Path 2 Integrity

Handbook for Trainers and Lecturers

Integrity in Research and Society

M-Series

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P2I	Path2Integrity
P2ILC	Path2Integrity learning cards
ECoC	The European Code of Conduct for Research Integrity

The purpose of the Path2Integrity handbook

Do you want to teach future researchers how to integrate their knowledge into their own research activities, as well as help them understand how important reliable research is for society? This handbook accompanies the **Path2Integrity learning cards (P2ILC)** on six topics (https://www.path2integrity.eu/ri-materials) and introduces you to an easy and fun learning programme that has been evaluated in over 15 training sessions. The Path2Integrity learning cards M-series is especially designed for graduates who already have a university degree. They learn how responsible research needs to be conducted in order to be reliable and thus useful for society.

The M-series learning cards help students use research findings responsibly while understanding the research landscape and processes within it, and by appreciating the importance of research integrity's criteria for society (cf. Häberlein 2020, 6f.). With the aid of many experienced teachers and trainers, the authors collected tips in this handbook on how to prepare each card, how to support your students' learning curve, and how to overcome the various challenges that might arise as you bring this important topic to your students.

In the next chapters, this handbook helps you prepare and carry out lessons on what makes for good, reliable research with the following learning cards (Fig. 1).

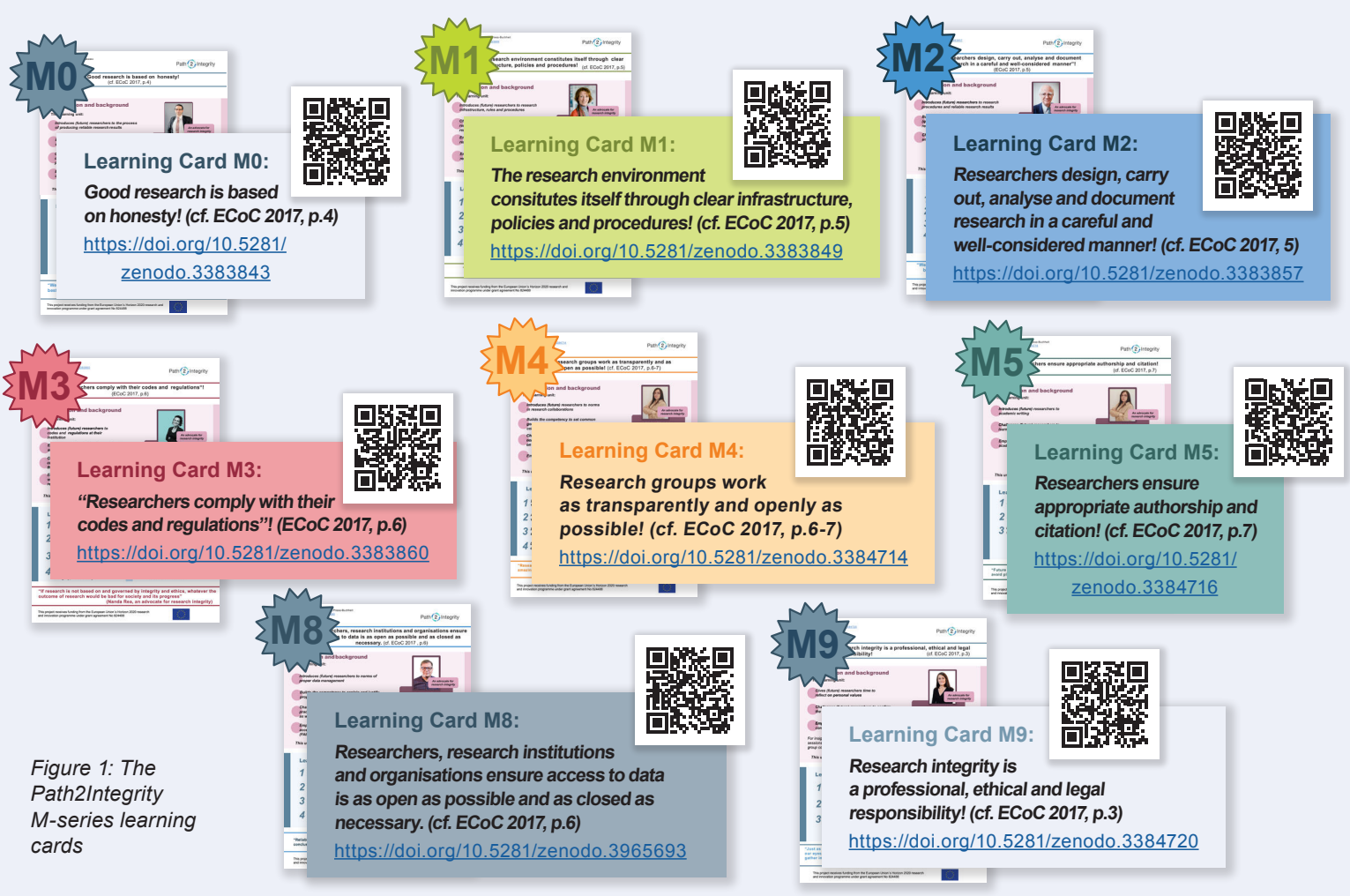


Figure 1: The Path2Integrity M-series learning cards

What the Path2Integrity learning card programme offers

The Path2Integrity learning card programme empowers people to present and discuss issues in a logical manner and to make evidence-based decisions that follow principles of open, honest, and dependable scientific research themselves. Each card can be used in a session of up to two hours to encourage dialogue, adopt different perspectives and get creative. You can use the cards as a guide for teaching a lesson or as an exercise sheet in the course. Furthermore, the length of the exercises and sessions can be adapted to meet the particular needs

of your participants; the flexibility of the programme allows you to choose and incorporate individual cards or select exercises from them that you consider suitable for your teaching area (Fig. 2).

> "I introduced my students to the subject of safeguards and existing codes and regulations when I used the cards in a course for masters students of healthcare in 2019. As graduates, they already had a lot of knowledge in their field of research, but had no understanding of research integrity at first. Still, they could immediately see the connection in terms of research integrity and their own discipline and research activity. We discussed which regulations are particularly important in healthcare and they realised that the research community follows certain principles that guarantee good research and reliable research results.

