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The Status of Science.

The UNESCO Recommendation on Science and Scientific Researchers: Issues, Challenges and Opportunities



A Reflection Paper for the Canadian Commission for UNESCO

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Summary

In 2013, the General Conference of the United Nations Educational, Scientific and Cultural Organization (UNESCO) adopted a resolution to revise the 1974 *Recommendation on the Status of Scientific Researchers*. Member states therefore sought to update the text of the Recommendation to reflect the rapid pace of progress in science, technology and information, and to ensure that the associated contemporary ethical challenges were taken into account.

The new text was adopted at the 39th General Conference of UNESCO on November 13, 2017 under a new name: *Recommendation on Science and Scientific Researchers*.¹ The comprehensive content of the new Recommendation is a rich source of ideas for reflection and action in Canada to address public policies on pure and applied research. It also provides the opportunity to reflect on the social acceptance of research, the relationship between science and society, and the contributions that educational institutions and the media can make to inform and educate the various audiences concerned. This paper will present an overview of the new Recommendation, followed by suggested avenues for further work that could benefit from the expertise of all involved, from political decision-makers to research communities and civil society.

¹ 39th General Conference of UNESCO (2017), Document 39 C/73, Annex III http://portal.unesco.org/en/ev.php-URL_ID=49455&URL_DO=DO_TOPIC&URL_SECTION=201.html

Introduction

“Science presents many dangers, but we must resist these dangers not by doing less science, but by doing more science that can create its own ethics.”

– Jean d’Ormesson

Since it was established in 1945, UNESCO has been interested in every aspect of science, ethics and research. Julian Huxley, one of the organization’s founders, pointed to the need for “large-scale campaigns of public education” and for many new areas of research. He was hoping that research could move beyond obscurantism and religious prejudice, and promote the application of newly acquired knowledge.

From its foundation, Julian Huxley and biochemist and sinologist Joseph Needham, “ideas about UNESCO developed informally, emphasizing the importance of science, international scientific cooperation and science education to promote the peace-building. Their conceptual input found concrete form in the name of the new organization. It was at their behest that the word “scientific” appears in the full title of UNESCO”.² It was later, during the term of director-general René Maheu (1961-1974), that the ethical dimension of UNESCO was proclaimed. Maheu believed that “technical and ethical considerations are inseparable one from another, and that UNESCO’s existence depends on that inseparability”.³ His assertion remains relevant in a world where research is highly competitive. Researchers must not only be competent, they must also be scrupulously honest, of great integrity and prepared to share their knowledge with governments, colleagues, civil society and the most vulnerable communities.

The role of UNESCO in ethics and responsible science has been prominent from the beginning and it should remain a priority now more than ever, when technical and scientific progress is so rapid that it is sometimes difficult to assess its impact and implications. It is therefore not surprising that concerns about science and ethics are still present and influence its current orientations and the development of standard-setting instruments, notably the *Recommendation on Science and Scientific Researchers*, adopted by the General Conference of UNESCO in 2017.

² See Chloé Maurel, *L’UNESCO de 1945 à 1974*, Paris, Histoire. Université Panthéon, 2013. Sorbonne-Paris I, 2006, p. 39. <https://www.tel.archives-ouvertes.fr/tel-00848712>

³ *Ibid.*, p. 140.

Background: Science in Overdrive

Science inspires fascination and distrust, even as it generates hope and concern. In recent decades, it has progressed at a dizzying pace in a number of fields, including genetics, genomics, neuroscience, information technology, digital technology, climate change, artificial intelligence, and big data. As the Organisation for Economic Co-operation and Development (OECD) has noted, “the scientific and research landscape is being reconfigured by convergence, interdisciplinarity and the new geography of innovation hot spots.”⁴ Research is no longer an individual undertaking, but involves constant cooperation between teams made up of many researchers drawn from a variety of disciplines and countries.

