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Project Report

Validation of the mapping of innovative methods and research integrity curricula

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Abstract

This document is an up-to-date map on curricula in which research integrity (RI) or research ethics (RE) is currently included. It contains a collection of curricula in which RI/ RE or associated fields are mentioned from the Path2Integrity partner countries Bulgaria, Denmark, Germany, Poland and Spain. Moving forward, the Path2Integrity training programme for educators will develop research integrity courses for trainers using this map as a reference. In this way, the project aims to support educators in closing possible gaps. At a broader level, Path2Integrity is involved in discourse with various stakeholders to establish a board of educational policymakers and stakeholders comprised of members from at least eight different countries to foster RI and parts of RI in European curricula.

Keywords

Research integrity, research ethics, research integrity in secondary school curriculum, research integrity in university curriculum, teaching research integrity

Introduction

This document provides an up-to-date map to secondary school and university curricula that currently include research integrity (RI) or research ethics (RE). It contains a collection of curricula in which RI/RE or associated fields are mentioned within the Path2Integrity partner countries of Bulgaria, Denmark, Germany, Poland and Spain (Fig. 1). The collection comprises a selection of case studies that do not replace comprehensive research. However, these European examples give us a picture of current curricula and how RI is being addressed in them, as well as how and to what extent schools and universities are currently aware of the importance of RI. The purpose of collecting these curricula is to use this map to identify possible gaps and encourage schools and universities to engage in a discourse about them in order to emphasise the importance of RI/RE.
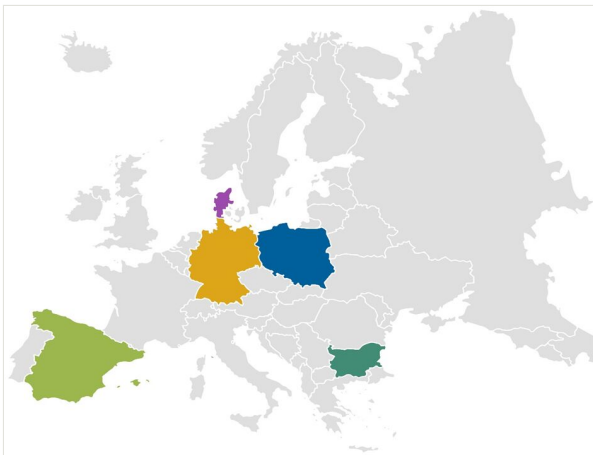

Figure 1. doi
Visual representation of the Path2Integrity map on RI/RE curricula.

What is the aim of this collection?

- Providing examples of RI/RE curricula
- Assessing RI's role in current European curricula
- Understanding the frameworks and contexts in which RI is addressed
- Identifying existing RI courses and possible gaps
- Encouraging a discourse about these gaps

During the keyword analysis, preliminary assumptions were confirmed that RI/RE is rarely explicitly mentioned in present curricula. Rather, other terms are used to deal with topics related to RI, such as plagiarism, data management or fake news. As a consequence, ethical questions concerning the responsible conduct of research are often omitted, as only related or associated RI topics are described in the curricula.

Why is this collection of RI curricula so important?

Curricula are the framework for teaching and learning, while their contents and descriptions comprise the main elements for teaching within organisations. Therefore, teaching and learning RI and its related topics is significantly dependent on this subject being taken up by current curricula. If RI does not find its way onto the curriculum, the topic will simply not be addressed. As a result, those who are directly or indirectly involved in teaching RI/RE should feel motivated by this map to identify where and to what extent the current RI landscape in curricula can be filled in.

How to proceed with this map?

This document is intended to highlight where and under what related topics RI appears in current European curricula and to become aware of gaps in order to be able to close them. The Path2Integrity project will continue to move towards this goal and thus contribute to the establishment of a RI culture. In particular, the digital and visually appealing presentation of the collection of curricula on the Path2Integrity homepage will provide encouragement in striving for this aim.

Project Description

As part of the Path2Integrity project, up-to-date curricula that include RI or related topics such as scientific writing, if not mentioning RI explicitly, will be assembled in a collection. The aim is to use this map to encourage schools and universities to fill in more of the RI landscape in their curricula.

