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Ethics Education in Science

Statement by the ALLEA Permanent Working Group on Science and Ethics

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Statement on Ethics Education in Science

Trust in the scientific enterprise and in the conduct of scientific research is fundamental for fruitful interaction within the scientific community as well as between it and society at large.

At the present time, perhaps more than ever, researchers need to be able to take decisions based on a solid legal, ethical and scientific understanding of the subject matter and its potential implications for science and society.

ALLEA argues in this statement that societies need to set aside or create resources (time, human resources, knowledge banks etc.), so as to ensure that all research is conducted by individuals who have the necessary literacy in ethics.

Ethics education in science should cover both internal and external research ethics, both canons of good research practice and ethical aspects of the relations between science and society.

To ensure that practitioners of science and research have robust guidance when they seek to follow the principles and commitments of their fields, universities and research institutes should provide a continuously updated education in ethics in all fields of scientific research.

The recommendations in this statement are addressed to universities, academies and other research-performing organisations with the responsibility of educating and employing researchers, as well to the governments and other funders who ultimately have to ensure that their funds, public or private, are used by beneficiaries who show full respect for the principles of responsible conduct of research.

The document is divided into two parts. This first part presents general principles and recommendations. The second part, with practical examples and references to on-line resources, will follow later.

1. WHY ETHICS EDUCATION IN SCIENCE?

In this context 'science' is used in a wide sense and includes the natural sciences, the social and behavioural sciences and the humanities. Scientific research aims to produce new, systematic knowledge. It is increasingly collaborative, competitive and global, using – and developing – new technologies and progressing rapidly.

New ethical challenges are raised by scientific developments. The challenges facing contemporary science and the complex relations between science and society highlight the need to be aware of the responsibilities of scientists. In view of recent events and debates, education in research ethics needs to be strengthened to ensure trust and confidence in scientific research.

Scientists have many different roles: as researchers, supervisors, evaluators and peer reviewers. Sometimes they are asked to give advice to governments and institutions. The ethical principles apply to all these roles.

(Principle 1) The challenges facing contemporary science and the complex relations between science and society highlight the responsibilities of scientists.

(Principle 2) Ethics education in science makes the responsibilities of scientists explicit and examines ways of meeting them.

The ethics of science should be an integral part of the education and training of all scientists. A positive attitude towards reflection, alertness and awareness of the ethical dilemmas early career researchers may encounter in their professional life is important. Also senior scientists, research leaders and researchers have a responsibility to promote and integrate research ethics in their own teaching. Thus, ethical training should be part of a researcher's career from beginning to end. Standards change, methods change, responsibilities change – everyone needs to keep up-to-date.

2. INTERNAL AND EXTERNAL ASPECTS OF RESEARCH ETHICS

The study of ethics can provide guidance not only for individual lives, but also in developing the insight and competence that communities need in order to face present and future challenges. But 'ethics' is used in many senses.

The field of research ethics is wider than the concerns raised by research integrity. There is more than one relevant distinction here, and different terminologies are used. One such distinction, already mentioned in previous ALLEA documents [ALLEA, Annual Report 2003], has been stated as follows:

"The external category of problems refers to questions such as:

• What justifies the choice of the research topic? Is it worth knowing what we investigate?

• Is scientific research truly sufficiently independent (of clients, interested parties, sponsors)?

• How far does the researcher's responsibility extend in respect of what is being done with his results?

• Is there a need for 'no go' or 'go slow' decisions in certain cases on the ground of ethical objections to implications or consequences of insights generated by the research? One may think of stem cell research, xenotransplantation, research into dangerous viruses, nuclear fusion or fission etc.

Internal social/ethical problems in science all refer to undesirable or unacceptable behaviour by scientists.

The following are relevant:

• negligent behaviour in regard of human or animal research subjects,

• careless or inaccurate communication with the general public and the media,

• disregard of the rules of good practice when publishing, quoting and evaluating research, and

• violation of the norms of scientific integrity.

The next part of this paper shall concentrate on this type of internal unethical behaviour - the violation of scientific norms of integrity". (Drenth 2006)

This distinction expresses two kinds of responsibility in science: the responsibility for the moral quality of our work (internal morality) and the

responsibility for its use or abuse by external parties (mostly in politics, but also business). Ethics education in science should cover both aspects of scientists' ethical responsibility: responsible conduct in research itself; and the socio-ethical context of research, focusing on ethical issues concerning the relations between science and society.

Considering the complexity and sensitivity of ethical problems in life sciences (which will mark this century), the key ethical issues of biomedical research on human beings need to be emphasised, including the protection of the dignity of human beings, problems of free and informed consent and the primacy of the human person versus the interests of science or society. The fight for these principles has not yet been won. But research in the social and behavioural sciences, too, raises intriguing ethical issues; this is true also of the humanities.