At the same time, given the speed at which information – real or fake – can spread, social media and cross-border communications present new challenges for governments and citizens, who often feel overwhelmed and well out of their comfort zones. As the World Commission on the Ethics of Scientific Knowledge and Technology (COMEST) noted: “This reflects a background of a certain fear of science and technology in Western societies. For example, the social dynamics of the debate on ‘human enhancement’ and ‘post-humanism,’ as well as concerns about specific misuses of technology and moreover about unknown risks for humans and the environment are different forms of this fear of scientific innovation.”⁵

In addition, a context that demands massive investments in research can increase the disparities between rich and poor countries, if the benefits of science are not accessible to the latter for lack of a critical mass of researchers and research facilities. Social justice and inclusion are often largely ignored in the wake of development, because “While scientific practice is increasingly globalized, science policy remains primarily national.”⁶

Researchers, research professionals, students and all involved in the production of scientific knowledge must be able to provide convincing data to their respective governments. Governments in turn must allow researchers and the scientific community as a whole to communicate freely both the results of their research, and the hopes and concerns it generates. Civil society must stay abreast of the issues related to research and its applications, and this requires the development of critical thinking. Awareness of science issues demands a level of scientific knowledge on the part of the public that it does not always possess. It is therefore up to the conveyors of information – journalists and science communicators – to acquire information and ensure that they use an accessible vocabulary in their accounts of scientific progress. How are science issues and their impact on people made understandable? How are the major challenges to be explained? How are sustainable development goals to be taken into account? How is the attention of governments to these global issues to be secured and maintained?

Researchers themselves could do much more to spread the word about their work, and its possible impact. Researchers produce new knowledge. Theirs is a demanding occupation that is constantly evolving, which is why their status and their working conditions should be optimized. The current scientific and technological

⁴ Organisation for Economic Co-operation and Development (OECD), *Measuring Innovation: A New Perspective*, Paris, 2010. https://www.oecd-ilibrary.org/science-and-technology/measuring-innovation_9789264059474-en

⁵ World Commission on the Ethics of Scientific Knowledge and Technology (COMEST), *Ethical Perspective on Science, Technology and Society: A Contribution to the Post-2015 Agenda*, SHS/YES/COMEST-8EXTR/14/3, Paris 2015, p. 5.

⁶ *Ibid.*, p. 10.

context raises new questions about the development and maintenance of responsible science, including scientific integrity and ethics.

It was in response to all these issues that at its 2013 General Conference, UNESCO decided to revise the 1974 *Recommendation on the Status of Scientific Researchers* “to reflect the contemporary ethical and regulatory challenges relating to the governance of science and the science-society relationship.”⁷ The revised 1974 Recommendation accordingly calls for efforts to optimize the conditions in which science and scientific research are conducted, and address the associated risks and responsibilities.

Genesis of the 1974 Recommendation

With a view to a more formal acknowledgment of its role with respect to ethics and responsible science, in 1974 UNESCO adopted the *Recommendation on the Status of Scientific Researchers*. It was designed to assist UNESCO member states in formulating and implementing appropriate policy frameworks for scientific research and development to support their researchers.⁸ It also sought acknowledgment of the growing value of science and technology in addressing the various problems the world faces.⁹

The adoption of the text was a laborious process, however, and the follow-up did not match expectations. In fact, the document remained relatively unknown to researchers and scientists generally, and references to the text and the principles it established were few and far between. In 2012, COMEST offered this explanation for the need to revise the 1974 Recommendation:

“In spite of its [the Recommendation’s] enduring value, [it] suffers in certain important respects from outdated language and from an excessively narrow framing that excludes or underplays important issues of contemporary concern. [...] Revision would be desirable, with a view to elaborating a powerful and relevant statement of science ethics as the basis for science policies that would favour the creation of an institutional order conducive to the realization of Article 27(1) of the Universal Declaration of Human Rights”¹⁰

At the 39th session of the UNESCO General Conference in 2017, Director-General Irina Bokova also noted in her speech, prior to adoption of the revised Recommendation, that the 1974 Recommendation remained relevant with respect to science policy and ethics, but its content was not widely known and promoting it was a difficult task. She further noted that it was difficult to apply, because the wording was obsolete and did not reflect the new circumstances in which researchers were working. She added:

⁷ Revision of the Recommendation on the Status of Scientific Researchers, SHS/BIO/SSR/2017/1, May 17, 2017.