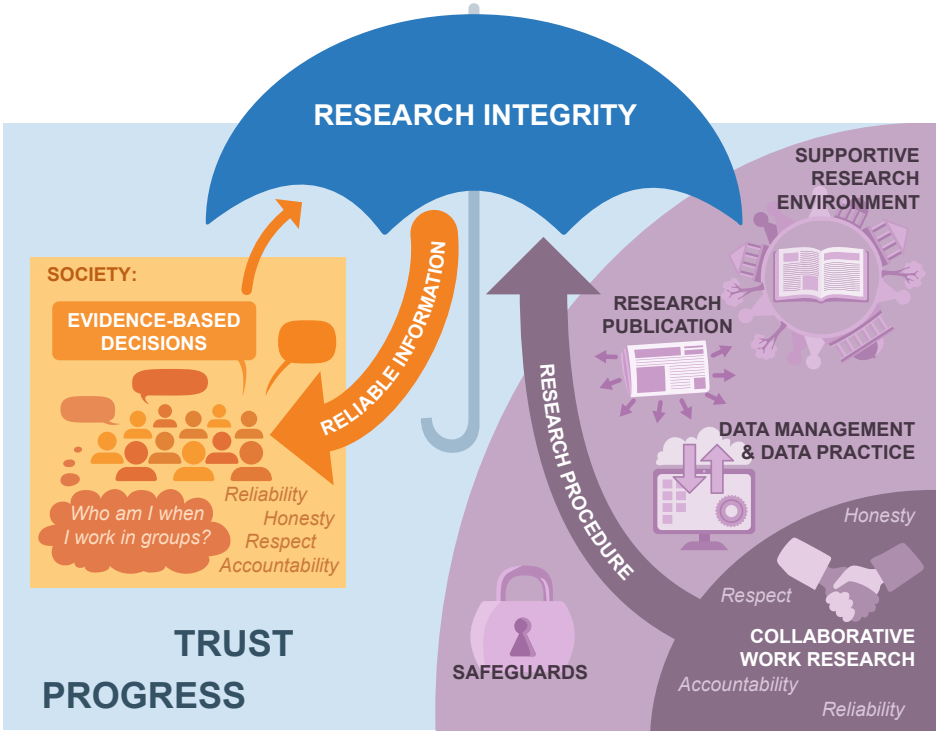


Figure 2: Integrity in research and society

As a cornerstone of the Path2Integrity learning card programme, students "[...] learn how to conduct a dialogue on the rejection or acceptance of norms in research integrity"[1]; in other words, they learn how to argue in favour of practices and principles that ensure good, reliable research results. To support them in this process, you can adapt the learning cards to your and your participants' cultural and religious backgrounds. The following chapters show you how to foster your participants' understanding of good research practice and its importance to society by using the Path2Integrity learning cards from the M-series. If you are interested in material prepared for secondary school students and undergraduates or post-graduates, switch to the handbook for the S-series for pre-disciplinary settings or the Y-series for interdisciplinary settings.

The Path2Integrity learning cards highlight student-centred interactions that help participants address challenging questions through role-playing, storytelling and reaching an agreement with one another. By using Path2Integrity learning cards, you enable future researchers to develop their own standpoint based on sound arguments, and to be able to demand integrity in research and society.

1 Prieß-Buchheit et al. 2020, 23, https://doi.org/10.3897/rio.6.e53921.

> "The design of the cards and the step-by-step procedure especially motivated my students when I used four learning cards from the M-series last semester. They also liked the active exercises, and found these exciting and engaging. In the session "Researchers comply with their codes and regulations!", I outlined the exercises from the sheet in detail and made reference to the students' prior experience in my explanations in order to enable them to relate to the topic. When we started to do the role-playing, this encouraged people to ask specific questions about their own area of research. It made me realise what an advanced level of study they're already at. I just supported them whenever questions arose; that has helped a great deal.

What is research integrity?

Lex Bouter, Professor of Methodology and Integrity at Amsterdam University Medical Centers describes research integrity as concerned with the behaviour of individual researchers. It is about research conduct and in this context about behaviour that affects trust in science or trust between scientists.

"Research integrity has obviously some overlap with research ethics and both of these concepts have some overlap with, what we call in Europe, responsible research and innovation, which is the societal relevance. [...] We call that responsible conduct of research. It's research that's relevant, that's valid, that's reproducible and also efficient".

Amsterdam Scholarly Summit, 2. July 2019 (http://editorresources.taylorandfrancis.com/wp-content/uploads/2019/07/What-is-research-integrity-Transcript.pdf).

How to prepare your teaching with the Path2Integrity learning cards

To orientate yourself and to prepare Path2Integrity learning card sessions, the **first page** of each card tells you what the respective learning card is about (Fig. 3). Using the Path2Integrity learning card gives you both structure for your session as well as additional information for composing your lesson individually. With the cards, the time you save preparing your lesson can then be used to adapt the tasks, subfields and phases to your group, allowing them to dive deeper into the topic.

Before you go into a Path2Integrity learning card session you should:

1. be acquainted with the card;
2. know the story: *Hannah's protocol –Is there a need for a research integrity policy?;*
3. be familiar with a code of conduct for research integrity; and
4. have a plan how to navigate your group through the card.

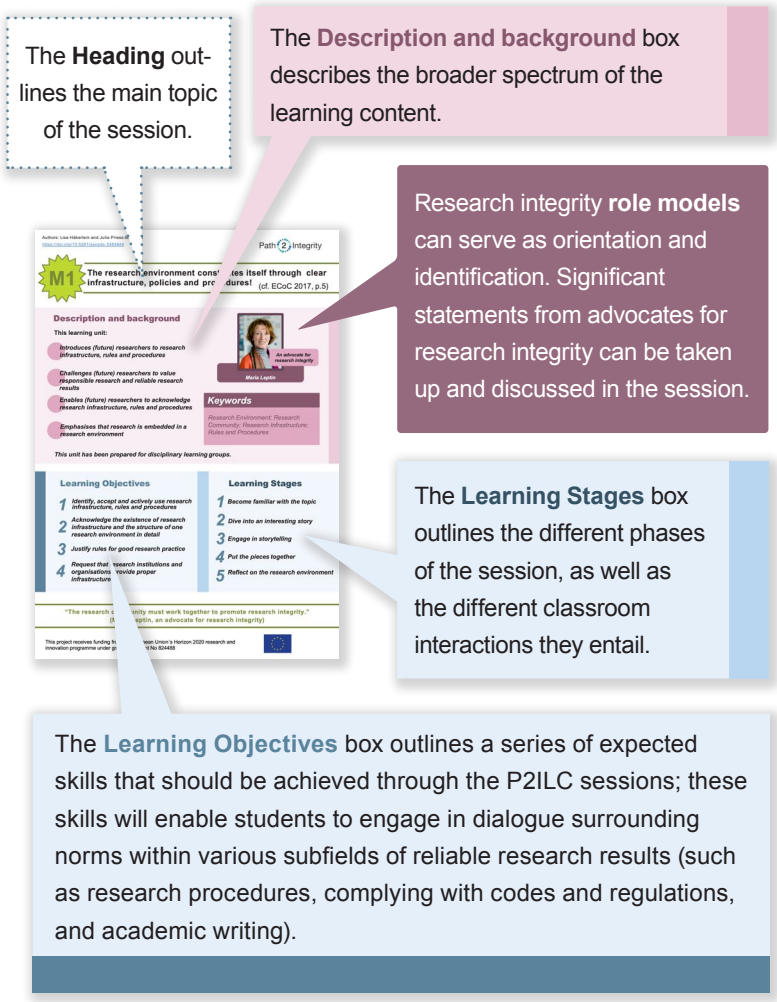


Figure 3: Path2Integrity learning card first page

"When I started using the P2I learning cards in November 2019, I realised that they contained more information and possibilities than I had expected. By reading the **first page** of each card, I encountered various topics surrounding integrity in research and society. I watched the short introductory video for the M-series (https://www.youtube.com/watch?v=ft-datvhmfo, Fig 4) and read the backgrounds and learning objectives on each card. With so many cards at hand, I was initially overwhelmed by the variety until I saw that each card had a **heading**, which described the main topic of each session.

