ethical norms underpinning the dual-use debate were constant between laboratories, or actually varied as a result of contextual content attribution. I therefore questioned whether the concept of dual-use in its current state could meaningfully transcend national boundaries as part of a global dialogue on ethics (along the lines of a “global system of ethics for the life sciences”), or whether it should only transcend cultural borders as a “content-poor” discussion (i.e. as the possibility that information generated by research can be misused for negative purposes) and required a “content-full” interpretation (i.e. specific interpretations of harm arising from the misuse of information) to be attributed to it in a particular context. Furthermore, the analysis thus interrogated the fitness of transporting a “content-full” approach (as the Western interpretation of dual-use appears) across borders without recognizing the need for a content re-evaluation in the new, different context.

Observations from Empirical Fieldwork: Understanding the Development of Dual-Use Discourse in Different Settings

As mentioned above, the empirical studies made use of the concept of dual-use as an example of a broad social issue. It is therefore important to present a synopsis of this topic, and to detail why exactly it was chosen to represent a diverse field of concerns. The following section therefore briefly discusses the development of the dual-use concept, the prevalent ethics rhetoric surrounding it, and current educational approaches to foster dual-use awareness amongst scientists.

The subsequent section presents the analyses of the fieldwork divided into two parts—the reactions of the scientists working in the UK and those from scientists in African laboratories. The justification behind these divisions is explored in some detail.

Dual-Use as an Example of a Broad Social Issue

Broadly, the concept of dual-use refers to the possibility that a third party may misuse beneficial scientific *knowledge* for nefarious purposes¹¹ (Miller and Selgelid 2007). In recent years, dual-use has rapidly become a topic of considerable discussion within many stakeholder communities associated with the life sciences. Increasingly, this concept is raising questions regarding the limits of research, the control of research, accountability within research, and of course responsibility for any dual-use events. Because of this, it serves as a good example of a broad social issue that is increasingly coming under discussion.

Dual-use, as the potential to turn the “life sciences into the death sciences” (Rappert and MacLeish 2007)—or at least into very harmful sciences—raises many ethical questions relating to how and why harm is conceived in a particular manner.¹² how responsibility is meted out for nefarious events, and what in fact constitutes adequate care to avoid events that are (at best) only a future potential. In particular, relating to scientists, dual-use forces us to question whether scientists should be held responsible for the misuse of their research at all, and if so what exactly can be expected of them to prevent such occurrences. Nonetheless, despite these difficulties, it is widely endorsed that scientists should identify with a “global responsibility” for addressing these issues and assisting in attenuating the nefarious potential within the life sciences.

By virtue of its focus, the concept of dual-use therefore hinges on an understanding of beneficence in research and harm arising from maleficent misuse. It thus stands to reason, based on the argument presented above, that the interpretation of principles such as beneficence and maleficence would be contextually informed and may vary considerably between scientific communities. Interestingly, however, there is little (if any) discussion on varying interpretation of these principles within dual-use and the principles of beneficence

¹¹This, of course, contrasts to biosecurity issues that are predominantly concerned with the misuse of physical samples, equipment or reagents (Clevestig 2009).

¹²Harm arising from the misuse of data may have many interpretations including the generation of weapons, adverse environmental impact, creation of social unrest, creation of situations in which individuals or communities may be stigmatized or penalized and many other possibilities.

and maleficence are predominantly ascribed a particular and constant content within this discourse.

It is likely that this may be attributed to two important considerations. Firstly, dual-use, due to its association with biosafety and biosecurity, is commonly presented with research ethics in education and discourse. This association, together with the influence of contemporary bioethics, has resulted in the promotion of a “global system of ethics for the life sciences” in dual-use discourse. Secondly, due to the majority of dual-use discussions originating almost entirely in the UK and the USA these have been few comparative studies of dual-use discourse outside the Western world.¹³ Thus, in the post-2001 climate of the “War on Terror”, the majority of dual-use discussions have focused predominantly on the possibility of beneficial research being misused by sub-state actors for biowarfare purposes (Kuhlau et al. 2008). In this manner, it may be suggested that the dual-use debate has become identified by certain interpretations of the principles of benefit and harm: namely that research produced in an ethically sound manner may be misapplied to contribute towards bioterrorism, and that this has become promoted as a globally-applicable interpretation of the dual-use principle.