⁸ UK National Commission for UNESCO, Policy Brief 19, *UK submission to the UNESCO review of the Recommendation on the Status of Scientific Researchers: key issues for inclusion*, <https://www.unesco.org.uk/wp-content/uploads/2015/06/UK-National-Commission-for-UNESCO-Submission-to-the-Consultation-on-the-Recommendation-on-the-Status-of-Scientific-Researchers.pdf>, 2015.

⁹ 39th UNESCO General Conference (2017), Document 39 C/26, *Consolidated Report on the Implementation by Member States of the 1974 Recommendation on the Status of Scientific Researchers*, <http://unesdoc.unesco.org/images/0025/002592/259256e.pdf>

¹⁰ UK National Commission for UNESCO, Policy Brief 19, *op. cit.*

“[Translated from French] The new text is more explicit with respect to human rights and other rights and responsibilities in research. It is stronger with respect to dialogue with society, open science, the building of shared knowledge, human rights for research subjects, data-sharing and confidentiality, the specificity of the private sector, freedom and responsibilities in the current context of careers in science, science education, and protection of infrastructures in times of conflict. These aspects were added as a result of the many comments we received, which reflect the changes that have occurred since 1974 in the research and development ecosystem and in our understanding of good governance of science.”¹¹

The revision process thus offered an opportunity to improve the text at a time when it was acknowledged that the development goals contained in Agenda 2030 could not be achieved without science. It was also an opportunity to take into account contemporary regulatory and ethical challenges in science governance, and the relationship between science and society, with reference to the 1999 *Declaration on Science and the Use of Scientific Knowledge* and the 2005 *Universal Declaration on Bioethics and Human Rights*, which constitute recognition of ethics in science as a direct extension of human rights.

The Director General’s voice was heard, and the revised Recommendation was adopted at the 39th session of the General Conference on November 13, 2017, with a new title: *Recommendation on Science and Scientific Researchers*.¹² Several countries welcomed and supported the revised version, asserted it is being of essence for the scientific community and an important tool.¹³

2018: Adoption of a New Recommendation

The new text is designed to identify deficiencies and challenges as well as the opportunities and issues associated with the new Recommendation, so as to stimulate reflection and discussion in the Canadian context, in which research is increasingly conducted and funded by large teams, with researchers drawn from many countries.

The Recommendation now has a new title: *Recommendation on Science and Scientific Researchers*. The change does not lack significance: it reflects a desire to cover improved conditions for scientific researchers, as well as for science in general.

The text of the revised Recommendation is intended to highlight the importance of the development by member states of evidence-based science policies that take the associated risks into account. It also references various aspects of UNESCO programs as set out in the new UNESCO Programme and Budget (Document 39C/5).¹⁴ The new Recommendation also relates directly to a number of performance indicators

¹¹ Intervention of the UNESCO ADG Social and Human Sciences, Item 7.4, Commission III – Social and Human Sciences: Proposal for the revision of the 1974 Recommendation on the Status of Scientific Researchers.

¹² UNESCO, *Recommendation on Science and Scientific Researchers*, <http://unesdoc.unesco.org/images/0026/002636/263618e.pdf>

¹³ 39th UNESCO General Conference (2017), Summary of debates, Commission III – Social and Human Sciences, https://en.unesco.org/sites/default/files/9_nov_4th_shs_summary_0.pdf

¹⁴ UNESCO, *Recommendation on Science and Scientific Researchers*, *op. cit.*

for the sustainable development goals of Agenda 2030, particularly No. 9.5, which refers to the need to “Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.”¹⁵

Member States and their respective national commissions for UNESCO therefore have a responsibility to be involved in the implementation of the recommendation by working with governments, research organizations, researchers, and civil society to enable them to fully understand the issues in the Recommendation that are relevant in their national context, to make the Recommendation better known, and to ensure that it is implemented.