What I like about the programme is the wide range of topics and the **flipped-classroom** style with reading preparations, in which my learning group was prompted prior to our session to acquaint themselves with the upcoming topic. Because each card outlines which articles, videos, cartoons etc. will help me best prepare my participants, my only task was to inform them what to read. In just three minutes, I had sent my group the task via email. This gave me time to consider extra material and adjust the card to the needs of my course. For my first try with the P2ILC, I chose the card "The Research Environment constitutes itself through clear infrastructure, policies and procedures!" and started to prepare myself with the help of the second page. I worked it through, thought about how I could lead my course through the card's various exercises and tasks using their specific knowledge and habits, and made a copy of the second page for each participant.

Figure 4: QR code link to the introductory video of the P2I M-series learning cards

As my participants were rather inhibited in performing the exercises, I supported them by limiting the perspective of the research environment to our research area, public health, and decided to start with joint brainstorming on a possible research landscape to ease them into a good working mood. Since they needed a little assistance here, I provided examples related to the different roles in exercise three and four so that students could identify specific stakeholders. It worked out great and helped get my students into a creative mood.

The session was a complete success! In class we introduced ourselves to Hannah, Rory and the various members at the conference, and performed an engaging storytelling exercise about the possibilities of promoting research integrity. Using the card, we got to know our research infrastructure, rules and procedures in detail and were able to identify possible gaps in our discipline. I enjoyed how much fun we had, and continued using the cards in future classes.

After the third session, my students began to anticipate the learning routine, even starting to regulate themselves and creating ideal learning opportunities. I was really able to become a mediator of their learning! In two subsequent sessions, I changed the phases to include longer discussions, after seeing how eager my course was to exchange their thoughts and arguments.

How to help participants use the card and adapt it to your teaching

I. You can flip your classroom

Each learning card contains a self-paced preparation phase. **Thus, you can divide each learning session into two phases:**

1. **the individual preparation phase**; and
2. **the classroom training**.

> Whenever I asked my students to study learning material at home, I carefully selected and prepared the material to avoid overloading them. I wanted my course to engage with the subject without losing motivation[2]. It's great that the P2ILC already contain material that I could supplement with guiding questions. I'm lucky that the paticipants of my course are used to doing some learning at home, meaning we had more time for the interactive sessions in class.

If you want, you can change the flipped classroom into a reading session at the beginning of the lesson. **When selecting material, please take into account that each participant needs to be able to access it.**

In the description of each learning card, the authors prepared additional material that you can use for the preparation phase (see the section **"Eight sessions on integrity in research and society"** on page 11 of this handbook). For more information on how to flip your classroom, as well as on how to supplement the learning material, please refer to the Path2Integrity road-map (https://www.path2integrity.eu/teaching-RI Fig. 5).

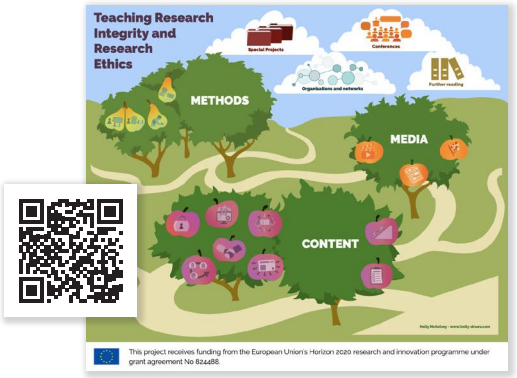


Figure 5: Path2Integrity roadmap

II. You can introduce Hannah's protocol: Is there a need for a research integrity policy?

Hannah's protocol is a narrative from the Path2Integrity learning card programme, in which research integrity is at stake. The narrative is introduced in M0 and subsequently used in several cards while developing in different directions.

> The **story** of Hannah and Rory at the conference meeting, which is used in many of the cards, fascinated us. From session to session, participants identified with the characters and imagined as well as relived their adventures. In particular, my students loved the pink sections of the learning cards, which emphasise taking a dialogical approach to Hannah´s protocol narrative.

With *Hannah's protocol - Is there a need for a research integrity policy?*, you can reflect as well as express different points of view and start a reciprocal learning process. If you want, you can use a graphic (https://zenodo.org/record/3384746#.XySdZedCSUk) at the beginning of each session. To ensure that your participants understand the narrative, you can ask them to describe the story in their own words and to articulate what integrity challenge is being described: namely, a familiar problem of conflicting motivations, in which good scientific practice is weighed against other inclinations and incentives such as obedience, hierarchy, structural forces or more (Fig. 6).

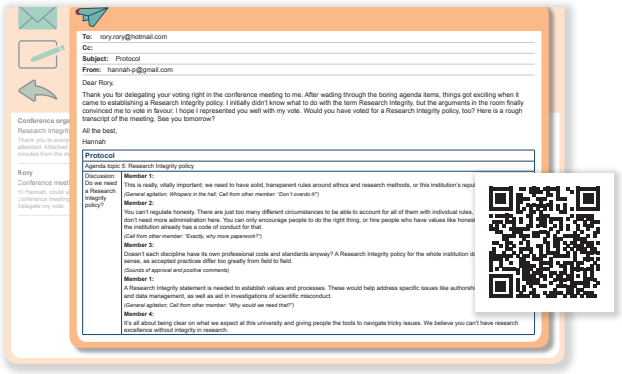


Figure 6: Hannah's protocol – Is there a need for a research integrity policy?

2 For further information see Nimmerfroh 2016.

> When we reviewed what Hannah´s protocol entailed, my students noticed that Hannah had participated in a meeting in which the need for research integrity policies with respect to different motivations was discussed.
>
> For my course, it was evident that different parties have taken opposing positions in this matter and were presenting conflicting arguments due to their diverse motivations. They understood that the main characters had no fundamental problem in terms of ethical orientation, and that they actually knew what was morally right to do. Nevertheless, they experienced a situation in which other incentives put research integrity at stake.
>
> When they were asked to engage in story-telling in M1, my course listened to different statements from their peers, outlined their knowledge, and started to discuss power structures in the context of Hannah's protocol. They began to develop and rationalise their own arguments for the importance of integrity in research and society.

