Edukacja 2020, 1(152), 42–53
DOI 10.24131/3724.200103
ISSN 0239-6858

The Perception of Research Integrity and Ethical Training in the Academic Community[1]

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The article presents academics' perceptions on research integrity and teaching integrity and ethics. The empirical basis of the article is a qualitative analysis of data based on open questions from two online surveys conducted among scientists, academic teachers and students. We point out two ways of defining scientific integrity: (1) as a common challenge for the academic community arising from the relationship between science and society; (2) as an individual choice and one's capital in achieving scientific success. We describe the respondents' views on the process of teaching integrity and ethics, rooted in a values-based approach to integrity. In this approach, teaching is open to the use of dialogical methods and takes into account the relative nature of the subjects being taught – research integrity and ethics. In our analyses, we focus on a positive approach to research integrity and show that it has great potential to raise the awareness of the scientific community about the principal values in science.

Keywords: ethical training, Path2Integrity, positive integrity, research integrity.

Introduction

Positive and Negative Approaches to Research Integrity

Building a culture of research integrity begins with shaping awareness of the importance of honesty, accountability, reliability and respect[2] in science. This can be done in two ways: based on norms, by generating clear rules and providing a framework for research conduct, stigmatising misconduct and warning against the consequences of bad behaviour (negative approach), or based on values, by pointing out the right behaviour, good practices and scientific role models (positive approach) (Godecharle, Nemery and Dierickx, 2014). Using the norm-based and values-based distinction, we write about negative and positive approaches in building a culture of research integrity not as evaluative categories, but

[1] This work is part of the project Path2Integrity. Path2Integrity receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 824488.

[2] These four values are stated in "The European Code of Conduct for Research Integrity" (ALLEA, 2017) as fundamental for reliable research.

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descriptive ones, indicating attitudes towards supporting research integrity: a guardian or a guide attitude. The negative approach (guardian attitude) seeks to surround scientific activity with norms, prohibitions and regulations, to enforce them and remove from the field of science such practices that do not meet the standards of integrity. In this way, publicising negative phenomena within the scope of reliability and research ethics seems to be the more frequent subject of empirical research, with a long tradition as a research field, rooted in scientific reflection on research integrity for about 40 years (Ferguson et al., 2007). Tracking misconduct is valuable as it shows the scale of impropriety in science (Fanelli, 2009; Marshall, 2000). This knowledge gives guidance on what needs to be improved and which procedures need to be put in place to support a culture of research integrity (Steneck, 2006). The negative approach recognises that the principles of ethical research are universal, clear and sufficient to establish possible misconduct. However, in many cases, this is not so simple and obvious (Horbah and Halffman, 2017; Salwen, 2015) because scientific integrity and ethics are shaped by a specific research process and should take into account its uniqueness and context, which emphasises a value-based approach (Godecharle, Nemery and Dierickx, 2014).

The second way to fair science – that we identify as positive integrity (guide attitude) – is, instead of avoiding misconduct, helping people to determine how to act properly during each step of the research process and to remind them about the importance and consequences of following a scientific ethos (Merton, 1973; Bieliński and Tomczyńska, 2019). The positive approach focuses on examples worth appreciating and emulating, rather than pointing out bad practices. In addition to legal procedures strengthening the ethical condition of science, there are also less formal ways of highlighting the importance of virtues in research, such as using dialogical methods in learning research integrity, organising public awareness campaigns, promoting scientific role models, etc. These positive ways of strengthening the culture of research integrity are the focus of the "Path2Integrity" project (Priess-Buchheit et al., 2020), in which we conducted the research presented in this article. We assume that promoting science based on values such as reliability, accountability, respect and honesty is necessary for the development of knowledge-based societies and economies.