Social participation in decision-making is an integral part of ethics, and enables the governments of Member States to identify and understand their citizens’ levels of social acceptability with respect to issues associated with the utilization of research results. UNESCO views science as a shared asset, the benefits of which should be accessible to all. If the benefits from research are not equitably shared, they may leave vulnerable countries and populations unable to benefit from these advances.

More and more frequently, there are calls for effective participation by the public in developing research policies, but this is not always an easy thing to achieve, since it implies a fairly high level of knowledge about a many-faceted and difficult subject. In order to be involved, citizens must have at least some knowledge of the implications of science and research presented in the Recommendation. The revised document provides a wonderful opportunity to embark on this enormous task.

The new text, with a title including not only researchers but science itself, will provide public authorities with an overall view of the role UNESCO perceives for member states in fields where they will be called upon to develop public policy that shows vision in responding to the social, economic, ethical and legal challenges of a changing world in which research requires substantial investment. We hope that the text will also serve to set the stage for more extensive discussions on the various underlying issues and that it will explore ways in which Canada and its research and science communities can take action.

Summary of the Text and Comments

Having described the background, the revision process, the main lines of the revision, and the implementation and monitoring of the Recommendation, this paper will now discuss the Recommendation itself, which is in seven parts:

- I. Scope of application;
- II. Scientific researchers in the context of national policy-making;

¹⁵ United Nations, Sustainable Development Objectives, <https://sustainabledevelopment.un.org/post2015/transformingourworld>

- III. The initial education and training of scientific researchers;
- IV. Rights and responsibilities in research;
- V. Conditions for success on the part of scientific researchers;
- VI. Utilization and exploitation of the present Recommendation;
- VII. Final provision.

Ten Key Areas of the Recommendation

- Adherence to United Nations ideals
- Science-society interface
- National policy-making
- Public role of science
- Inclusion and non-discrimination
- Human rights
- Freedoms, rights and responsibilities
- Ethics
- Human capital
- Enabling conditions

General Comments and Ideas to Consider

The text of the Recommendation is very dense and shows signs of a desire for a pragmatic consensus whereby, as Gilbert Hottois puts it, “agreed operating rules can be established while preserving freedom of thought and diversity of belief”.¹⁶

Several components of this text could generate be the subject of further reflection and the development of working tools by UNESCO’s national commissions. In order to launch some ideas for consideration, in the following pages we present elements of the Recommendation that seemed to us most likely to be usable by Canadian partners involved in research, such as the research institutes, the research councils of various organizations, government departments with research responsibilities, universities, and other research institutions like colleges, provincial research centres and networks.

What is Science?

Following numerous consultations conducted by UNESCO, the scope of application suggests the following definitions of “science” and “scientific researchers”:

“the word “science” signifies the enterprise whereby humankind, acting individually or in small or large groups, makes an organized attempt, by means of the objective study of observed phenomena and its validation through sharing of findings and data and through peer review, to discover and master the chain of causalities, relations or interactions; brings together in a coordinated form subsystems of knowledge by means of systematic reflection and conceptualization; and thereby furnishes itself with the opportunity of using, to its own advantage, understanding of the processes and phenomena occurring in nature and society;”

“the term ‘research and development’ comprises scientific research and experimental development for which ‘scientific research’ signifies those processes of study, experiment, conceptualization, theory-testing and validation involved in the generation of scientific knowledge...”

¹⁶ Gilbert Hottois, *Qu’est-ce que la bioéthique?*, Paris, Vrin, 2004, p. 39.

“the term ‘scientific researchers’ signifies those persons responsible for and engaged in research and development.”¹⁷

Moving on from this neutral definition of science to the conditions applicable to the researchers, individuals and establishments that are the subject of the Recommendation, the text enters a more philosophical and interesting area.

It explains that “The word ‘status’, as used in relation to scientific researchers, signifies the standing or regard accorded them, as evidenced, first, by the level of appreciation both of the duties and responsibilities inherent in their function and of their competence in performing them, and, secondly, by the rights, working conditions, material assistance and moral support which they enjoy for the accomplishment of their task.”¹⁸

To Whom Does the Recommendation Apply?