Research integrity deals with problems that are typically tackled in national or international guidelines for responsible conduct in research and for handling alleged misconduct in the research process and in the publication of research results, including research fraud, publication ethics and misconduct concerning other activities such as the ethics of applications for financial support and the ethics of scientific evaluations of science.

The relevant norms are defined and established through the scientific community itself and the ideal of research integrity has its roots in the autonomy of science. Here also protection of whistle-blowers is taken into account – as well as recommendations on how to report cases of suspected misconduct.

External research ethics, on the other hand, deals with other types of ethical issues in research, in particular with respect to the relationship between the researcher and the research subject and between the researcher and society (individuals and institutions) outside the research community. The problems include, more specifically, for example, risks and benefits of the design and implementation of clinical trials that include experiments involving human beings, human biological materials or experiments on animals, which are regulated somewhat differently in many countries. It includes issues like the responsible application and use of research results, possible restrictions on research on the ground of ethical objections, including possible consequences of research insights (dual use of research). External research ethics also covers the legal framework that sets the field-specific norms, as well as the protection of

basic rights and values like human rights.

Violations of internal and external ethical rules are usually handled in different ways. But some of the recommendations below are relevant for research ethics in both of these senses.

The fact that the way research integrity is managed or mismanaged will have effects on trust and confidence in science, and hence have external effects, is no objection to this distinction. Similarly, conflicts of interest and lack of independence can appear in both internal and external research ethics, but again that is no objection to this distinction.

Cross-border exchanges - political, economic, social and scientific - pose challenges to many legal and ethical norms and values. In external research ethics there are differences between countries. However, there are also many joint policies in effect at the European level. This is reflected in the Charter of Fundamental Rights of European citizens and in several EU directives that member states are obliged to transpose into national law, including the data protection directive, the clinical trials directive, the biotech directive and the cells and tissues directive.

Results of scientific research can be of immense significance for large-scale societal choices. Some of these choices are regulated by law, others not. The relations between ethics and law are complex and it is difficult to draw a sharp line between ethics and 'soft law', as codified in international codes and conventions and which deals with issues in internal as well as external research ethics.

(Principle 3) The responsibilities of scientists include awareness of and ability to deal with issues concerning research integrity and research ethics in a wider sense.

(Principle 4) Ethics education in science focuses on clarifying these responsibilities and on promoting responsible conduct of research.

(Principle 5) The ethical responsibilities of scientists are to be integrated into the curriculum of scientific education and learned as part of the mastery of the specific field of research itself.

These principles are relevant for science in the wide sense, that is, the natural sciences, the social and the behavioural sciences and the humanities. ALLEA is aware that not everything can be stated in principles and rules. There is a culture, an ethos, in science from which you learn by paradigmatic examples and role models. Mentors play an important role in the training of early career researchers.

3. AIMS AND MEANS OF ETHICS EDUCATION IN SCIENCE

To ensure that practitioners of science have robust guidance when they seek to follow the internal and external principles of research ethics in their fields, universities and research institutions should provide a continuously updated education in ethics in all fields of scientific research.

Scientists will benefit from training in ethics and in critical examination of arguments, as well as from training in understanding and applying the values that underlie and justify national and international guidelines and declarations in research ethics.

The new challenges for advanced science in society at large require the development of, and respect for, norms and standards for all scientific fields. Here it is essential to distinguish between subject-specific standards and general research integrity standards.

Training in research ethics should be specific to the discipline, whereas this is less essential for training in issues related to research integrity and internal research ethics. Criteria that define good scientific practice are by no means self-evident – but they can be taught and learned.

(Principle 6) Ethics education in science aims to fully incorporate awareness of the ethical aspects of the decisions and choices that scientists – in a wide sense – face in their work.

The general aim of education in both internal and external research ethics is to increase early career researchers' awareness of the ethical dimensions of their work and to improve their skills in critical examination of arguments offered for or against different positions. Researchers are not only an object of ethical regulations, but as agents are the subjects of their own ethical responsibility in this field of action as well. Therefore the ability to examine ethical arguments is essential.

To be successful, ethics education presupposes that the teachers are aware of the choices facing scientists in their work and that the scientists are familiar enough with concerns, concepts and traditions in ethics to make possible a meaningful dialogue on ethical issues in research.

The most important ability conveyed through good ethics training is argumentation. A 'rational argument' is not just a set of statements

designed to sway an opponent, the way advertising and some forms of rhetoric do. The ability to construct good arguments and to distinguish good arguments from bad ones is something early career researchers can and will learn.