In the absence of a wide range of alternative approaches to the concept of dual-use, this “Western-centric” approach has rapidly become accepted as the standard interpretation. Indeed, it has received global attention due to the considerable amount of the dual-use policy-related initiatives from the USA and the UK that increasingly require dual-use considerations to feature in funding, publication, and collaborative initiatives (Rappert and MacLeish 2007). This “web of prevention” approach (as it has come to be named) advocates increasing current biosafety and biosecurity controls so as to guard against the possible misuse of information by bioterrorists (Rappert and MacLeish 2007). In this manner, dual-use as specifically referring to the prevention of bioterrorism is increasingly becoming a recognized bureaucratic element on Western funding forms, import and export controls, publication and review requirements, biosafety and biosecurity requirements and many other areas that affect daily research activities.

Furthermore, the emerging field of dual-use ethics has largely sidestepped issues of contextuality within ethics—potentially in part due to the similarity between the interpretations of the dual-use concept by the “key players” (UK, USA, Australia). Thus, the majority of the discussions on contextual variations has therefore tended to focus on differences in regulatory and legal initiatives for dual-use control and do not address the possibility of contextually different interpretations of the key principles such as harm and beneficence in dual-use.

This recent legacy has obviously influenced current educational initiatives aimed at raising dual-use awareness amongst scientists. The majority of current dual-use educational initiatives have been developed in the UK and USA—mainly for scientists in these countries (NRC 2011). To this end, they widely promote the specifically Western-centric interpretations of harm and beneficence described above. Similarly, they rarely (if at all)

¹³Although this is changing, these studies are still in a considerable minority in comparison to those focusing on Western countries.

include discussions on how the interpretation of these principles is informed by the context in which the argument is developed.¹⁴ Thus, these educational modules are particularly suited to scientists within developed countries, however it must be questioned how suitable they are for building international discourse on dual-use if (as suggested above) scientists from different communities may have considerably different interpretations of the concept.

Such concerns become particularly pertinent when considered against the international endorsement of the need to create a “common culture of awareness and a shared sense of responsibility within the global community of life scientists” (NSABB 2006: 5). In light of this aspiration, it becomes important to question whether current approaches to the concept of dual-use and dual-use education are sufficiently able to do this in the absence of considerable discussion on contextual variations in ethical principles. In particular it is vital to consider that scientists in developing countries may not only have markedly different interpretations of what “harms” and “benefits” may arise from the use or misuse of their work, but that the imperialistic manner in which the dual-use debate is introduced to them may alienate them from the debate, rather than encourage their participation.

Nonetheless, a growing amount of attention is paid to raising dual-use awareness on a global level, and these dual-use discussions and the educational models they have generated are being used as templates for disseminating information about dual-use in other regions.¹⁵ Together with the increasing bureaucratization of dual-use issues, this presents scientists in these different contexts with two related challenges. Firstly, due to the internationality of life science research, they are increasingly coming into contact with dual-use regulations and controls developed specifically within and for a Western context. Secondly, the majority of dual-use education which might ameliorate this problem by providing the scientists with a contextually applicable manner of accessing the concept of dual-use remains Western-centric in its approach and compounds the existing problems by promoting the notion of a “global dual-use ethics”.

To date, considerations about scientists in developing (and/or non-Western) countries have formed a very small part of dual-use discourse. Indeed, the majority of discussions focusing on raising dual-use awareness developing countries have been limited to the creation of contextually appropriate case studies on bioterrorism (NRC 2011). None, to my knowledge, have questioned the suitability of transporting what is essentially a Western interpretation of the concept beyond its natural social and ethical context, and thus—using the discussion above—testing the limits of a “global dual-use bioethics”.

As discussed above, dual-use was presented to the study participants in the manner of most educational initiatives. Thus, the concept was presented as a biosecurity issue in which the

¹⁴For example, the majority of discussions on dual-use education *automatically* make the connection between the principle of harm and bioterrorist activity, as can be observed in the recent review book on dual-use education *Challenges and Opportunities for Education about Dual-Use Issues in the Life Sciences* (NRC 2011). Although it is recognized that there may be differences between the educational requirements of scientists in developed and developing countries, this book (for example) limits discussion on contextuality to the need to develop more “context appropriate” case studies. Nothing is said about the possibility that the principle of harm (and associated principles such as beneficence) may be interpreted differently by scientists not working in a Western context.