Method

Path2Integrity partners from Bulgaria, Denmark, Germany, Poland and Spain conducted independent, country-specific searches for current RI courses offered to secondary school students, bachelor's and master's students and young researchers in the countries' respective curricula. The search was based on a keyword investigation of terms that were found to be relevant for identifying RI/RE courses and related topics. Selected keywords were considered useful in answering the following queries:

- Are there current courses that explicitly address RI/RE?
- Are there courses that address related topics to RI/RE such as courses on scientific writing or data protection?

The aim of collecting results on courses addressing RI/RE or associated topics was to gain a better overview of the current situation regarding RI curricula, as well as to answer the question of which related subjects are being addressed.

Keyword set

research, science, ethics, ethical principles, professional ethics, professional challenges, expertise, research dilemmas, morality, moral development, values, norms, responsibility, trust, correctness, justification, practice, responsible conduct of research, research procedures, good research practice, philosophy, skills, cognitive, instrumental, methodology, bioethics, biology, biotechnologies, integration, integrity, identity, subjectivity, individual project, elective course, self-education, knowledge, information, reflective competences, public health, clinical ethics, medicine, research funding, social and legal conditions, clinical trials and human research, communication, media, fake news, research data, data management, data protection, academic writing, plagiarism, authorship, citation, publication, mentoring, secondary school, bachelor programme, undergraduate programme, master programme, graduate programme, postgraduate programme, PhD course.

Results and Discussions

RI/RE examples in Bulgarian curricula

provided by Iliyana Demirova and Teodor Metodiev

Secondary school level

Ministry of Education and Science

According to the educational programme provided by Bulgaria's Ministry of Education and Science, one of the modules for the philosophy-profiled high school students in their last year of secondary education is "Philosophy of Science". Some of the discussed topics include ethical values in science, authority, objectivity, and bioethics.

PDF available here (December 11 2019).

Keyword hits: science, philosophy, skills, research, methodology

Bachelor's degree level

Faculty of Philosophy and History, Plovdiv University 'Paisii Hilendarski'

One of the obligatory courses for sociology students of the Faculty of Philosophy and History at Plovdiv University 'Paisii Hilendarski' is "Biotechnologies - scientific, engineering and ethical problems". According to the curriculum, by the end of the semester the student should be able to recognise and intervene in social, economic and ethical problems caused by modern biotechnology.

PDF available here (December 11 2019).

Keyword hits: ethics, bioethics, science, skills, biotechnologies

Master's degree level

Faculty of Philosophy, Sofia University

According to the web portal of the Sofia University's Faculty of Philosophy, one of the master's degree programmes, called "Integrative Bioethics", includes courses such as ethics, introduction to bioethics, reproductive ethics, medical ethics, social and ethical aspects of biotechnologies, bio law, justice and solidarity in medicine.

Course description here (December 11 2019).

Keyword hits: bioethics, ethics, research, science, integration

Doctorate's degree

Faculty of Economics, University of National and World Economy

One of the requisites for a Doctorate's degree in Economics from the University of National and World Economy is the "Methodology and Methods of Science Research." According to the curriculum, the course discusses ethics and moral values in science, principles, practices and case studies as well as formation, regulation and regimentation of science research principles.

PDF available here (December 11 2019).

Keyword hits: research, science, ethics, moral, values

RI/RE examples in Danish curricula

provided by Mette Winge Jakobsen, Paula-Manuela Cengiz and Maria Palianopoulou

Secondary school level

Ministry of Children and Education

At the secondary school level, there are no cross-cutting curricula on research integrity or research ethics. However, there is a general course on student training projects, which combines different scientific disciplines. In this course students examine and analyse a concrete problem depending on their choice of specialisation by using their knowledge, skills, and methods and including basic scientific theory (Vejledning Studieretningsprojektet – stx 2019 (pdf)). It is advised to introduce the students to proper citation and to referencing literature. Still, there are no requirements that students be introduced to ethical considerations related to their analysis before beginning.

Course description here under "Læreplan Studieretningsprojektet" (November 27 2019).

Keyword hits: Secondary school, research integrity, research ethics, individual project assignment

If ethical considerations are included in study programmes, they are taken up in the individual courses themselves e.g. biology, physics, chemistry, biotechnology. In the overall curricula developed by the Ministry of Children and Education, it is stated that biology courses (A,B,C-level) teach reflective competences in using knowledge and appropriate methods from the biological field to reflect on potential social, technological, environmental and ethical problems, and to develop and assess solutions (translated from Vejledning A,B og C – stx 2018 (pdf)).