The text specifies that the Recommendation applies to many people active in research, science and technology:

“(a) all scientific researchers, irrespective of:

- (i) the legal status of their employer, or the type of organization or establishment in which they work;
- (ii) their scientific or technological fields of specialization;
- (iii) the motivation underlying the research and development in which they engage;
- (iv) the kind of application to which that research and development relates most immediately;
- (v) their professional status or employment status;

(b) technicians, support staff and students supporting and contributing to research and development;

(c) institutions and individuals responsible for research and development and other aspects of science, including such as science education, science communication, regulation and policy, oversight, funding, recruitment, peer review and scientific publishing.”¹⁹

¹⁷ UNESCO, *Recommendation on Science and Scientific Researchers*, *op. cit.* pp. 5 and 6.

¹⁸ *Ibid.* p. 6.

¹⁹ *Ibid.*, p. 6.

The Role of Decision-Makers

In order for decision-makers to be able to make enlightened decisions, the recommendation requests that in the context of their international relations, member states:

- “use scientific and technological knowledge in decision-making and policies for international relations, for which they should strengthen capacities for science diplomacy;
- cultivate opportunities for scientific researchers to participate in developing national science, technology and innovation policy; and
- ensure that scientific researchers, who give policy advice to policy-makers and other public officials, can do so in an accountable manner in which conflicts of interest are disclosed.”²⁰

To that end, it is suggested that member states establish “suitable means to address the ethics of science and of the use of scientific knowledge and its applications, specifically through establishing, promoting and supporting independent, multidisciplinary and pluralist ethics committees in order to assess the relevant ethical, legal, scientific and social issues related to research projects involving human beings.”²¹

Education and Training

Part III of the text, on “The initial education and training of scientific researchers,” proposes a substantial program of training for researchers that concentrates mainly on the importance of developing qualities of integrity, respect for ethical principles, avoidance of discrimination and the elimination of inequality of opportunity. It also restates the need to incorporate ethical dimensions in science curricula in order to develop intellectual integrity, vigilance for conflicts of interest, respect for ethical principles, and the ability to foresee the probable social and ecological consequences of research and development activities. Lastly, it promotes a willingness to communicate with others and work in a team.²²

Rights and Responsibilities in Research

Part IV, “Rights and responsibilities in research,” calls upon member states to deliver high-quality science in a responsible manner by ensuring that researchers can work in a spirit of intellectual freedom. Researchers should seek to minimize harmful impacts on living subjects of research and on the natural environment. They should also be able to express themselves freely and openly on the ethical, human, scientific, social or ecological value of certain projects²³.

²⁰ *Ibid.* p. 8.

²¹ *Ibid.*, p.8.

²² *Ibid.*, pp. 10 and 11.

²³ *Ibid.*, pp. 12 and 13.

In those instances where the development of science and technology undermines human welfare, dignity and human rights or is “dual use,” scientific researchers should have the right to withdraw from those projects if their consciences so dictate. They should also have the right and responsibility to express themselves freely on and to report these concerns²⁴. This is a particularly important section, mentioning as it does the need for researchers to be able to express themselves freely.²⁵

Researchers should also:

- promote access to research results and engage in the sharing of scientific data among researchers, with policy-makers, and with the public wherever possible, while being mindful of existing rights;
- disclose both perceived and actual conflicts of interest according to a recognized code of ethics that promotes the objectives of scientific research and development;
- integrate in their research and development work systematic disclosure to each human research subject in order to obtain their informed consent.²⁶

Areas Strengthened by the New Recommendation

The revised Recommendation seeks to strengthen the following areas:

- the exploitation of scientific data (sharing and protection of data, big data, social sciences);
- open access, open science, the development of a community of knowledge, shared benefits (transparency, country-to-country exchanges);
- research ethics, codes of ethics for researchers and coordination with society (control, regulation, awareness, risk management and so on);
- women in research and, more generally, non-discrimination and diversity; and
- the characteristics specific to the private sector, and the application of rights and responsibilities given the current circumstances of researchers’ professional careers (vulnerability and so on).²⁷

All these subjects are addressed, but more work will have to be done to clarify their meaning and scope. It should be noted that the appeals to Member States on these topics are valid, but it is questionable how far their application will go, since the Recommendation itself notes that states remain sovereign in the decisions they make. Where women’s freedom is denied and their access to education restricted, will the revised Recommendation be followed up to measure progress? Canada has an opportunity to position itself as a leader in these areas.