¹⁵These include online courses such as those developed by the University of Bradford (www.brad.ac.uk/bioethics/), summaries of course contents (NRC 2011) and codes of conduct (such as NSABB 2012).

harm arising from the misuse of research was through bioterrorist activities. It was represented as a universal concern and one that scientists had a responsibility to address in their daily research through compliance with regulations and legislation. Unsurprisingly, this approach stimulated much heated discussion amongst the participants, particularly regarding the issue of harm arising from research misuse. This was to be expected, as the issue of harm in dual-use discussions acts as an important motivator for concern and action and understanding the idea of harm as the result of “malicious reuse” is vital for engaging with the concept.

It is vital to note that although the harm arising from the misuse of scientific information could refer to a number of different outcomes, the dual-use debate has become strongly associated with issues relating to biological weaponry, as discussed above. Thus, the issue of harm has become strongly associated with *one particular possible content*. This link between harm and bioterrorism has unquestionably been influenced by recent terrorist attacks around the world, which have collectively contributed towards a heightened perceived threat from international terrorism¹⁶ (Kuhlau et al. 2008). Nonetheless, this interpretation strongly reflects a particularly Western interpretation of the possible harm arising from the misuse of information.

Interestingly, this close relationship between the concept of “harm” and this specific content within dual-use debates has already proven problematic in the UK and USA. A recent survey suggested that many scientists doubted the likelihood of such harm ever arising from their research (AAAS 2009), and in so doing thus questioned the applicability of dual-use as an issue for their personal responsibility. In the survey, however, 15 % of nearly 2,000 scientists also reported voluntarily changing research plans or protocols because of concerns about misuse. This would seem to suggest that while in many cases these scientists struggled with it as a personal concern, it remained something that was widely accepted as a feasible result of the misuse of information. In part, this acceptance of the broader possibility of harm arising from terrorist activities was probably in some part due to the social climate within countries post-2001.

In contrast (as mentioned above), little work has been done to determine how dual-use—and the harm arising therefrom—is conceptualized and accepted by developing and non-Western countries. Many of these countries, struggling as they do with low funding for research, historical legacies of colonialism affecting educational systems, less advanced national infrastructures and lower numbers of scientists (Fine 2007), may indeed view the concepts of beneficence and harm in dual-use considerably differently from their Western counterparts. Furthermore, significant healthcare problems, food security issues, and widespread national unrest may influence the prioritization given to dual-use and the issue of bioterrorism.¹⁷

¹⁶While the motivations for these sub-state aggressors are understood to vary and are religious, political or, ideological; the results of their actions are similar: to deliberately target or disregard the safety of non-combatant civilians, and bioterrorism is thus usually viewed as a unified term.

¹⁷This is, of course, in contrast to official claims of developing countries governments that see a technical divide by the West on life sciences and technologies. It is possible that this may be a fruitful area for further study.

It must therefore be questioned whether limiting dual-use discussions to this specific content-full interpretation of principles such as harm is useful in fostering discussions within non-Western countries. One must ask: will this content assist or deter scientists from accessing the central aspect of dual-use—the idea that research is being misapplied to intentionally hurt the general public. If, instead, discussions were liberated from the strict focus on bioterrorism it is possible that this idea could be linked to other interpretations of misuse and misapplication. As suggested by Brian Rappert, “weapons of mass disruption”, instead of “weapons of mass destruction” may be an alternative means of visualizing the products of dual-use events (Rappert 2010: 13).

If such speculation is extended further, and dual-use is liberated from the expectation that misuse of research will result in biological weaponry, it becomes possible that other forms of fear mongering and panic-spreading may be included in the dual-use debate. Allowing communities of scientists the opportunity to ascribe contextually relevant content to the concept of “harm” within dual-use debates is valuable for building capacity in countries in which bioterrorism has not the same position of importance as it does in certain Western countries. It therefore becomes important to question whether the strict association between dual-use and bioterrorism (as the misuse of research for malicious purposes) may serve as a potential barrier to the uptake of the concept by scientists. To illustrate these issues, some fieldwork responses concerning harm are discussed in some detail.