(Principle 7) Ethics education in science focuses on the critical examination of arguments and the assumptions they are based on, as well as on the rational justification of ethical decisions taken.

To be able to argue rationally and to examine arguments critically – including in situations where there are conflicts of interest and in newly emerging fields of science – researchers must have developed a competence in ethics and be able to use it to deal with the issues they face.

Early career researchers need to develop sensitivity for the risks and benefits of the results and products of research, as well as for the possibility of potential dual uses, for instance. As an example, recent virological discoveries may lead to the production of new vaccines and at the same time be used for biological warfare or pollute our environment.

General principles of good scientific practice constitute a core element of research ethics relevant for all academic disciplines. Mandatory courses should give early career researchers the opportunity to learn to specify these principles, apply them to problems in different fields of research and to discuss grey zones of scientific practice.

(Principle 8) The means of ethics education include seminars and lectures, examining and discussing real cases collected from scientific practice.

The means of ethics education include seminars and lectures focused on real cases, recent as well as past, collected from scientific practice. Subject-specific cases are to be collected and shared with other teachers. Such a bank of examples needs to be updated on a regular basis. Different modules can be combined in several ways, according to the wishes of the teaching institution or the funding organisation.

The crucial importance of case studies is emphasised. All parts of research ethics education should allow for sufficient time for the discussion of such cases and for sharing personal experiences. Group work will give an opportunity to learn how to argue and to balance conflicting norms in an appropriate manner.

(Principle 9) Subject-specific cases should be collected and shared with other teachers, and they should be updated on a regular basis.

Moreover, without basic knowledge in ethics and training in developing argumentative skills, early career researchers may not be able to question some of the problematic practices they may come across during their career.

(Principle 10) Ethics education will empower early career researchers to understand the difference between what is and is not ethically acceptable, and prevent them from making mistakes they would later regret because of the adverse consequences for others, for science and for their own career.

In some cases, ethics is already included in the research curriculum, in others it is not. This has to be taken into account in considering ways of introducing and developing ethics in the research curriculum.

Ethics education will also prepare early career researchers to participate actively in debates about the consequences of their scientific activity and respond to those who have concerns about it. With additional training, scientists could also serve the scientific community by working in ethics committees and internal review boards.

The scientific competence and personal integrity of thesis supervisors is a decisive factor in both the research and the ethics education of early career researchers.

4. RECOMMENDATIONS

The previous sections describe the rationale for and relevance of research ethics in the context of modern scientific research, as well as the aims and methods of such education. 'Scientific research' is used in a wide sense and includes the natural sciences, the social and behavioural sciences and the humanities. In this section a list of recommendations to universities, research institutes, academies and funding organisations is presented.

It is recommended that all institutions responsible for the establishment and operation of graduate and doctoral research education include education in research ethics in their curricula. Such education should be specific and relevant to the research field concerned. It should also deal with good conduct and honesty in publishing as well as with several other problems mentioned in this statement, including the ethical issues raised by controversies over intellectual property rights.

It is recommended that these institutions create conditions so that such education in research ethics is perceived and performed as an important part of research training. Mastery of the key skills conveyed by research ethics education are to be seen as one entry requirement for successful high-quality research.

Universities and research institutes responsible for the funding of graduate and doctoral research training need to see to it that appropriate high-quality staff in research ethics is made available.

The requirements in the ethics curriculum should emerge from discussions among the leading scientists and research ethicists in a given field, and be revised on a regular basis in the light of scientific advances and new international guidelines.

National Academies, as associations of leading scholars and assemblies of leading research institutes, bear a special responsibility for spearheading this process. They are well placed to promote and guide debates and decisions across all research fields by arranging workshops, symposia and conferences, in particular those of an interdisciplinary character. When public debate emerges on ethical issues in science, the National Academies should make their voice heard.

Where national debates between stakeholders are necessary in order to achieve a consensus, Academies have the convening power to provide a neutral platform to discuss processes and a meaningful distribution of tasks and roles.

It is recommended that high-quality teaching materials for students and teachers in research ethics be developed at a national, European and even global level, taking into account advanced methodologies and reflecting the latest scientific advances and challenges.

It is also recommended that centres of information and expertise be used or established at national and international level and that relevant resources (textbooks, case studies, etc) be collected and made digitally accessible. These centres could function as regular meeting places for exchange among professionals, curriculum developers and teachers and as a basis from which to develop cooperative ventures.

In order to ensure the highest possible quality of education in research ethics, it is essential that the teachers in research ethics have competences in both research ethics and the scientific field in question.

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