Course description [here](#) under "Læreplan Studieretningsprojektet" (November 27 2019).

Keyword hits: reflective competences, individual courses, biology, ethical issues

Bachelor's degree level

In bachelor programmes, RI issues are integrated into the teaching of research methods. At the bachelor level, programmes seldom give RI much attention. A rough screening of bachelor programmes at different universities indicates that no RI courses were available for bachelor students.

Keyword hits: bachelor programme, undergraduate programme, research integrity, research methods

Master's degree level

Faculty of Health Sciences, University of Southern Denmark

In some master's studies, RI and its wider ethical and professional challenges are emphasised. For instance, the principles of RI and their application to public health issues are covered in the public health ethics course of SDU's Master of Science programme. The responsible conduct of research and the role of research ethics committees are also discussed in this course.

Course description [here](#) (November 27 2019).

Keyword hits: master programme, graduate programme, research integrity, research ethics, public health, responsible conduct of research, professional challenges

Faculty of Health and Medical Sciences, Copenhagen University

At Copenhagen University, the elective course on "Public Health in the Media" is an example of a reflective course that addresses RI issues connected to "the changing media landscape", where the students "connect the specific topic of public health communication to wider debates about trust, scientific expertise, and knowledge in an era of 'fake news' and social media".

Course description here (November 27 2019).

Keyword hits: master programme, undergraduate programme, elective course, public health, communication, media, trust, scientific expertise, fake news

Doctorate's degree

Roskilde University

Mandatory PhD programmes can vary slightly in content, e.g. the course "Introduction to Research Ethics and Integrity" by Roskilde University includes an introduction to research integrity including the philosophical basis of research ethics.

Course description here (November 27 2019).

Keyword hits: postgraduate programme, PhD course, research ethics, research integrity, philosophy

University of Southern Denmark

The Faculty of Health Sciences provides the PhD course "Responsible Conduct of Research". This course gives an overall introduction to research ethics as well as more practical knowledge on how to make a data management plan.

Course description here (November 27 2019).

Keyword hits: Postgraduate programme, PhD course, research ethics, research integrity, data management

Additional remarks

In Denmark, the Danish Ministry of Higher Education and Science published the Danish Code of Conduct for Research Integrity (DCCRI) (Ministry of Higher Education and Science, 2014). This guideline is a combined effort across all Danish universities and higher-level institutions to develop a common framework for ensuring research integrity (RI) in higher education and in research.

The DCCRI is based on international guidelines (The Singapore Statement, The Montreal Statement, The European Code of Conduct for Research Integrity). In regard to teaching, training, and supervision in the contexts of RI, the DCCRI states outlines the responsibility of universities in introducing the principles of RI within undergraduate (bachelor) and graduate (master's) programmes. In PhD and postdoctoral programmes, the universities should include specific RI teaching and training as well as supervision.

Open PhD courses on the subject of responsible conduct of research are provided by the universities of Aarhus and Copenhagen and The University of Southern Denmark (SDU). It is mandatory for all PhD Students in Denmark to take a course on research ethics and integrity (also referred to in Denmark as responsible conduct of research).

RI/RE examples in German curricula

provided by Lisa Häberlein

Secondary school level

Bavarian State Ministry for Education and Culture

At the advanced level in Bavarian secondary schools, research integrity is present in different contexts. A course on "Development and Socialisation" is intended to give students an insight into research practice. To this end, students in the 11th grade analyse a study on youth and identity research and familiarise themselves with concepts and methods of scientific surveys. They train their awareness of deliberation and are able to judge whether the results are adequately addressed in public discussion. Students are furthermore encouraged to use an example to develop the thematic focus of a study, the overall design and intention of the study, its methods (e.g. questionnaires, biographical portraits) and reception.

Course description here (October 15 2019).

An additional course offered in Applied Computer Science draws students deeper into the topic of data security and data protection. It is assumed that students have already encountered hese topics in the subject Nature and Technology when dealing with data sets. In this course, participants reflect on their knowledge from the previous course, while deepening their understanding of data security and data protection. The students are given insight into various technical procedures for storing and securing data on a long-term basis. Only students who have not previously participated in computer science classes are allowed to take part in this course.