Talking to UK Scientists—During the fieldwork conducted in the UK I noticed that participants in the interviews and focus groups made a rapid transition from the introduced concept of dual-use to issues relating to more traditional biosecurity topics, such as theft and/or misuse of samples. Indeed, within one focus group I struggled to maintain the focus of the discussion on dual-use, and not biosecurity misuse of physical samples and reagents. I had to reiterate the difference between misuse of samples and information three separate times in order to reposition dual-use (as the possibility of the harmful use of *knowledge*) within the biosecurity debate. Thus, it would appear that the participants did in fact place the dual-use issues at the end of the biorisk spectrum, as is the case for a Western interpretation of the harm arising from dual-use events (as in Institute of Medicine 2002).

Within these discussions on bioterrorism, it became rapidly apparent that the participants distinguished between the threat of bioterrorism and its likelihood, as was apparent in the American survey discussed above (AAAS 2009). While recognizing that the information and materials generated by modern scientific research provided ample opportunities for misuse, scientists pointed to the difficulty of doing so in a non-laboratory environment. The head of the department succinctly summarized this concern, saying: “... *there’s plenty of information out there that someone could gain today and take a viral construct and manipulate it to make it into a bioterrorist weapon—there’s more than enough information out there anyway. But they would have to have an appropriate place to do that, so that restricts it in some sense*”.

These hesitations were repeated by a number of different participants. Thus, biosecurity issues tended to be examined mainly through discussions of current biosecurity regulations in place to limit access to samples, reagents, and materials as well as access to institutions

and staff surveillance. These debates highlighted that the participants were not as worried by the possibility of misuse of information, but the reality of threat of biosecurity. This, in turn, was lessened by a belief in the fitness and effectiveness of the regulations currently in place to control it.

In the focus group, as well as in some of the interviews, the link was made between the difficulty of conducting illicit research outside of a laboratory environment and the threat of the “terrorist within”. Two postdoc participants conducting a joint interview had this exchange:

I2 “... *Because what is a bioterrorist?*

I3 *it’s probably somebody like you and me who’s had a very bad day and a very bad life who’s had the same training.*

Author *you mean the “terrorist within” scenario?*

I3 *yeah, if anything that’s where it would be. You say it’s very easy to get this training. I’ve been working for a number of years to get these skills.*

I2 *yeah, it’s not that easy, but on the other hand, how many nuclear threats can we have? How many bioterrorist threats can we have, and how many of them come from these blacklist of countries that are a threat to the global community and how many are coming from legal governments, and what kind of funds are going to these places. You don’t know what the governments are doing, and this could be called bioterrorism.”*

Such discussions on the misuse of science from practicing scientists were followed by comments on related issues, such as the 2006 call by Al Qaeda’s for biological scientists to join their movement. From these discussions it became apparent that the participants identified the most immediate threat (aside from biosafety incidents) as coming from within the scientific community or from governmental programmes particularly dealing with biological weaponry.

Reviewing the transcripts therefore suggested that a considerable amount of discussion in the UK focus groups and interviews centered on biosecurity issues and the threat of misappropriation of scientific research products. Many of the participants were highly knowledgeable about recent biosecurity and bioterrorist attempts, such as the 2001 Anthrax attacks in the USA and the Aum Shinrikyo activities in Japan. When one considers the high level of exposure that these scientists have to international political affairs, when taken together with the bioterror-adverse culture of the UK, which has recently been subject to attempted and successful terror attacks, it is perhaps unsurprising that the threat of terrorism arising from scientific research was not highly questioned.

Nonetheless, it became apparent that—aside from malicious release of something like viral stocks—the participants believed that the facilities and the expertise needed to manipulate modern research were considerably beyond most terrorist organizations. Instead, they placed

most of the threat within the science community—the “terrorist within” scenario similar to that which precipitated the Anthrax attacks.