²⁴ *Ibid.*

²⁵ See Michèle Stanton-Jean, “Bonifier l’interface entre le décideur et le chercheur : quelques pistes de réflexion basées sur une expérience pragmatique [Improving the interface between decision-makers and researchers: some ideas based on practical experience]”, in: Catherine Régis, Lara Khoury and Robert P. Kouri, *Les grands conflits en droit de la santé* [the main conflicts in health law], Montreal, 2016, pp. 339-353.

²⁶ UNESCO, *Recommendation on Science and Scientific Researchers*, *op. cit.* p. 13.

²⁷ Revision of the Recommendation on the Status of Scientific Researchers, *op. cit.*

Application of the Recommendation

In order to prevent the new Recommendation from suffering the same fate as its predecessor, Resolution 39 C/23 invites member states and the UNESCO Secretariat to monitor it in different ways.

Member states are invited to:

- apply the provisions of the Recommendation on Science and Scientific Researchers by taking appropriate steps, including legislative steps, in conformity with the constitutional practice and governing structures of each State, to give effect within their territories to the principles of the Recommendation;
- bring the Recommendation on Science and Scientific Researchers to the attention of the authorities and bodies responsible for science, technology and research, and for education;
- strengthen the application of the Recommendation on Science and Scientific Researchers and the establishment of reports and communication relating to it, emphasizing 10 of its key areas: adherence to United Nations ideals; science-society interface; national policy-making; public role of science; inclusion and non-discrimination; human rights; freedoms, rights and responsibilities; ethics; human capital; and enabling conditions;
- include, in their reports on the implementation of the Recommendation on Science and Scientific Researchers, data on the condition of scientific researchers, preferably disaggregated by sex.²⁸

The Secretariat is invited “to submit to Member States new guidance for the future monitoring of the Recommendation on Science and Scientific Researchers, taking the abovementioned identified key areas as a guiding framework, and in cooperation with National Commissions and UNESCO Chairs.”²⁹

At the 41st session of the General Conference of UNESCO in 2021, the Director-General will transmit to Member States the first consolidated report on the implementation of the Recommendation on Science and Scientific Researchers.

The aspects of the resolution with respect to implementation of the Recommendation are demanding for member states, which are often reluctant to provide all the data required in the reports. Moreover, UNESCO’s current budget situation deprives it of a source of revenue that would enable it to increase its vigilance over the implementation of the Recommendation. Let us hope that collaboration between the Secretariat and member states will produce the desired results!

Relevance for Canada

Does the Recommendation raise issues that are not currently on the radar of science and research communities in Canada, but should be? Are issues as important as reconciling traditional and scientific knowledge on matters like climate change well represented? What should the next steps be to continue

²⁸ Records of the 39th UNESCO General Conference (2017), Volume I - Resolutions, pp. 74-76.

<http://unesdoc.unesco.org/images/0026/002608/260889e.pdf>

²⁹ *Ibid.*

UNESCO's international reflection work in a Canadian context? These are questions that Canada's scientific community must ask itself.

In 2013, there were 160,000 researchers in Canada, and this country produced 4% of the world's scientific publications.³⁰ However, research has become increasingly focused on the biomedical area, and less on social sciences and humanities, which are equally important in understanding how our societies function as their demographics change.³¹ Social sciences and humanities, like biomedical sciences, can make a significant contribution to, for example, our understanding of the consequences of the aging of the population, or the psychological impact of the use of social media, information in real time, factors related to epigenetics (education, environment, public health and so on). Fortunately, the most recent Canadian federal budget provided significant additional funding for social sciences and humanities. The need now is to continue efforts to increase interdisciplinarity among all sectors.