Course description here (October 15 2019).

In German classes, students learn to plan, revise and design texts on their own during the 11th grade. When focusing on writing, they are asked to pay attention to correct quotation and to be able to discuss the text. In this regard, the curriculum for secondary schools in Bavaria states: "In both text-based and open discussions, [students] explore complicated questions in literature as well as debate current socio-political and ethical-philosophical problems. They clarify their own point of view and develop conceptually elaborate, clearly structured and well-formulated arguments. In writing, they practice and strengthen their skills by editing texts. In this way, they come to understand writing as a planned process". (translated by Lisa Häberlein)

Course description here (October 15 2019).

Keyword hits: research practice, research ethics, research methods, research data, data protection, academic writing, plagiarism, authorship, citation

Bachelor's degree level

Faculty of Biology, Bielefeld University

The supplementary module to the Bachelor's programme in Environmental Sciences, under the title "Scientific Behavior: Practical, Legal, Social and Ethical Framework", combines introductory lectures with student seminar papers and broad discussion. The supplementary module gives the students the opportunity to individually profile and specialise in one or more subject-related interdisciplinary areas. A wide range of topics are covered weekly, such as applications for research funding, ethics of research conduct, genetic engineering (GenTG) and release, good laboratory practice, good manufacturing practice, publishing (plagiarism; original data), public relations work/outreach, stem cells and germline (Embryo Protection Act ESchG), environmental protection and sustainability, publications, scientific image processing as well as business planning. The broad range of topics provides students with a broad insight into the interrelationships, responsibilities and possibilities of research.

Course description here (November 18 2019).

Keyword hits: research integrity, research ethics, research practice, responsible research conduct, research funding

Master's degree level

Art. 55, Bavarian Higher Education Act

In the Bavarian Higher Education Act, it states that "[t]eaching and study shall prepare students for a profession and impart to them the required knowledge, skills and methods of their respective course of study in such a way as to enable them to carry out scientific or artistic work and to act responsibly in a liberal, democratic and social constitutional state". (cf. Bavarian Higher Education Act, Art. 55, 1, translated by Lisa Häberlein)

Access to document here (October 15 2019).

Keyword hits: responsible research, research methods

Faculty of Social Sciences, Ludwig-Maximilians-Universität München

The Master's Thesis Tutorial in the field of Sociology gives graduates the opportunity to present their thesis. In groups, students discuss the progress and the results of their research. These discussions focus on choosing a topic, choice of method, structure and layout, literature selection and interpretating the results. The lectures, which are held by the students, enable them to develop their own presentation skills as well as their ability to construct an argument. The subsequent discussion helps to reflect critically on one's own research process.

Course description here (October 15 2019).

Keyword hits: research procedures, research methods, research results

Doctorate degree

Graduate Centre, Friedrich-Alexander-University Erlangen-Nürnberg (FAU)

The Graduate Centre of FAU offers alternating seminars for doctoral students and post-docs, as well as interdisciplinary information events and seminars on key qualifications. One example is the seminar on good scientific practice, where participants are taught the basics of ethical conduct in research. Topics include good research practice, data documentation, data management, authorship and publication procedures, avoidance of plagiarism, correct handling of sources, as well as mentoring, conflicts of interest and research collaboration. The content and scope of this seminar is based on the central DFG memorandum "Securing Good Scientific Practice" (2013), the current "Statutes for Securing Good Scientific Practice and Dealing with Scientific Misconduct at the Friedrich-Alexander-Universität-Erlangen-Nürnberg (FAU)" and the recommendations of the curriculum for courses on "Good Scientific Practice" in Natural Sciences and Medicine.

The list of courses includes a seminar on scientific publications and quality assessment in cooperation with the University Library Erlangen-Nürnberg, where participants get insight into what they need to pay attention to when publishing as a young researcher. Another example from the list is a workshop on research data management, in which doctoral students receive an introduction to the basics of research data management. Topics include organisation, protection, description of digital research data, data management requirements of research funding organisations and scientific journals, publication of research data and re-use of external research data.

List of courses and their descriptions here (November 18 2019).