Thus, despite the debates on the likelihood of dual-use incidences occurring, the fieldwork participants in the UK had no discernable problems accessing the *content* of the principle of harm in the dual-use debate as it was presented to them. By identifying the content of harm (and the related principles that are not discussed in this paper) as legitimate they were able to freely access the concept of dual-use—particularly as an extension of the biorisk spectrum. By identifying with the content of the principles they were able to immediately access the debate and start to relate it to their own work and their own concerns.

Talking to African Scientists—The four African laboratories¹⁸ that I visited were, to some extent, unified by certain elements in the social and research environment. Despite the health burdens of these countries, in many cases the available local research moneys¹⁹ directed towards agricultural outputs and food security. In addition to the impact that this has on health research, the emphasis on agricultural research has also had a significant influence on biosafety and biosecurity discourse in the region. To date, most of the capacity building initiatives center on genetically modified organisms, in contrast to the increasing emphasis on the threat of deliberately caused bioterrorism and warfare which is emerging in Western countries (UNAS 2008: 4). Despite recent attempts to raise the profile of biological warfare and dual-use issues within African science, and the majority of African countries being signatories to the Biological and Toxic Weapons Convention (BTWC), such issues have remained largely in the background of African scientific discourse and government involvement in science.

Furthermore, in relation to scientific discourse, it must also be emphasized that the majority of African countries have a low level of science literacy within the general population. Indeed, in most countries secondary and tertiary education are not accessible to all learners—something that has had a large impact on general scientific discourse. Furthermore, this low level of literacy is often reflected in the popular science journalism and information to which the public has access. Thus, in these countries there is a very low level of discourse between the scientists and the society in which they operate.

Interestingly, despite the considerable social and economic variations between the African countries visited, the responses of the African scientists appeared very similar between the fieldsites. This gave rise to some interesting speculation of how to understand communities in science. The similarity of the responses resulted in the four African sites were grouped together and compared against those being taken from the UK site. In itself, the similarities of the responses obtained (in this regard) from the four African sites was surprising.²⁰ However, when reconsidering this in retrospect, I recognized that many of the participants at

¹⁸Designated Kenya (KY1), Uganda (UG1), first South Africa (SA1), second South Africa (SA2).

¹⁹Even with the recent prioritization of scientific research by the African Union (AU), few African governments invest even 1 % of the Gross Domestic Product (GDP) into scientific research (COHRED 2010).

²⁰I had suspected that South Africa’s earlier biological and nuclear weapons programmes (Venter 2012) would have contributed towards a greater acceptance of the threat of biological warfare or the possibility of bioterrorism amongst the scientific population. However this did not appear to play a major role in how South African scientists accessed the dual-use concept, and indeed there were very few references to the Apartheid government’s weaponry programmes during the fieldwork.

these sites explicitly referred to “Africa’s problems” when discussing these issues, which would lead to the possible conclusion that (at least in this case) they were identifying themselves as a community, and thus present some unity of ethical content between the sites.

Although I had no problems getting scientists to talk about dual-use issues, it became rapidly apparent that the African interviewees’ responses differed markedly from those collected in the UK. One of the most prevalent opinions was that dual-use was an interesting, yet hypothetical, problem. Statements such as: *“So sure, we’re... willing to discuss because it’s more academic, a philosophical interest. It’s really not pertinent to us”* (SA1, a PI), were common in all African sites and appeared to be distributed evenly along the career trajectory.

It appeared that many participants thus initially distanced themselves from the concept of dual-use by viewing it purely as an academic problem. It was interesting to note that despite clearly indicating that dual-use was not a problem in their daily research, participants nonetheless appeared to relish the opportunity to discuss the topic. This suggested that there was not a problem engaging the participants in ethical discussion, which might have been initially suspected, but rather an issue with the content of the principles that were employed to illustrate the argument.

Another commonly expressed sentiment was that dual-use was an issue for the West. Many of the participants were quick to point out to me that dual-use was not (and should not) be a concern for African research. As one PI succinctly put it to me: *“[w]hen we came to the bioterrorism thing that you mentioned then I thought it was totally irrelevant and paranoid on the part of the Western world”* (SA1). This idea of “their problem” versus “our problems” came across strongly in all four African fieldsites, and many interviewees made references to the difficulties that they experienced in their research as a “justification” for not considering dual-use issues.