III. You can encourage storytelling

Storytelling can increase "sympathetic imagination"[3], ethical reflection and comprehension of others, as well as vivid, reflective and experiential responses.[4] Through storytelling, graduates can acquire knowledge, develop solutions to a problem together and build a common language by expressing realities of human experience through the art of narrative.[5]

Figure 7: Storytelling

In the storytelling exercises contained in the P2ILC, participants articulate how they interpret concepts like research integrity or how occurrences of e.g. mistrust can influence their point of view. Using their own words and expressing both common and diverse views, they tell short stories e.g. about rules for appropriate citation, the possibility of fostering reesarch integrity in the research landscape or reasons for reliable research results for both research and society.

Learning with storytelling invites participants to step away from their own feelings and subjective attitudes and to begin developing a common language by "thinking aloud" and exchanging different points of view.

> When I asked participants in my course to write an email to Hannah giving tips for correct citation in our M5 session, they really got into it, referring to common citation rules from our discipline. Participants enjoyed using specific citation styles and supporting Hannah.
>
> At one point, I intervened and pointed out that *'Hannah's protocol - Is there a need for a research integ*rity policy?' is a fictional narrative that can develop in different ways, so they created advice that worked for different contexts. The peer correction of citation in exercise four was fun and solved some uncertainties! Working in small groups, they found themselves at the centre of a process in which both interaction and problem-solving skills were required.

3 Nussbaum 1997, 85 and 95.
4 cf. Frank and Osbeck 2016; Nussbaum 1990; Nussbaum 1997; Phillips 2010; Zipes 2005.
5 cf. Nussbaum 1990, 5.

IV. You can promote role play

Role-playing is an exploratory game in which participants assume an "as-if character".[6] Through role play you promote classroom participation, awareness of the complexities of ethics, critical and reflexive thinking, application of concepts, emotional engagement and personal accountability.[7]

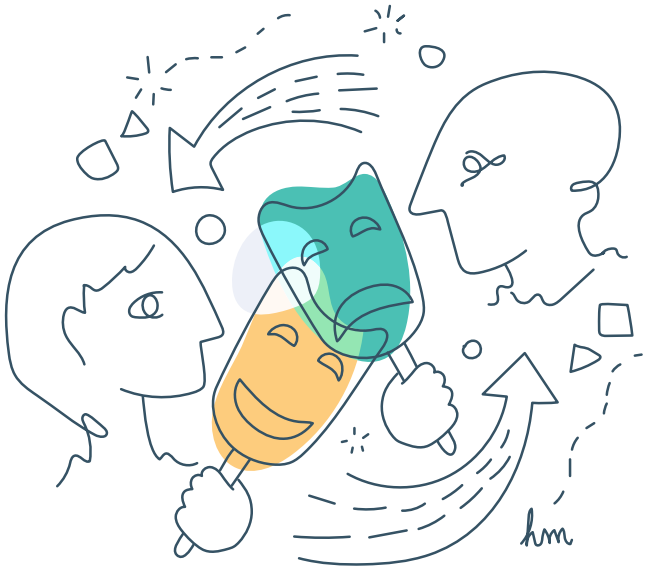


Figure 8: Role play

6 Fürstenau 2015, 106 [translated by Lisa Häberlein].

7 cf. Löfström 2012, 349 in reference to Clarkburn 2002, Sirin et al. 2003, Sparks and Hunt 1998, DeNeve and Heppner 1997; Grose-Fifer 2017; Löfström 2016; McCarthy and Anderson 2000; McWilliams and Nahavandi 2006; Poling and Hupp 2009; Poorman 2002; Rosnow 1990; Strohmetz and Skleder 1992.

> "It is this experience of putting oneself into different roles that helped my course develop a deeper understanding of their own and others' positions, and to engage questionable research procedures and research results, as well as possible solutions by taking an active approach. I liked that the role play imparts technical knowledge by directly referencing sources such as '*The European Code of Conduct for Research Integrity*'.
>
> One challenge, however, was ensuring that participants thoughtfully addressed the learning content of learning card M2 "Researchers design, carry out, analyse and document research in a careful and well-considered manner". Out of shyness towards others or perhaps due to overload, time and again roles were exaggerated or poorly presented. I decided to pause the role play and invite my course to spend some time discussing the screenplay. I asked them to imagine themselves as researchers in a situation in which they are unsure about how to proceed. How could they prioritise different research procedures? What are the consequences? Why would this or that action be good or bad for science and society? We discussed which action should be referred to as good scientific practice or misconduct. This allowed my students to delve into the scenario more deeply. We tried the role play once again and it worked much better.

To get started with role play in the Path2Integrity learning cards, you can orientate yourself using the following steps:

1. Preparation: **You know your learning group best**. Get them in the right mood thematically and emotionally. Read the instructions together and help your participants identify with their role. Offer them a comprehensive picture of the situation. You can also describe characteristics of the role to be played in detail.[8]

2. Performing: **Provide ample space for the role-playing scenario**, making sure to give your students enough time as well. If necessary, you can also provide a start signal or assign moderators to take over a guiding function in the role play.

3. Reflection: Make sure that you plan in at least as much time to reflect the role play as for the role play itself. Gradually guide your group out of the scenario by allowing them to summarise and evaluate what they have experienced[9]. Follow the instructions from the P2ILC or invite your students to share what they have observed in the play, and how they have judged decisions and interpreted the actions of others. Finally, evaluation of the role play should focus on how your participants can apply these concepts in future, and use them to argue in favour of evidence-based decisions and good research practice. If necessary, provoking questions about honesty, accountability, respect and reliability in research can stimulate a reflective analysis of the players' behaviour and their reasoning for it.

8 cf. Fürstenau 2015, 96.

9 cf. Fürstenau 2015, 104.

V. Refer to a code of conduct for research integrity

The Path2Integrity project uses *The European Code of Conduct for Research Integrity* (ECoC) as a reference document. It provides clear guidelines and reference points for orientation in the research community. By referring to the ECoC, future researchers are able to recognise standards of good research as such and refer to them in specific cases when they need guidance. This document, like other codes of conduct, serves as a basis for regulating one's own behaviour; this makes it possible to avoid thinking in terms of relativism when evaluating research behaviour through a moral lens. Depending on your cultural and disciplinary requirements, you may refer to the ECoC or choose other national, institutional or disciplinary codes of good research practice within your area of teaching that seem most appropriate for your group.

It is important to remember that the code of conduct you choose to refer to should not be used dogmatically, but rather should serve to orientate participants towards basic principles of good research practice.