Canada attaches great importance to the quality of research done in this country. The recent budget provided significant new funding for research and innovation, but money is not the only factor to be considered. It could be helpful to think about assessing researchers not only on the basis of the impact of their publications but also on the basis of their involvement in their community, and their scientific integrity.

Publicizing and explaining a recommendation like this one is a demanding, long-term task. Communication technologies have developed substantially in recent years. Many people are inundated with information via the Internet and social media. It is important that these sources of communication and information be properly used. Since computers and smartphones have become information and training vehicles in emerging and developing countries, perhaps Canada could work with them to develop online training materials. Canada also has the resources to assist such countries in developing their research infrastructure, in order to avert a brain drain from countries that have excellent researchers but inadequate research budgets.

There is even reason to wonder whether we are not witnessing the emergence of a new paradigm that emphasizes collective approaches (teams of researchers, and big data that may require us to re-think the technicalities of individual consent and confidentiality) rather than individual approaches.

The Recommendation fails to make sufficient reference to responsible science: in other words, scientific integrity, honesty among researchers, plagiarism, fraud and the falsification of data. Nor does it place sufficient emphasis on student supervision and the duty of supervisors to inform and train their students, sound management of public funds and all the other things that, in many cases, lie outside clinical ethics and the role of ethics committees.

In Canada in 2009, following reports of misconduct in the media, the Minister of Industry asked the Council of Canadian Academies to make an assessment of research integrity in this country. The following year, a

³⁰ Sources: Observatoire des sciences et des technologies. Cited by Mathieu Gobeil, "Où fait-on de la recherche au pays? La réponse en carte.[A map showing where research is done in Canada] [Online]: <http://ici.radio-canada.ca/nouvelle/1031925/ou-fait-on-de-la-recherche-au-pays-la-reponse-en-carte>.

³¹ See Atlantic Health Promotion Research Centre and Canadian Institutes of Health Research, *The Social Sciences and Humanities in Health Research*, Ottawa, 2005. http://publications.gc.ca/collections/collection_2007/cihr-irsc/MR21-58-2005E.pdf

committee of experts produced a report entitled *Honesty, Accountability and Trust: Fostering Research Integrity in Canada*.³² Canadian granting councils subsequently developed a reference framework for the responsible conduct in research,³³ and Quebec developed a policy on responsible science.³⁴ This area that once generated little discussion has “exploded” in the last few years. This is an interesting subject to explore in order to identify best practices in Canada, make these issues better known to a wider public, and bring them to the attention of political decision-makers. This is becoming all the more important as collaborative research multiplies and sometimes fuels occasional controversies over the place given to the names of students in the list of researchers associated with a publication.

Further Thoughts: Fruitful Themes

Women’s Participation in Science

Only 17 women have won a Nobel Prize for physics, chemistry or medicine since Marie Curie in 1903, compared with 572 men, and only 28% of all the world’s researchers are women.³⁵ A study that appeared in *Nature Communications* in April 2018 points out that gender disparity is still very evident at scientific seminars. The Gender Summit held in Montreal in November 2017 raised numerous new issues for study: work-family balance, maternity leave and the return to work, career advancement, continuing education, raising young women’s awareness of science, and so on.³⁶ Canada’s federal government, which allocated \$925 million to granting councils in its most recent budget, is now awaiting “new plans, strategies and targets” designed “to achieve greater diversity among research funding recipients;”; the reference here is specifically to “women, underrepresented groups and early-career researchers.”³⁷ It would be wise to bring the Recommendation to the attention of the authorities who will be developing these new strategic plans. Provincial institutions of higher learning will doubtless suggest pilot projects and innovative strategies that could be identified and shared with countries where, among other things, women do not have access to training and research careers.