Keyword hits: good research practice, data management, authorship, publication, plagiarism, mentoring

RI/RE examples in Polish curricula

provided by Agnieszka Dwojak-Matras and Agnieszka Koterwas

Secondary school level

Ministry of Education

In the national curriculum there is a specific subject dedicated to RI/RE issues in Poland, called "Ethics". Participation in this course is voluntary and there are schools where Ethics classes do not take place if there are no Ethics teachers available.

Secondary school students who participate in Ethics may be introduced to selected issues, depending on the head teacher. One of these topics is Ethics in Science and Technology, which enables students to deal with examples of appropriate and inappropriate use of new technologies. Information technology, for example, calls student's attention to the fact that

progress in research and society is made through the acquisition of knowledge and fosters their ability to analyse selected moral problems related to research and technical progress (e.g. problems of data protection, cyber-violence, development of artificial intelligence, transhumanism).

Download PDF here (November 18 2019).

Keyword hits: introduction to Ethics, identity, subjectivity, moral development, creating statements about morality, self-education and knowledge of ethics, creating statements with an emphasis on correctness of one's justifications)

Bachelor's degree level

Faculty of Medicine, Jagiellonian University

The course on "Ethics of scientific research involving people" covers various topics such as analysing medical definitions contained in Polish law, like 'research experiments' and 'clinical study of medicinal products', and examining the effects of applying these definitions on research practice in Poland. International guidelines such as the Nuremberg Code, the Helsinki Declaration, the International Ethical Guidelines for Biomedical Research involving Human Subjects (CIOMS), the European Bioethical Convention and others will also be discussed. In addition, the importance of informed consent for participation in clinical trials will be addressed along with examples of properly prepared informed consent forms; the question of consent and objection of persons without legal capacity will be explored as well.Other issues covered in this course include the ethics of research on vulnerable populations, ethical problems in clinical trials, ethics in epidemiological and health policy research, research ethics, clinical ethics and what are known as learning health systems, and the working fields of bioethics committees in Poland and around the world.

Course description here (November 18 2019).

Keyword hits: bioethics, clinical ethics, ethics, ethical procedures in clinical trials and human research, ethical, social and legal conditions of exercising the medical profession

Master's degree level

Faculty of Cognitive Science, Institute of Philosophy, Jagiellonian University

At the Faculty of Cognitive Science, there is an obligatory course on "Research Ethics" for 1st year students that introduces them to the ethics of scientific research.The course addresses legal and ethical standards of scientific research, international and national regulations, as well as principles and criteria for the ethical evaluation of scientific research with human participation. This includes the principle of respect for the autonomy of research participants (the rule of informed consent, confidentiality, non-infringement of privacy), the principle of care for the benefit of the research participant (the requirement to avoid unjustified risks; the principle of balance in randomised clinical trials) or the principle of fair treatment of research participants (fairness in the selection of research participants,

fair compensation for damage suffered by research participants).At the end of the semester, students know and understand the rules of scientific research, the ethical aspects involved and the legal requirements. They are able to identify ethical principles of scientific research and to present and discuss ethical controversies in connection with research activities. The students are ready to shape their own attitudes under the influence of the ideas presented, but without giving up intellectual independence or criticism.

Course description here (November 19 2019).

Keyword hits: general ethics and professional ethics, scientific research dilemmas, ethical principles of research procedures

Doctorate's degree

Department of Management, Poznań University of Economics and Business

For PhD students in the 3rd year of study, the participation in a course called "Ethics in scientific research and intellectual property protection" is obligatory.According to the presented educational programme, the course conveys the basics of knowledge in the field of ethical reflection on scientific practice while developing researchers' ethical and methodological self-awareness and professional ethics. It also focuses on increasing the awareness of copyright and intellectual property protection rules.

PDF available here (November 18 2019).

Keyword hits: general ethics and professional ethics, cognitive and instrumental norms / values, responsibility of the researcher, ethical principles of research procedures

RI/RE examples in Spanish curricula

provided by Belén Lopez

Secondary school level

Royal Decree states that in order to improve the quality of education, to achieve adequate performance of activities and to effectively solve complex problems, to acquire knowledge, skills, abilities and attitudes that contribute to the achievement of the objectives of each phase of teaching and learning and to acquire competences, the basic curricula for secondary school diploma explicitly aims for students to understand the elements and fundamental proceedings of research and scientific methods.(cf. Royal Decree chapter III, article 25, objective j)

Access to document here (December 6 2019).