VI. Evaluating future researchers' knowledge and ability to defend good scientific practice

Over the lifetime of the project, the Path2Integrity learning card programme additionally includes one card each for pre- and post-testing (M0 and M9). If you prefer to evaluate without the cards, you can use the following two links (Fig. 9):

Pre-test:
https://path2integrity.eu/limesurvey/index.php/238122?newtest=Y&lang=en

Post-test:
https://path2integrity.eu/limesurvey/index.php/238122?newtest=Y&lang=en

Figure 9: Pre-test & Post-test evaluations

The pre- and post-tests each take approximately 15 minutes. The test evaluates the effectiveness of the learning cards in your course and examines in open and closed questions (1) how to act as a researcher, e.g. how to manage data or where to go to report misconduct; and (2) how to argue in favour of good scientific research, e.g. to achieve systematic and accessible knowledge or to make one's work more transparent.

The test examines the future researchers' points of view on what makes for good and reliable research. Comparing results from the pre- and post-tests will illuminate any changes in the students' knowledge and patterns of argument that have emerged during the course of using the learning cards. As indicated in learning card M9, you only need to send an email to evaluation@path2integrity.uni-kiel.de to receive your results. The anonymised results are indicators of how your students on average (not at an individual level) argued in favour of good scientific practice both before and after P2I sessions.[10]

The P2I project recommends starting with M0 and ending your teaching with M9 if you intend to use three or more learning cards. As a trainer you can also give feedback on what obstacles you encountered in your sessions or what made you and your students particularly enthusiastic about the learning cards. This feedback will help to identify your trainer-specific needs in the classroom and to develop the programme further. Use this link: https://path2integrity.eu/limesurvey/index.php/593973?lang=en

If you would like to find out how the participants' experience was, you can have everyone fill out the smiley face questionnaire at the end of your P2I courses: https://path2integrity.eu/limesurvey/index.php/553522?lang=en

How to support a dialogical learning setting

The Path2Integrity learning cards use dialogical methods to provide an active and sustainable learning environment. The sections marked in pink on the exercise sheets indicate that participants will engage in storytelling, role-playing or reaching an agreement. In these sections, students are challenged in various contexts to provide rational arguments, set common goals and norms, request that someone do something, establish preconditions for a dialogue and weigh both pros and cons of different actions. To this end, participants need to show a certain amount of tolerance for ambiguity, communicate openly, listen actively and trust one another.

It can sometimes be difficult to create an atmosphere in which dialogical methods can be successfully pursued. Holding the lesson in a room that is large enough for interactive sessions and which allows chairs and desks to be removed can provide a supportive surrounding; as well as letting participants sit together (though not

10 cf. Wilder et al. 2020, 15.

in front of one another) and providing everyone with the same materials, e.g. exercise books, pencils etc. It is possible to hold these sessions online. Just use a tool that supports breakout sessions.

If participants are not used to actively contributing, trainers can facilitate a smooth transition into the exercise by allowing the future researchers to choose between being an observer or player during the dialogical exercises, thus giving participants time to adjust. In such sessions the tasks highlighted in pink on the learning cards are conducted by players, while observers closely watch one or two groups and subsequently write down what they learned from the presentations of others with regard to the key message from the heading of the respective card, e.g. ***Researchers ensure appropriate authorship and citation!***

In case you notice shortcomings in the dialogues of groups that are struggling to perform the tasks highlighted in pink, you can discuss all or some of the following rules with your students to take a new direction[11]:

1. Be ready to have a dialogue about accepting or rejecting norms.
2. Make sure that everyone can participate in the dialogue.
3. Acknowledge each contribution to the discussion as a noteworthy argument.
4. Share your prior knowledge when required and be prepared to discuss it.
5. Do not call upon someone's prior knowledge when you have rejected it yourself as unacceptable.
6. Do not stick to an opinion in the face of better information; accept stronger arguments.
7. Do not use an ambiguous argument to convince someone.
8. Remember that your social status does not replace making a good argument.
9. Be ready to provide reasons for your statements if asked to do so.

How to improve the learning curve

To improve the learning curve, the Path2Integrity project recommends using a **learning journal** after each session. To implement a learning journal in your Path2Integrity teaching, you can follow these steps:

1. Review the learning objectives box on the respective Path2Integrity learning card.
2. Create a writing prompt for your students that requires them to summarise the lesson. Start the prompt with, **"Write between five and ten sentences starting with the words *'how did you…'*"**
3. Then list the objectives of the respective card, e.g. from card M5:
   a) Explain the importance of citation;
   b) Weigh criteria for good academic writing;
   c) Prioritise appropriate academic writing.

11 These are nine out of 14 rules on how to conduct a rational dialogue (cf. Klare and Krope 1977, 124).

The dialogical approach to teaching students about what is necessary to produce reliable research results and evidence-based decisions in society: a closer look.

According to Lorenz (2005, 189–191), a dialogue is a verbal discussion between two or more people, characterised by speech and counter-speech with the following specifics: question and answer (to clarify terms), claim and counter-claim (to justify decisions), and proof and falsification (to disclose inferences). A dialogue is a high-quality interpersonal relationship (cf. Widdershoven and Solbakk 2019) and seeks to be an ideal speech situation (cf. Habermas 1990, 43–115) in which the other (›you‹) is recognised as a person, instrumentalisation is renounced, others' right to differing opinions is taken seriously, and an **I** and **you** role can be clearly defined (cf. Lorenz 2005, 189–191). When impartial, unconstrained and non-persuasive acts are respected, a dialogue can be conducted (cf. Gethmann 2005, 191).

A dialogical approach in teaching and learning builds common language and enables participants to answer questions and develop solutions. It can be successful when equal rights and obligations for all parties are ensured and power-driven assertions, threats, deceptions and promises that cannot be fulfilled are eschewed (cf. Janich 2009, 20–21).