Ethics and scientific integrity in Canada

It would be useful to conduct a survey of what is happening in this area, and identify best practices. Such an exercise could identify any existing coherence among the provinces and territories, and produce relevant

³² Council of Canadian Academies, *Honesty, Accountability and Trust: Fostering Research Integrity in Canada*, Ottawa, 2010. <http://www.scienceadvice.ca/en/assessments/completed/research-integrity.aspx>

³³ Tri-Agency Framework: Responsible Conduct of Research (2016) <http://www.ccr.ethique.gc.ca/eng/policy-politique/framework-cadre/>

³⁴ Politique sur la conduite responsable en recherche (2014) http://www.scientifique-en-chef.gouv.qc.ca/wp-content/uploads/Politique-sur-la-conduite-responsable-en-recherche_FRQ_sept-2014.pdf (Available in French only)

³⁵ See UNESCO, *Cracking the Code: Girl’s and women’s education in Science, Technology, Education and Mathematics* (STEM), Paris, 2017. <http://unesdoc.unesco.org/images/0025/002534/253479e.pdf>

³⁶ Gender Summit, *Toward a New Normal, Equity, Diversity and Inclusion as Integral to Research and Innovation Excellence: Models for Success*, Outcomes from Gender Summit 11 North America Montreal November 6–8, 2017, https://www.gender-summit.com/portia_web/assets/GS11NA_REPORT_EN.pdf

³⁷ Canadian Consortium for Research. *Budget 2018: Research community welcomes record investments in fundamental research for Canada*, Ottawa, February 28, 2018. <http://ccr-ccr.ca/budget-2018-research-community-welcomes-record-investments-in-fundamental-research-for-canada/>

recommendations. Further thought might also be given to the ethical implications of a specific field – artificial intelligence, for example.

Indigenous Traditional Knowledge

It would be timely to examine various ways of associating traditional knowledge with scientific research. The environment, natural resources, sustainable development and some aspects of health are examples of appropriate areas for the inclusion of such knowledge.

Open Science and Free Access to Data

These concepts are expanding rapidly, and raise a number of issues relating to responsible science. It could be helpful to look into this subject, or include it in the agenda of working groups where it is relevant to their terms of reference. As incubators of excellence and innovation, UNESCO Chairs in Canada could be associated with these efforts.

Conclusion

The UNESCO texts referred to are the outcome of many years of reflection and experience from many disciplines and many countries. They all highlight the benefits and risks of current scientific progress, and show how important it is for decision-makers and researchers to see both sides of every issue.

As we have said, these texts are the result of pragmatic consensus. If the new Recommendation is to be more productive than its 1974 predecessor, it must be publicized and implemented. It correctly identifies the issues facing science today. It is therefore up to governments and the authorities concerned to find ways of making it better known; otherwise, it will remain an expression of wishful thinking.

Suggested Ideas for Reflection and Action

- Encourage collaboration among researchers from various disciplines (including research funding).
- Incorporate ethical dimensions in science curricula in order to develop intellectual integrity, vigilance for conflicts of interest, respect for ethical principles, and the ability to foresee the probable social and ecological consequences of R&D activities.
- Cultivate opportunities for scientific researchers to participate in developing national policy on science, technology and innovation.
- Disclose both perceived and actual conflicts of interest according to a recognized code of ethics that promotes the objectives of scientific R&D.
- Establish independent, multidisciplinary and pluralist ethics committees in order to assess the relevant ethical, legal, scientific and social issues related to research projects involving human beings.
- Facilitate access to research findings and engage in the sharing of scientific data among researchers, with policy-makers, and with the public.
- Ensure that there is proper disclosure about the research to every participant when obtaining their free and informed consent.
- In instances where scientific researchers consider that the development of science and technology is being misused, they should have the right to withdraw from those projects if their consciences so dictate and should also have the right to report these concerns.
- Consider assessing researchers not only on the basis of the impact of their publications but also on the basis of their involvement in their community, and their scientific integrity.
- The various reports on the implementation of the Recommendation should include data on the 10 key areas, preferably disaggregated by sex.
- Help emerging and developing countries develop their research infrastructures by working with them to develop online training materials.
- Continue awareness and training efforts to place sufficient emphasis on responsible science (scientific integrity, honesty among researchers, plagiarism, fraud and data falsification).
- Identify and share best practices in ethics and scientific integrity.
- Examine various ways of associating traditional knowledge with scientific research.
- Reflect upon the implications of artificial intelligence, big data, open science / free access to data, etc.
- Do further work to clarify the meaning and scope of the Recommendation.

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