As one MSc student in Kenya mentioned, *“... the people in the States and the UK should worry about that because they’re more advanced. Here in Africa we don’t have the equipment or reagents, so we don’t have the time to do that. We’re fighting for how to do our research. We don’t have time to be getting biological weapons”* (KY1). I noticed that particularly in the Kenyan and Ugandan sites, where there is less support for scientific research from the government, there was definitely a feeling of needing to build up African scientific research before worrying about issues such as dual-use. As one Kenyan technician put it: *“I think for Africa at the moment it’s not a problem. We’re trying to build up ourselves, and that is by publishing and marketing ourselves”* (KY1).

Interestingly, when reviewing the transcripts I noticed that many of the respondents have appeared confused when I asked them about dual-use in relation to their research. One PhD student at the SA2 responded to the explanation of dual-use by saying: *“I haven’t grown up with the concept of American, British and European sciences, so I’m not sure what all the paranoia is about”* (SA2). Similarly, another PhD student at the SA1 site stated their opinion that *“... in Africa we just don’t deal with such questions. I think it’s more in the*

domain of the western world—America, UK—where the threat of bioterrorism is a very real threat, and so I think this issue is poignant there” (SA1). Similar responses were also had from scientists higher up on the career ladder, such as PIs, which seemed to suggest that many of the African participants were actively positioning themselves as separate from Western scientists. As these responses came from all points on the career ladder, it was unlikely that such distinctions could be simply interpreted as due to the funding and research difficulties mentioned above.

That said, however, it was obvious that most participants at least partially linked the lack of facilities, funds, or advanced research projects in Africa to their understanding of dual-use as a Western issue. Particularly the PIs and permanent researchers expressed their opinion of dual-use as a Western problem with frustration. Often, this frustration was linked to the assumption that dual-use controls would further complicate their working environment, through increased restrictions or requirements.

However, in three cases PIs made the link between their shortage of funding and the amounts of money spent on dual-use awareness and control. One PI at SA1 explicitly stated this, contrasting the funding for dual-use to the perceived need for additional funding for HIV research. She said: *“it’s just huge amounts of money that go into fighting this phantom threat where I feel like we have more important things to do here as we’re in the middle of a huge HIV and TB epidemic and we just want to get on with doing the research. It was not an issue that I’d ever considered before, and quite frankly I don’t feel it’s very relevant”* (SA1).

The frustration at the perceived amount of money diverted to dual-use control was also linked to shortages of funding within African science and poor infrastructure. Many participants expressed opinions that science in Africa would benefit more from investments in research and infrastructure than (what they saw as) improving biosecurity regulations on the continent. The fieldwork thus suggests an interesting distinction. Scientists in Africa were willing and able to discuss the topic of dual-use, however due to the manner in which the concept and the ethical principles associated with it were presented, there was an overwhelming rejection of the discussion.

It was noteworthy that, although many of them explicitly stated their understanding of the concept by referring to it as an “interesting problem”, they nonetheless did not engage with the content of harm or malicious misuse as they are usually presented in dual-use discussions. This appeared to suggest that the *content-poor* version of the dual-use concept—as the possibility of beneficial research to be misused for nefarious purposes—might have traction within these scientific communities. This, and the alternate manner in which African scientists ascribed content to principles such as harm in dual-use are discussed below.

Allowing Content to be Ascribed to the principle of “Harm”—As mentioned above, in dual-use debates the principle of harm refers broadly to the idea that information may pass out of the control of the scientist and be misused in some way. However, as was evident from the fieldwork, African scientists struggled to attach value to the content that was subsequently attributed to the principle of harm: that of bioterrorism and bioweaponry.

Nonetheless, during the fieldwork I regularly noticed that many of the participants in the African sites proposed alternative interpretations of harm arising from information misuse.

When I analyzed all the data together it appeared that there was one particular alternative interpretation that resonated with the African scientists: that of fear-mongering in the press.