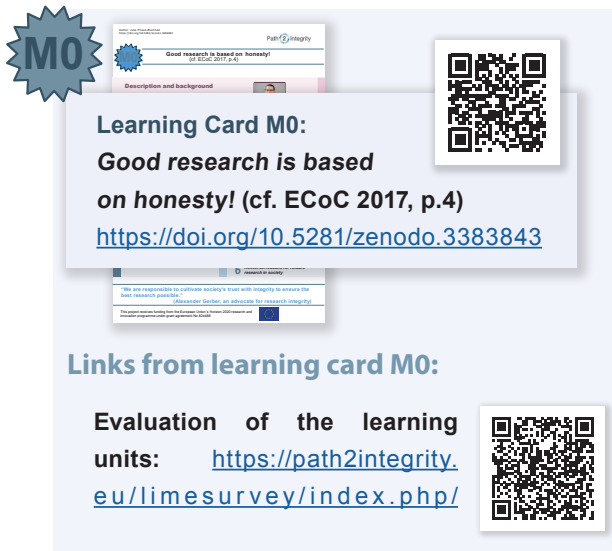
A piece of advice from gender expert Katharina Miller:

One challenge within dialogical learning settings can be the lack of eye-level conversations between different genders. Within the Path2Integrity project, the gender dimension has been observed to play a role in interactive sessions. "Storytelling and role play are often gender-mixed interactions in classrooms, incorporating gender-specific interaction patterns. Because women have less speech percentage and more speech interruptions in gender-mixed discussion groups […]"[12] P2I suggests teachers be aware of these (usually unconscious) power structures. That is why we recommend that you empower men and women to "[…] unfold their different emotions connected to their experiences"[13] by raising their awareness of existing differences and supporting their individual approaches towards participating in the dialogical discussions. This could be accomplished through an awareness training before the use of the learning cards starts. I am happy to accompany your learning experience. You can send an email to miller@3ccompliance.com and I will provide you with more information.

12 Prieß-Buchheit et al. 2020, 20.
13 Prieß-Buchheit et al. 2020, 20.

4. To conclude the prompt, add **"…in our session today? Can you draw any references and links between the actions of the session and theories, findings or methods, you already know? What do you think about when transferring these actions to a broader scale?"**
5. Provide your course with the writing prompt at the end of the session and decide when they need to return their response.

Eight sessions on integrity in research and society



This learning card **introduces** future researchers to how important the responsible conduct of research is for society. The exercises introduce research and how reliable research results are produced, and enable an understanding and usage of research results in our knowledge-based society. In six learning steps, participants learn basic values that characterise good research, formulate reasons for reliable research by telling stories and find arguments for trustworthy research results for science and society. **This learning card is best used to start the P2ILC programme.** Using the pre-test linked on the card, you can test for improvement in your courses. Feel free to use the test as an opportunity to discuss where reliable research results are at stake.

Figure 11: M0 learning card

M1

Learning Card M1:

The Research Environment constitutes itself through clear infrastructure, policies and procedures! (cf. ECoC 2017, p.5)

https://doi.org/10.5281/zenodo.3383849

This learning card draws learners' attention to the fact that good research is integrated into a larger environment that is characterised by a clear infrastructure, principles and procedures. Participants get to know the rules and regulations of the broader scientific community in five learning steps. They engage in role play and reflect on how to require a research landscape to provide an infrastructure that promotes honest research.

> "Since my teaching experience has taught me that students, even if they already have specific knowledge in their field, are often not yet familiar with the technical terms, I started to introduce them to the terms 'research community', 'funding agency' and 'whistleblower' using the definitions in the infographic from the learning card. This was a good move, because my students were not yet familiar with the idea of a 'research environment' so I tried to actively support learners in making use of the infrastructure of the research landscape.

Links from learning card M1:

The European Code of Conduct for Research Integrity: https://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf

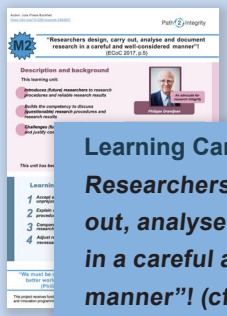
The Research Community Safeguards: https://ori.hhs.gov/sites/default/files/2018-04/3_Should_You_Trust_Science.pdf

If it works for your course, you can also use the following additional material:

The lecture "Why do ethics matter?" is a 20-minute video by Shefali Roy, who has spent most of her career in the field of ethics and compliance. It deals with the importance of ethics in practice and was held on a TEDx-event. You can ask learners to watch the video and to reflect on how important ethics is to them. What values do they bring to their institution? https://www.youtube.com/watch?v=yesE4mcv4CM

Figure 12: M1 learning card

M2



Learning Card M2:

Researchers design, carry out, analyse and document research in a careful and well-considered manner"! (cf. ECoC 2017, 5)

https://doi.org/10.5281/zenodo.3383857

This learning card introduces learners to research procedures that are necessary for careful and well-considered research and for producing reliable results. In five learning steps, participants explain and justify the criteria of responsible research. In role-play they compare research processes in different fields that are important from idea to publication in order to ensure research integrity. They are able to endure other points of view and adapt their own positions while they evaluate different arguments, face dissent and achieve consensus.

> "Before we dealt with an example from research practice, we discussed what 'Responsible Research Conduct' and 'Reliable Research Results' actually mean and once again looked at the values and norms mentioned in the ECoC. The yellow box on the M2 learning card was very helpful to remind us of basic knowledge about research integrity beforehand.

Links from learning card M2:

The European Code of Conduct for Research Integrity: https://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf

If it works for your course, you can also use the following additional material:

The Economic and Social Research Council (ESRC) helps researchers consider ethics issues throughout the complete life cycle of a project. Case studies, listed under a specific ethics issues category, aim to raise awareness of some of the ethics issues that can arise in research: https://esrc.ukri.org/funding/guidance-for-applicants/research-ethics/ethics-case-studies/

The science comic from digital architect Patrick Hochstenbach "Anatomy of scientific bias" illustrates clear messages regarding norms in research procedures. https://hochstenbach.files.wordpress.com/2017/02/scientific_bias_600dpi_rgb.jpg?w=710

Figure 13: M2 learning card

M3

Learning Card M3:
"Researchers comply with their codes and regulations"! (ECoC 2017, p.6)
https://doi.org/10.5281/zenodo.3383860

This learning card introduces learners to guidelines of research integrity and requires criteria for the promotion of good research and the dialogue on it. In five learning steps, participants are asked to take account of the rules by which good research is maintained, switch to help mechanisms to ensure research integrity and establish an open, transparent, logical and reasonable dialogue. In rotatory role play, they recognise that structural violence hinders good research.

Figure 14: M3 learning card

Links from learning card M3:

The European Code of Conduct for Research Integrity: https://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf

If it works for your course, you can also use the following additional material:

In the approx. 15 minute video **"Research Integrity and Ethics"**, Wilna Venter, M.A., M.Ed., cluster manager for strategic support in the research office of the University of Cape Town, presents the historical background, the definition and the conduct of responsible research: https://www.youtube.com/watch?v=vxNqGtNHPb0

> "For exercise 4, we first discussed the 'Safekeepers of Research Integrity' together, which are named on the learning card in the yellow box; this helped my participants to think about next steps in a situation where a dialogue on research integrity is not possible. They realised that there are ways to get help.

M4

Learning Card M4:
Research groups work as transparently and as open as possible! (cf. ECoC 2017, p.6-7)
https://doi.org/10.5281/zenodo.3384714

This learning card introduces learners to research collaborations and corresponding principles. In five learning steps, future researchers learn what collaborations are and why it's necessary to be able to reach an agreement. Participants relate to their own field of research, express their wishes and needs and practice mutual understanding and respect in a dialogue.