The Perception of Research Integrity Within and Around Academia

Scientific knowledge does not belong only to the academic community, neither does the responsibility for it. Progress and development are very dependent on the perception of research integrity and the social image of scientists in society. It is important because all social actors are involved in building the culture of research integrity – those who provide scientific knowledge, those who disseminate it, and those who use it. However, the first challenge is to educate and raise awareness among young researchers and future scientists. The ways scientists and students perceive the world of science and the values that guide it influence the steps that need to be taken to guarantee integrity and ethics in research. Requiring an understanding in the academic community of the rules and standards of good science ensures that research results will be respected and used responsibly. In this perspective, it seems that the ethical support of research practice begins with the recognition of ideas and beliefs about what good and bad science means. At the same time, it is useful to follow how scientists are perceived within the scientific community. A positive reception of scientists by society strengthens trust between science and society (National Academy of Science, 2009),

but this trust begins with a positive attitude of the academic community towards scientific role models. The trust and respect that scientists have for their colleagues and their achievements should be an example of the positive reception of scientists by the wider public.

The purpose of this article is to present research results on the perception of scientific integrity and ethical training among the academic community. In the text, we focus on answering the following research questions. First, we describe *how the academic community perceives research integrity*. We characterise several dimensions of defining research integrity that have appeared in scientists and students' statements about their understanding of the role and meaning of research integrity. In reference to these analyses, we describe two types of perceptions of integrity in science – individualist and collectivist. Next, we reflect on *how ethical formation should be developed according to researchers and lecturers*. We recall the ideas on developing ethical training at universities with particular regard to the processes of formal learning (Breen and Maassen, 2005), especially when it is conducted in a dialogical way (Klare and Krope, 1977; Priess-Buchheit et al., 2020). We believe that the perception of didactical practices in the area of integrity and ethics is as important an aspect of building a culture of research integrity as the image of a trustworthy scientific community that scientists want to contribute to. In didactic processes, we can internalise patterns and reflect on the right and wrong practices in science (Hyytinen and Löfström, 2017). Therefore, reflection on the teaching of research integrity and ethics occupy an important place in the shaping of scientists' awareness.

Methodology

Research Design

The article presents selected results of two mixed-methods studies (Creswell, 2013) conducted as a part of the project "Path2Integrity: Rotatory role-playing and role-models to enhance the research integrity culture" (Priess-Buchheit et al., 2020). The project is funded under the Horizon 2020 programme and implemented by a consortium of nine institutions[3] from five European countries (Bulgaria, Denmark, Germany, Poland, and Spain), with activities scheduled for three years (2019–2021). The premise of the project is to support the development of a culture of scientific integrity through education (using dialogical methods for teaching research integrity and ethics) and to conduct a public campaign enhancing the awareness of the importance of fundamental principles (ALLEA, 2017) in science. The studies, which are the basis of the presented content, were conducted using two online surveys. The data was collected over one year, from March 2019 to April 2020[4], among representatives of the academic community in various European and non-European countries[5].

[3] Cobourg University of Applied Sciences and Art (Germany – leader), Christian-Albrechts-Universität zu Kiel (Germany), EUREC Office (Germany), Pensoft Publishers (Bulgaria), The University of Southern Denmark (Denmark), Educational Research Institute (Poland), Fundació Catalana per a la Recerca i la Innovació (Spain), 3C Compliance SL (Spain) & Charité – Universitätsmedizin Berlin (Germany).

[4] In the first stage of the research, both studies were conducted simultaneously from March to July 2019. During that time we were able to complete the research on dialogical methods of teaching research integrity. However, we decided to continue collecting data on the perception of research integrity and the survey was available until April 2020.

[5] The invitation to participation in the surveys was answered mainly by representatives of European countries, they constitute the majority of the sample.

The aim of the first study was to obtain information on perceptions about scientific reliability, the social responsibility of scientists, causes of research misconduct, and ways of preventing misconduct by different groups involved in building a culture of research integrity. The data was collected using an online survey addressed to five categories of respondents: (1) the academic community: researchers, lecturers (academic teachers) and university students; (2) secondary school teachers who teach science, ethics or philosophy; (3) public administration, administrative staff at universities; (4) the general public, civil society; and (5) companies, foundations, publishers.