²¹ It appeared that this issue was something that was attributed value by these participants at all the fieldsite. In this manner it became apparent that the notion of “malicious reuse” and “harm” arising from this misapplication was being re-interpreted by the participants to contain content that resonated with their particular setting. Thus (often without recognizing it), the participants continued discussions that related to the content-poor version of the concept of dual-use by construing the key ethical principles with contextually valid content.

In this manner, many of the African scientists suggested alternative interpretations of harm in contrast to the traditional interpretations of dual-use harm. They saw this harm as principally arising from information misuse—a harm that obviously mattered deeply to them. In many cases this process of “content attribution” was accompanied by stories. For example, in Kenya I was told on three separate occasions about an incident that had affected the laboratory when the first HIV vaccine trial was being launched. Misinformation provided to the public regarding the process and aims of the trial by popular newspapers delayed the start of the trial by over half a year and necessitated considerable outreach to the community and government in order to rectify the situation.

This was just one of a considerable number of stories told by the African participants about irresponsible journalism, public mistrust and deliberate misinformation involving scientific research. In all these cases, the scientists were very clear about the fact that these incidents demonstrated the misuse of beneficial research for nefarious purposes. What differed, of course, was their contextual understanding of nefarious purposes such as low science literacy and irresponsible journalism. It was clear from the manner in which these stories were introduced and told that these events, and the consequences arising from them, were taken very seriously by these participants and viewed not only as a considerable hindrance to their future work, but also as a harm arising from its misuse.

It was interesting to note that once the participants had attributed this content to the principles underpinning dual-use they were much more willing to re-discuss dual-use according to the Western interpretations. Instead of rejecting it outright, they were able to see how the Western interpretation reflected one specific interpretation of a concept that had meaning for them as well. These fieldwork data thus demonstrated that different communities of scientists had very different reactions to the content of the harm principle that is generally proposed in dual-use education (without any accompanying discussion). While the UK scientists (with some reservations) were able to access the content and see its value and validity in relation to their research context, the African scientists interviewed did not. Indeed, their (often violent) disagreement with the content made it very apparent that

²¹This also raises questions about the possible difference that such an approach has compared to the traditional dual use discussion: that of intent. Is intent a necessary component of misuse (in bioterror-related dual use or other outcomes), as in the case of fear mongering it could be rather ascribed to irresponsibility (ignorant, blind, not necessarily intentionally malicious)? This might be an area for further investigation.

any educational initiative assuming that the content-full interpretation of harm would transfer easily across borders could run into trouble. These observations thus firmly emphasized the need to explicitly excavate the content of the harm (and other) principle within dual-use education.

Concluding Remarks

Thus, to summarize, an analysis of the fieldwork data demonstrated some key issues:

- The need to recognize the difference between content-poor and content-full interpretations of the ethical principles underpinning discussions on broad social issues within ethics education.
- The need to be aware of problems involved in transporting content-full (instead of content-poor) versions of broad social issues beyond their contextual boundaries.
- The difficulties of making bureaucratic duties based on content-full interpretations of broad social issues valid and pertinent to foreign scientists.

These observations may thus be extended using the earlier theoretical discussions to make some important comments about the current state of life science ethics and the manner in which ethics is taught to scientists. Firstly, such considerations highlight the limitations of promoting a “global system of ethics for the life sciences”—particularly in relation to discussions about broad social issues. What the fieldwork clearly illustrates is that, when considering broad social issues, a normative system with specific content expectations cannot be assumed to fit to scientific communities around the world. Thus, not only educational initiatives but also bureaucracy aimed at addressing these issues needs to be cognizant of this when being transported out of a cultural environment. Indeed, it is highly debatable whether they will retain their efficacy if they are transposed without an accompanying discussion on the contextual content of ethical principles.

These observations are very much in keeping with the work of H. T. Engelhardt Jr, and it is feasible to extend them further to suggest that more emphasis in life science ethics needs to be placed not on a communality that would unite persons, but rather the recognition of a diversity of human sympathies and sensibilities, and a plurality of visions regarding concrete moral obligations (Engelhardt 1986: p 41). In addressing this issue, Engelhardt suggests that society, instead of being viewed as a secular whole, be instead divided into what he termed “moral communities” which are united by common (and contextual) interpretations of the moral landscape. Understanding international ethical discourse according to *content-poor* and *content-full* interpretations of ethical principles as well as moral communities²² might provide a valuable means for fostering international dialogue on ethical issues in the life sciences. By understanding that—particularly as relates to broad social issues—there can be many different interpretations of the same issue may provide scientists with an important means to not only develop their own ethical identity, but also to respect it in others.