Figure 15: M4 learning card

Links from learning card M4:

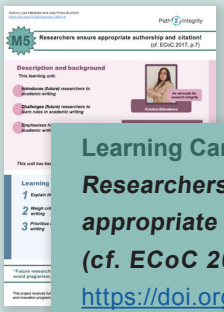
The European Code of Conduct for Research Integrity: https://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf

Building a Foundation: https://www.path2integrity.eu/teaching-RI/content/collaborative_work

If it works for your course, you can also use the following additional material:

The popular TV series "The Big Bang Theory" is about researchers from various disciplines. This sequence deals with a humorous discussion on research collaboration between the two characters Amy and Sheldon https://www.youtube.com/watch?v=XgrQpLn7Lac

M5



Learning Card M5:
Researchers ensure appropriate authorship and citation! (cf. ECoC 2017, p.7)
https://doi.org/10.5281/zenodo.3384716

This learning card covers the topic of scientific writing and authorship and introduces learners to the rules of research publication in four learning steps. In storytelling, participants explain the meaning of citations and references, weigh criteria of scientific writing and prioritise honest scientific writing over poor research practice and plagiarism.

> "When we worked on the M5 card together, focusing on correct authorship and citation, my students started to ask questions about their seminar papers and final theses. So, I took this opportunity to encourage individual questions on scientific writing.

Links from the learning card M5:

Write ethically from start to finish: https://ori.hhs.gov/sites/default/files/2017-12/8_Ethical_Write.pdf

Tips for Avoiding Plagiarism: https://ori.hhs.gov/sites/default/files/2019-02/Tips%20for%20Avoiding%20Plagiarism_Rasterized.pdf

The European Code of Conduct for Research Integrity: https://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf

If it works for your course, you can also use the following additional material:

The document **"Why do we even give sources?"** presents a list of reasons why we give sources. The reasons can be collected by participants. https://www.academicintegrity.eu/wp/materials/why-do-we-even-give-sources-a-list-of-reasons-for-good-practice-maintaining-integrity/

Figure 16: M5 learning card

M8

Learning Card M8:
"Researchers, research institutions and organisations ensure access to data is as open as possible and as closed as necessary." (cf. ECoC 2017, p.7)
https://doi.org/10.5281/zenodo.3965693

This learning card introduces (future) researchers to norms of proper data management and addresses the issue of open access data. In five learning steps, participants engage in role play and choose data practices that respect the rights of others as well as support their own work while comparing and prioritising different handlings of proper data management.

> "I'm a fan of encouraging discussion. Still, I did moderate controversy in the participants' discussions to prevent emotions flaring. I wanted to keep the balance between what Retzmann, an economics education expert, calls "involvement and distance" and decided to provide my students with decision matrixes to help them clarify the advantages, disadvantages and consequences of alternative decision options. It's great that the learning cards allow you to be so flexible.

Links from the learning card M8:

FAIR Principles: www.go-fair.org

Figure 17: M8 learning card

M9

Learning Card M9:

Research integrity is a professional, ethical and legal responsibility! (cf. ECoC 2017, p.4)

https://doi.org/10.5281/zenodo.3384720

With this learning card, participants reflect on the professional, legal and ethical importance of research integrity in science and society. In four learning steps, they become aware of their own research integrity, outline values for their research and create their own declarations in favour of honest research. This learning card should be used to conclude your teachings with the Path2Integrity learning cards from the M-series. With the post-test and the request in learning card M9 to send an email to evaluation@path2integrity.uni-kiel.de, you will be able to gain insight into your students' improvement.

> "It was great to do the test again at the end of the course with four of the P2ILC and to hear from the students themselves that they felt much more confident in their answers on research integrity questions.

Links from learning card M9:

Evaluation of the learning units: https://path2integrity.eu/limesurvey/index.php/238122?newtest=Y&lang=en

If it works for your course, you can also use the following additional material:

"On being a scientist" is an approximately 60 minute long fictional film that takes up some important topics of questionable research practices. After you have given participants a deeper insight into the topic of research integrity, this film can be used to reflect once again on what has been learned. https://www.youtube.com/watch?v=tCgZSjoxF7c&feature=youtu.be

The article **"Understanding Reproducibility and Replicability"** discusses how the practice of science has evolved. After you have given participants a deeper insight into the topic of research integrity, you can reflect on reproducibility and replicability. https://www.ncbi.nlm.nih.gov/books/NBK547546/

Figure 18: M9 learning card

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List of links

https://www.path2integrity.eu/ri-materials All Path2Integrity learning cards and accompanying material

https://doi.org/10.5281/zenodo.3383843 Learning Card M0

https://doi.org/10.5281/zenodo.3383849 Learning Card M1

https://doi.org/10.5281/zenodo.3383857 Learning Card M2

https://doi.org/10.5281/zenodo.3383860 Learning Card M3

https://doi.org/10.5281/zenodo.3384714 Learning Card M4

https://doi.org/10.5281/zenodo.3384716 Learning Card M5

https://doi.org/10.5281/zenodo.3965693 Learning Card M8

https://doi.org/10.5281/zenodo.3384720 Learning Card M9

https://www.path2integrity.eu/ Path2Integrity homepage

https://www.youtube.com/watch?v=ft-datvhmfo An introduction video for the use of the Path2Integrity M-series learning cards

https://www.path2integrity.eu/teaching-RI The Path2Integrity roadmap, a categorised collection of existing innovative and traditional educational material on research integrity and research ethics

https://doi.org/10.5281/zenodo.3384746 Graphic: Hannah´s protocol - Is there a need for a research integrity policy?

https://path2integrity.eu/limesurvey/index.php/238122?newtest=Y&lang=en Pre-test to evaluate learning units

https://path2integrity.eu/limesurvey/index.php/238122?newtest=Y&lang=en Post-test to evaluate learning units

evaluation@path2integrity.uni-kiel.de email address of a P2I member to contact after evaluation

https://www.allea.org/wp-content/uploads/2017/05/ALLEA-European-Code-of-Conduct-for-Research-Integrity-2017.pdf The European Code of Conduct for Research Integrity

https://ori.hhs.gov/sites/default/files/2018-04/3_Should_You_Trust_Science.pdf Infographic on “The research community safeguards”

https://www.path2integrity.eu/teaching-RI/content/collaborative_work Path2Integrity comic: “Building a Foundation”

https://ori.hhs.gov/sites/default/files/2017-12/8_Ethical_Write.pdf Infographic on “Write ethically from start to finish”

https://ori.hhs.gov/sites/default/files/2019-02/Tips%20for%20Avoiding%20Plagiarism_Rasterized.pdf Infographic on “Tips for Avoiding Plagiasrism”

www.go-fair.org FAIR Principles

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3383842

Path 2 Integrity

M0

Good research is based on honesty!
(cf. ECoC 2017, p. 4)

Description and background

This learning unit:

- *Introduces (future) researchers to the process of producing reliable research results*
- *Enables an understanding and usage of good research procedures*
- *Challenges (future) researchers to comply with research codes and principles*
- *Emphasises how important responsible conduct of research is for society*

An advocate for research integrity

Alexander Gerber

Keywords

Research practice; misconduct; honesty; reliability; accountability; respect in research; research and society

This unit has been prepared for all learning groups with a university degree.