In this article, we focus on the first group of respondents, analysing data obtained only from the academic community. Out of the 209 questionnaires, 103 were completed by researchers, lecturers and university students. There were 62 men and 41 women in the sample. The majority of respondents were German (N=45), Spanish (N=21), many fewer were British (N=9) or Danish (N=6)[6]. The most frequently practiced set of disciplines was STEM (N=52) or social sciences (N=27). Fourteen respondents declared involvement in disciplines relating to the medical sciences, such as public health, medicine, clinical research or immunology. Eight representatives of the humanities were also included in the sample. Two persons indicated that they are involved in both social sciences and STEM.

The survey questionnaire contained closed and open questions. In this article we discuss the answers to three open questions: *What are the key messages of research integrity?* and *What is your understanding of a culture of research integrity?* (in the chapter on perceiving research integrity), and *How should RI ideally be taught?* (in the chapter on ethical training). The data collected during this study were used in designing a public campaign promoting research integrity among academics, secondary school teachers, young researchers and students.

The aim of the second study was to identify and evaluate teaching strategies, which encourage and maintain student-centred dialogue. We conducted an online survey targeted to lecturers and academic teachers of integrity and ethics issues. We gathered 34 completed questionnaires from several countries, mainly Denmark, Germany, and Spain. Respondents represented various sets of disciplines: social sciences (N=12), medical sciences (N=12), humanities (N=5) or STEM (N=3)[7]. Most of the academic teachers taking part in the study teach research integrity or ethics less than once a week, more often while teaching another subject rather than as an individual subject only on research integrity.

The questionnaire consisted of 26 questions, most of them were open and concerned teaching experiences, innovative methods, problems, good and bad practices during the teaching of research integrity and ethics. In this article we analyse questions regarding the lecturers' evaluation of teaching methods used during ethical training and reasons for using the chosen methods. Further analyses, not included in this text, concerned the following issues: topics of the classes, teaching objectives, dialogical learning methods used for teaching research integrity, their benefits and potential impact as well as their reference to the "The European Code of Conduct for Research Integrity" (ALLEA, 2017; Dwojak-Matras, Kalinowska and Koterwas, 2020). The main result of this study was used to create an interactive website "Path2Integrity Roadmap"[8] (Häberlein et al., 2019).

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[6] The remaining respondents came from such countries as: Austria, Belgium, Croatia, Finland, Greece, India, Iran, Italy, Latvia, Netherlands, Poland, Portugal, Switzerland, United States of America (1–3 people from each country).

[7] Two respondents did not provide information about their discipline (the question was not mandatory).

[8] Available here: https://www.path2integrity.eu/teaching-RI.

The collected data were subjected to a qualitative content analysis focused on two issues: ways of understanding research integrity and perceiving didactic practices in ethical training. At the beginning we did an open coding of the respondents' survey statements. This allowed us to group and categorise the answers concerning particular issues, and then interpret the meanings of the statements, compare them and relate them to theoretical findings (Gibbs, 2007; Silverman, 2016).

Limitations

First, the conducted research was limited by the qualitative and applied research methodology. Qualitative analyses provide a deeper insight into the studied phenomena, but do not allow their scale to be estimated (Denzin, 2017; Gibbs, 2007; Lofland, Snow, Anderson and Lofland, 1995; Silverman, 2016). The research was designed as exploratory and application-oriented, our goals were to gather information and hold a preliminary discussion on different perceptions of issues relating to scientific reliability and on useful and effective learning methods in ethical training. The practical purpose of the research, as part of the project's objectives, was to create campaign materials promoting excellence in scientific behaviours and to design innovative learning cards[9] to teach research integrity. Therefore, the research process was not dedicated to answering the basic research questions or develop an original contribution to a field of knowledge of research integrity, but to solving specific practical problems relating to the implementation of teaching and dissemination tools.

Another limitation is that sampling in the polls was not random, we used the snowball method to collect the sample (Babbie, 2014; Biernacki and Waldorf, 1981). Links to the surveys were sent in different ways to a wide audience. The main channels recruiting respondents were: (1) offices/advisors for scientific integrity at universities and (2) mailing lists of national and international agencies and networks involved in research integrity[10]. The invitation to participate in the study was answered by people from various countries and scientific disciplines. The origin and field of interest of the respondents was not controlled, this is why there is not an equal number of respondents in the individual categories. The collected data is fragmentary, it concerns selected areas of the problem and should not be generalised; therefore, the article has no ambition to present a comprehensive analysis. The presented material is a contribution to further research and discussion on building a culture of research integrity.