²²In contrast to more homogenous interpretations of the “global scientific community” as often promoted by global systems of ethics for the life sciences.

Interestingly however, as the fieldwork results reported above suggest, it is too simplistic to reduce “moral communities” to national boundaries. Indeed, the commonality of the manner in which the scientists at the African fieldsites interacted with the concept of dual-use strongly suggests a combined identity of an “African scientist” that identified with regional problems and aspirations. It thus would appear that “moral communities” within the life sciences are a complicated concept that requires considerable future research.²³ Despite the need for future research, however, this approach may already be useful to life science ethics education in a number of ways.

First and foremost, the fieldwork strongly suggests (in contrast to a number of current approaches) that improving ethics education for scientists in the developing world cannot be achieved by transporting Western ethics educational initiatives wholesale, or by merely developing “more contextually-appropriate case studies”. What this study has shown is that scientists in developing countries often interact with the ethical principles underlying life science ethics topics in markedly different fashions from their Western colleagues. Thus, the ascribing of *content* to ethical principles by virtue of membership to a moral community and therefore shaping ethics discussions accordingly is something that needs to be explicitly addressed within future educational initiatives.

Similarly, it is important that the notions of *content-poor*, *content-full* and a “global system of ethics for the life sciences” are not used interchangeably or without distinction within ethics education. As the fieldwork demonstrated, presenting a *content-full* interpretation to African scientists as a *fait accompli* significantly reduced the efficacy of the awareness-raising initiative. Furthermore, the implicit suggestion that the *content-full* interpretation was an aspect of a “global system of ethics for the life sciences” initially reduced the desire of the African scientists to challenge or engage with the topic. Based on the fieldwork observations, it appears that future educational initiatives need to “tread carefully” in this area in order to avoid losing the attention of the students before they have actually commenced.

A third consideration is that by emphasizing the presence of moral communities within the global scientific community (and not, as is often promoted, a homogenous body of “scientists”) the autonomy of these communities is respected. Indeed, in order for a system of moral communities to work it is important that their autonomy in defining *content* for ethical principles is respected. In this manner—particularly for developing country scientists—educational initiatives can sidestep the possibility of unwittingly succumbing to “ethical imperialism” and unduly promoting a specific ethical interpretation as the “right one”. Furthermore, it is likely that by emphasizing the importance of *every* communities input into ethical discussions that developing countries will feel less like “second class scientists”—something which often happens when they try to become involved in with Western scientific ethics debates.

A final consideration is based at a more practical level. By emphasizing moral communities and contextual differences within ethics discussions will foster more discourse on variations

²³Manuscripts in preparation.

between research environments, social issues and priorities, regulatory and legislative differences. As the fieldwork demonstrated, if regulations and requirements demonstrate a lack of sensitivity towards the specific pressures of a research environment they run the risk of not being valued by the communities of scientists on which they are imposed. By demonstrating the key link between the research environment and the *content* of ethical principles, scientists will be encouraged to critically examine their environments and contrast them to those of their colleagues.

H. T. Engelhardt Jr once suggested that morality is provided with a particular socio-historical context informed by a fabric of customs (Engelhardt 2012). In order to offer more than empty moral platitudes one must enter into a particular moral community and embrace its particular viewpoint so as to possess a concrete understanding of the right and the good. Only within such a particular socio-historically conditioned context can morality gain content (Engelhardt 2012: 98). This study would suggest that the situation is no different within the life sciences. Indeed—particularly within discussions on broad social issues—it would appear that a sensitivity of contextually informed content of ethical principles is vital for truly international discussions. This paper thus strongly suggests that the issue of contextuality in life science ethics be closely examined by future pedagogical initiatives and awareness-raising discussions.

Acknowledgments

Many thanks to Prof Brian Rappert at the University of Exeter for his comments on this manuscript. The fieldwork presented at this paper was sponsored by the Wellcome Trust.

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