For the Autonomous Region of Catalonia, an official document containing general rules to be applied in all Catalan schools, stipulates in Annex I, on general competencies to be acquired at secondary school in the section on competence in information management and treatment, that students must be aware of the ethical dimensions in the handling and

use of information. To this end, they must learn the appropriate way to respect copyright, correctly identify the sources consulted and ethically use the information received.

PDF available here (December 6 2019).

Keyword hits: authorship, information, research method

Bachelor's degree level

Psychology Faculty, University of Santiago de Compostela (USC)

A specific course on research design, techniques and methodology in Psychology during the first year of study teaches students the basic terminology of the various research modalities in psychology, familiarises them with the different methods and concepts of psychological research and introduces them to the philosophy of research, so that they learn to plan and structure research by choosing the most appropriate method, design and techniques.Psychology students should be able to critically read and analyse any report or scientific communication after completing this course.

Course description here (December 6 2019).

Keyword hits: research integrity, research method, authorship, data management, ethics, bioethics

Master's degree level

Observatory of Bioethics, University of Barcelona (UB)

In a master's programme in Bioethics and Law, students learn about global and integrative bioethics and its legal implications. They explore various problems within the debate on the fundamental questions of bioethics, using an interdisciplinary approach that combines philosophical, medical and scientific threads, as well as discussing the application of research and its legal treatment. They discuss and decide rationally on the significance of problems arising from bioethics and technology for society. The aim of the course is to train future professionals in bioethics and law who can respond to the growing need for experts in these fields.

Course description here (December 6 2019).

Keyword hits: research integrity, research method, authorship, data management, ethics, bioethics

Doctorate's degree

Faculty of Economics and Business, Autonomous University of Madrid (UAM)

A special seminar on "Ethics and Integrity in Research and Publication" is organised by the Master and Doctoral Programme in Economics and Innovation Management at the Autonomous University of Madrid. The seminar covers the design and conduct of research,

as well as various aspects of research integrity in academia, including lack of integrity, which is often manifested in fraud, data production and plagiarism, etc. This seminar emphasises that both researchers as well as society reflect an honest attempt to describe the world accurately and in an unbiased manner, and that this is critical in being able to trust research results as reliable.

Course description here (December 6 2019).

Keyword hits: research integrity

Conclusions

In most of the courses compiled here, RI is indirectly addressed in various contexts. The results show that, according to the course descriptions, students usually deal with ethics issues in specific subject areas, such as ethics problems in the context of modern biotechnology. In these settings, students get to know RI and RE to the extent that moral questions about research integrity are relevant to the subject. By addressing ethical research issues, they learn about RI: The courses introduce students to RI and RE by asking moral questions about specific topics and answering them with more hands-on "how to" knowledge. For example, how to create a data management plan. They learn to analyse research problems using their existing knowledge, skills, and methods, and to develop and evaluate solutions.

In several cases, the principles of RI and their application to the relevant topics are explicitly addressed as well. These are then discussed in a broader context, such as the role of responsibility and accountability surrounding "fake news". These concrete and practical examples provide students with a comprehensive overview of RI's relevance to various topics. Through discussion, reflection, critical thinking, awareness-raising, and knowledge-sharing, RI courses promote students' moral development.

Outlook

This map to European curricula that mention RI/RE provides a starting place for raising awareness about the subject of research integrity both at the school and university levels, and creates the opportunity to further incorporate RI topics into secondary school and university curricula.

Those directly or indirectly involved with RI teaching can build a deeper understanding of how RI is currently being integrated into curricula, as well as gain insight into the issues currently being addressed in the selected curricula. The map provides examples as well as possible gaps that could be closed by developing curricula to include RI, and which explicitly address the topic. In particular, the digital and visually appealing presentation of the collection of curricula on the Path2Integrity homepage will provide encouragement in achieving this aim.

Grant title

Path2Integrity: Rotatory role-playing and role-models to enhance the research integrity culture, Grant agreement No 824488

Hosting institution

Coburg University of Applied Sciences and Arts, Coburg, Germany