Results

What is Good Science? Perceiving the Culture of Research Integrity

The horizon of understanding scientific integrity is usually determined by defining what honest science is not. The most frequently discussed topics relating to research integrity are misconduct (fabrication, falsification, plagiarism) and questionable research practices, such as bias or the phenomena of sloppy science. This tendency applies to both media and scientific articles. In their analyses of media discourse on science, Ilaria Ampollini and Massimiano

[9] Priess-Buchheit, J., Häberlein, L. and Lindemann, T. (2021). *Path2Integrity Learning Cards & Handbook for Trainers and Lecturers: Y-Series*. ARPHA Preprints. https://doi.org/10.3897/arphapreprints.e66720

[10] Like EUREC (European Network of Research Ethics Committees) or UKRIO (UK Research Integrity Office).

Bucchi state: "Not surprisingly, analysis of keyword occurrences in the collected articles underlines a clear disproportion between the frequency of negative terms such as "fraud or specific types of misconduct and the frequency of positive terms, such as 'ethics' and 'research integrity'" (Ampollini and Bucchi, 2020, p. 455). Positive connotations were much less frequent. In turn, a team of interdisciplinary American researchers examined the frequency of such slogans as: "scientific integrity" (research integrity), "research ethics" and "scientific offense" (scientific misconduct) using Pubmed, a database of medical and life sciences articles. They observed that the academic community began to write about misconduct in the 1980s, while the reliability and ethics of research were first mentioned only in the 1990s (Ferguson et al., 2007). For many years, researchers have been defining and monitoring all types of scientific offenses (Fanelli, 2009; Marshall, 2000; Resnik, Neal, Raymond and Kissling, 2015; Steneck, 2006), identifying the causes of bad science (Sovacool, 2008, DuBois et al., 2013) and looking for ways to prevent misconduct (Titus, Wells and Rhoades, 2008).

Scientists seem to be less likely to ask and describe what good science means, and what the motivations for conducting honest research are. Scientific cheating and misbehaviour are the domain of empirical research, while the image of good science and virtues in science are rather the domain of legal regulations, codes of conduct, theoretical considerations or educational practice. We wanted to reverse this trend, and thus asked scientists what they meant by research integrity and what their perception of research integrity was associated with. The answers we received were varied, some respondents referred to the sources of research integrity, others defined it by indicating valuable individual or team practices, others saw research integrity as a challenge or goal, or as capital in the work of the researcher.

Respondents pointed to several aspects of a culture of research integrity when asked about the ways they understand this concept. First of all they emphasised the close **relationship between science and society** and *the benefits for humanity when research is clean* [1/ES/MED][11]. Survey participants also wrote that *good science is crucial for development and growth* [1/IN/STEM] and *research must be trustable since [it] is the basis for building the future* [1/ES/STEM]. These statements indicate that the importance of science to society can be perceived as the commitment to reliability. Several respondents emphasised that humanity needs scientists when facing global problems and that their professional knowledge, reliable research and honest communication of results are essential in times of numerous challenges in the modern world. As we can see, understanding research integrity begins with the search for its sources in the social character of scientific knowledge and the social impact of science, as one of the statements shows: *We need to transmit the values of honesty and respect, because research is just a human activity like any other, and it generates knowledge that has to be useful for everybody* [1/ES/STEM]. According to respondents, building a culture of scientific integrity is therefore the duty of science to society.

The second source of the definition of research integrity relates to the functioning of academic culture and results from the characteristics of the **values on which it is founded**. *Researchers are the champions of truth, i.e. they should not allow their ambitions, prejudices, bias and pre-conceived ideas to get in the way; they are interacting with nature, the experimental instruments of other individuals* [1/GR/STEM]. Integrity and ethics are identified as

[11] The quotations are coded as follows: the number 1 or 2 indicates the survey in which the statement was made; the respondent's country is indicated by a two-digit ISO 3166-1 alfa-2 code; at the end there is information about the set of disciplines: STEM, medical sciences (MED), social sciences (SOC), or humanities (HUM).

inseparable elements of science, a prerequisite for the existence of the science sector: *Without integrity, research is condemned to disappear* [1/ES/MED]. These strong statements showed that when asked about the definition of research integrity, the scientific community sets a mark of equality between the culture of scientific integrity and academic culture in general. According to some respondents, there is no science outside the culture of research integrity.

Another dimension of understanding scientific integrity refers to its **community nature**. *Culture has to do with the prevailing working environment and attitudes towards how scientific experiments are designed, executed and critically analysed. An environment of undue pressure, bullying, harassment and willingness to cut corners in scientific experiments all contribute to a negative culture of research integrity* [1/GB/STEM]. Research integrity was then perceived as a common challenge for the academic community. This means that the conditions for fairness must be created together, good research attitudes are developed *where everyone is aware of expectations and standards surrounding research integrity and strives to maintain integrity in their activities and encourage it in the activities of colleagues and collaborators* [1/GB/STEM]. Survey participants underlined that scientists learn not only professional knowledge in their scientific disciplines from each other, but also ethical attitudes. Respondents noted that the keys to building a culture of integrity in academia are: *the environment that promotes responsible conduct of research* [1/HR/STEM] and *collaboration and ethical management* [1/PL/SOC]. Another person pointed out that *every level in the system we call academia should support RI and prevent misconduct* [1/FI/SOC]. Respondents argued that research integrity is teamwork.

Researchers and students defined scientific integrity as an **embodied experience**. *It is inherent in everything we are doing* [1/SOC] – as one respondent wrote. The others indicated the practicality and usability of principles in science: *A culture of research integrity is characterized by a set of interrelated social norms and values conducive to good scientific practice* [1/DE/SOC]; *We need a shift away from the focus on metrics, excellence, impact, etc. towards good research practices* [1/DK/SOC]. According to some participants, understanding what research integrity means is reflected in research practices. It is an area of practice, not only theory; this is why *RI needs to be lived – ranging from teaching a student, how to keep a proper lab book and interpret data, to how to handle conflicting data and authors* [1/DE/STEM].

An interesting aspect of defining research integrity is combining it with the **passion and mission of scientists**. Being a scientist was described by several respondents *as passion for the profession, not only a career* [1/DE/STEM]. They wrote that the path to research integrity resulted from deep curiosity and a passion for knowledge. On the other hand, a scientific career built on the pursuit of positions and publication points seemed to them to be a trap, a path that exposes them to abuse. At the same time, researchers highlighted the profitability of doing good, ethical research. Integrity was defined as **individual gain** for the researcher. Some respondents emphasised that scientific success is not possible without reliability, honesty, respect and accountability. *To report results without any bias due to your interest* [1/ES/MED] – as one person wrote. According to others, it is worth remembering that the measurable benefits of responsible research and innovation are not only individual, but extend to the entire academic community and society because *money and time is saved when research is done well* [1/ES/MED].

The results of our study show that perceiving research integrity, focused on a positive understanding of this phenomenon, refers to two visions of the university: collectivist and liberal (Dwojak-Matras, Kalinowska and Koterwas, 2020). The first approach has its origin in defining the university as a community built on values such as honesty, cooperation,

responsibility towards society (Znaniecki, 1940; Merton, 1973). Research integrity is a common value and a common challenge, its perception is strongly linked to that of academic ethos (Bieliński and Tomczyńska, 2019), professional ethics (Emmerich, 2019) and culture on the university campus (Ferguson et al., 2007). In the liberal approach to the university, scientific work is regulated by the market, including the grant funding system, the culture of competition among scientists and the culture of audit (Shore and Wright, 2015). In this perspective, research integrity is an element of building individual scientific careers, and a kind of "ethical capital" (stemming from experience and practice) of the researcher allowing him or her to achieve professional success. Understanding scientific reliability in a collective spirit highlights those aspects of the phenomenon that are related to its origin and social function. A liberal understanding refers rather to the practice of research integrity and its presence in a regular academic life. This finding shows that the paths to scientific integrity can lead simultaneously by promoting it as the heritage of academia but also through the development of each individual.

What Should Ethical Training Look Like? Thoughts on Teaching Research Integrity

Heidi Hyytinen and Erica Löfström (2017) identified two academic concepts for teaching research ethics and honesty that make up ethical training: the proactive and reactive approaches. In the proactive approach, the institution actively enhances ethical behaviour through supervision, courses, promotion of good practices and role models. The culture of research integrity is strengthened by discussing best practices, following the examples of role models, departmental observation and participating in the university community (Rissanen and Löfström, 2014). This teaching concept aims to make it easier for students to build their own knowledge and experience, leading to the embodiment of good behaviour. In this model, misconduct is treated as an opportunity for reflection and discussion with students. The reactive approach focuses on maintaining the discipline of integrity and ethics through the teacher's intervention in cases of misconduct. The aim of teaching about research ethics in the reactive model is to provide information on how to avoid bad behaviour and how to react to misconduct. The distinction between proactive and reactive ways of teaching integrity and ethics can be linked to the distinction between a values-based or norms-based approach to integrity, as we mentioned earlier (Godecharle, Nemery and Dierickx, 2014). While the general discourse on integrity is dominated by a negative, normative approach, we can currently see a tendency in education to focus on the proactive way of teaching (Ferguson et al., 2007), but researchers emphasise that both ways are complementary and inseparable.

The described approaches to teaching lead teachers to choose direct or non-direct didactic ways of teaching integrity and ethics. The followers of the reactive approach focus rather on creating special ethics courses (explicit teaching), the supporters of the proactive one, besides formal teaching, also use observing faculty and being part of the academic community to shape ethical awareness (implicit teaching) (Rissanen and Löfström, 2014). Desk research on the effectiveness of these forms of educating points out the dominant role of non-direct teaching. According to some researchers, targeted teaching is not as effective as the authors of academic courses would like (Watts et al., 2017: Marusic, Wager, Utrobicic, Rothstein and Sambunjak, 2016; Hofmann, Myhr and Holm, 2013). However, in the consciousness of academic teachers, the teaching process is still seen as a conventional activity in the university classroom, included in the study programme. In our survey, scientists were more concerned

about enhancing a culture of research integrity through dedicated courses. Only two statements concerned the concept of implicit learning as an integral part of the process of teaching research integrity. One person recommended *a mixture of formal and informal courses/lectures, including this in lab meetings and project discussions, to cover the various aspects depending on the context. It should also be integrated in other soft skill courses (for example questions on authorship could be included in workshops on scientific writing)* [1/DK/STEM]. Another respondent stressed that *it [formal and informal learning] should be integrated, else it is of no value. It should not produce a difference between* [1/DK/SOC].

Most academics describing the educational content of the courses were rather focused on the norm-based approach (such as authorship, publishing, data management, conflict of interest). They mentioned that the main purpose of selecting content for the curriculum is to help students gain a deep understanding of the codes of conduct (ALLEA, 2017), rules and principles of ethical behaviour. Nevertheless, some academic teachers discuss the values essential for the production of scientific knowledge with students in their classes. *To be reflexive about how to produce knowledge in a transparent way. To be reflexive about knowledge interest, its consequences and interaction with the field* [2/DK/SOC]. Their courses are rooted in a positive, value-based approach and address topics important for building dialogue between science and society, such as: *the utility of research (for scientific aims, for public policies, but also for social needs), innovative methodologies of research, end-users involved in research, ways of implementing dialogue between research and society* [2/ES/SOC].

The methods of teaching integrity and ethics described by the respondents in our surveys led to constructing students' knowledge and experience by encouraging critical, challenging and creative thinking. Some teachers recommended case-based learning to give students the opportunity to share their own experiences and personal learning points. They argued that case-based learning shows a range of viewpoints, allows students to reflect, and makes it easier for them to relate to the discussed content: *We do a lot of small group discussions on realistic cases and use a technique called moral case deliberation to reflect on real dilemmas that participants experience themselves* [2/MED]; *I give participants the opportunity to discuss case studies as a group (peer learning is very helpful to enable individuals to share experiences and personal learning points). I also provide time to reflect and an activity to enable them to identify what they are going to do differently (and share one point with the group)* [2/GB/MED]. Most of the answers related to the proactive approach. Even if teachers identified misconduct as a starting point for the class, they treated it as a value, as an opportunity to learn and reflect: *I proceed through examples of misconduct or examples of aporia – they think through the contradictions and thus discover the need for some regulating principles* [2/FR/HUM].

Survey participants stressed that research integrity and ethics are specific to other subjects, because they are relative and subjective: *RI/RE is no rocket science, but the essence is reflection* [2/MED] and *[it] is not a matter of being taught like a usual scientific domain. It is more of developing awareness with hand-on problems* [2/FR/STEM]. As a result, the emphasis in teaching ethics should be not on knowledge, but on attitudes and skills. One of the academics gave his vision of teaching integrity and ethics: *I think that it is not enough to tell people what not to do (the black and white of RI, comparable to the 10 commandments), but that you need time to show them: (a) the swamps of RI (the grey areas) and (b) ways to actually do better science and to protect themselves when navigating through moral dilemmas* [2/DE/MED]. This point of view has a direct impact on the methods used in ethical training. Defining ethical issues as relative, questionable, difficult to define clearly gives an important argument in favour

of teaching through dialogical methods: *ethics is not a simple good/bad matter, so one needs interaction and reflection and the best way to do this is through dialogue I think* [2/NL/SOC]. As one researcher concluded: *Doubt is my favourite word* [2/DK/SOC].

Most academic teachers imagine ethical training as a process of direct learning through dedicated, compulsory courses. The key to this process are planned activities. Coexistence in the academic environment, the observation of role models or conversations in university corridors are less important (or even unimportant) according to this approach. On the other hand, scientists believe that a good way to teach research integrity is to work on real case deliberation, dilemmas, and problems, which are close to students' experiences. This is typical of the proactive approach to integrity. Moreover, according to academic teachers, using dialogical methods results from the relative nature of ethical issues.

Conclusion

Strengthening the culture of scientific integrity is one of the most important social challenges today. It is a task for both the academic community and the wider community. In our reflections, we focused on building a culture of scientific integrity within the academia. We take the view that members of the scientific community (whether beginners or experienced scientists) need to know both the negative and positive perspectives of conducting honest research. The Path2Integrity project, of which this research is a part, fits into the current of positive integrity. The objectives of the undertaken research emerged from the need to propose positive solutions, describe good scientific practices, promote role models and dialogical methods of teaching integrity in research and ethics. However, it should be emphasised that the article presents only the research on the awareness of scientists, the subject of our research was not research practices. This makes it impossible for us to conclude on the basis of our analyses how the convictions of scientists translate into actual practices in the area of research reliability and ethics.

Knowledge about attitudes towards research integrity in the academy is needed to shape effective policy on research integrity and to build an appealing scientific culture around it. It seems that the efforts being made to promote and teach research integrity should bring benefits (from being an honest scientist) both to society and individuals. Researchers understand research integrity partially as a common challenge and the responsibility of science towards the world and partially as a personal investment in scientific success. Therefore, it is worth noting that adherence to the fundamental values of good science is a double victory – for the whole community (academy and society) and for individual scientists.

The study results indicated that academics have various opinions about how to build ethical awareness, though the positive, value-based approach dominates in teachers' statements about learning integrity and ethics. Teaching methods and educational content arise from teachers' experiences and their own beliefs. These components affect each other. Teachers and academics teach about ethical norms, rules and principles (individual approach) as well as about social responsibility and its value to society (collective approach). If the content consists of standards, rules and principles, it would seem that knowledge transmission will dominate through a teacher's explanation and demonstration. However, regardless of the subject matter, the methods they described were student-centred and based on knowledge construction.

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