Learning objectives

1. *Describe the values of a researcher*
2. *Outline reasons in favour of conducting reliable research*
3. *Argue in favour of the importance of reliable research results for both research and society*
4. *Realise consequences of research*

Learning stages

1. *Become familiar with the topic*
2. *Collect your experience*
3. *Dive into an interesting story*
4. *Connect to your own life*
5. *Engage in storytelling*
6. *Reflect on reasons for reliable research in society*

"We are responsible to cultivate society's trust with integrity to ensure the best research possible."
(Alexander Gerber, an advocate for research integrity)

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488.

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3383842

1 Become familiar with the topic:

Homework (before the unit starts) or reading session

Fill out the survey to evaluate the learning units.

Use this link: https://path2integrity.eu/limesurvey/index.php/238122?newtest=Y&lang=en

A two-digit group code is required to link relevant data in an anonymised manner. Before you begin, define this code together with the group and use it in the questionnaire. Keep a note of the code for later use. Note any interesting or challenging cases as well as any unknown words and bring these notes to your class.

2 Collect your experience:

In your class, discuss how sure or unsure you were regarding your answers to the survey. Which cases from the survey were especially interesting to you?

3 Dive into an interesting story:

Read Hannah's story aloud. Describe her by embellishing the story. Who is she in your imagination? Is she, for example, a motivated master student in the field of humanities or rather a doctoral candidate in chemistry? Does she have many friends and prefers spending time out rather than studying?

4 Connect to your own life:

Take a minute for yourselves, and think about someone in your environment who used research results to argue in favour of something. Write down a description of that person and what they argued in favour of.

Research principles are...

"Reliability in ensuring the quality of research, reflected in the design, the methodology, the analysis and the use of resources.

Honesty in developing, undertaking, reviewing, reporting and communicating research in a transparent, fair, full and unbiased way.

Respect for colleagues, research participants, society, ecosystems, cultural heritage and the environment.

Accountability for the research from idea to publication, for its management and organisation, for training, supervision and mentoring, and for its wider impacts." (ECoC 2017, p. 4)

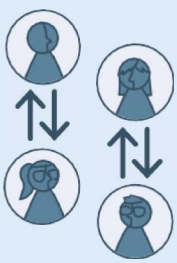
5 Engage in storytelling:

Introduce your character. In pairs, introduce your character vividly to your partner. What did the person argue in favour of, using their research results? Explain whether this person is a researcher or whether they are working in another area of society.

Imagine the worst. In a co-creative process with your partner, pick one of the people you wrote about and imagine a scenario in which the research results turn out to be fraudulent because the researcher cheated. Build a story around the cheating researcher and your character. Include a person or part of society that is hurt by the fraudulent results. Write your storyline down in bullet points.

Turn it to its best. Now rewrite your story! Together, imagine that another researcher steps in to stop the cheating. Describe this researcher's values, as well as how your character is now able to use reliable research results to make their argument. Write a short story in which a person or part of society benefits from the reliable results.

Read some of these stories aloud!



6 Reflect on reasons for reliable research in society:

As a class, brainstorm reasons for reliable research and write these on a chalk board or flip chart. Discuss why it is important that researchers follow good research practice!

Pick four significant reasons from the board as to why researchers need to follow these principles. Write them in your notebook.

Authors: Lisa Häberlein and Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3383848

Path 2 Integrity

M1 The research environment constitutes itself through clear infrastructure, policies and procedures! (cf. ECoC 2017, p. 5)

Description and background

This learning unit:

- *Introduces (future) researchers to research infrastructure, rules and procedures*
- *Challenges (future) researchers to value responsible research and reliable research results*
- *Enables (future) researchers to realise research infrastructure, rules and procedures*
- *Emphasises that research is embedded in a research environment*

An advocate for research integrity

Maria Leptin

Keywords

Research environment; research community; research infrastructure; rules and procedures

This unit has been prepared for disciplinary learning groups.

Learning objectives

1. *Identify, accept and actively use research infrastructure, rules and procedures*
2. *Learn about research infrastructure and the structure of one research environment in particular*
3. *Justify rules for good research practice*
4. *Request that research institutions and organisations provide proper infrastructure*

Learning stages

1. *Become familiar with the topic*
2. *Dive into an interesting story*
3. *Engage in storytelling*
4. *Put the pieces together*
5. *Reflect on the research environment*

"The research community must work together to promote research integrity."
(Maria Leptin, an advocate for research integrity)

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488.

M1 Path 2 Integrity

Authors: Lisa Häberlein and Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3383848

1 Become familiar with the topic:

Homework (before the unit starts) or reading session

European Code of Conduct for Research Integrity

Read the paragraph on research environment in "The European Code of Conduct for Research Integrity"

Bring the complete code with you to class, and discuss the meanings of any unknown words.

2 Dive into an interesting story:

Read or recall together Hannah's protocol and briefly flesh out what happened in the meeting. The protocol shows arguments against a research integrity policy. Take your time and consider arguments in favour of a research integrity policy. To do so, carefully read the preamble of The European Code of Conduct for Research Integrity (use QR code or link above).

Write your arguments into your notebook!

3 Engage in storytelling:

Choose one person in your class to be a moderator that leads you through the next steps. Move all tables and chairs aside.

Get into groups of three or four, and select one of the following roles for your group:

Research Community Safeguards

Part 1: Head of your research faculty

Part 2: Head of a funding agency important in your field

Part 3: Whistleblower

Part 4: Representative of the government

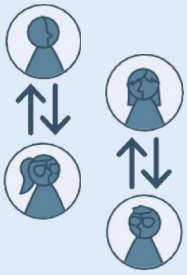
Part 5: Representative of your researchers community

Part 6: Editor of a scientific journal from your field

Part 7: Representative of the early career researchers from your field

Familiarise yourself with your role. What guidelines, procedures or infrastructure does your role entail in order to foster good research practice?

Find some online references that outline what your role does in order to foster good research practice. Pick three or four of the most important ways in which it does this, such as rules, procedures or infrastructures. Each of you should familiarise yourself with one way to foster good research practice. Present them in big letters on a piece of paper.



4 Put the pieces together:

Spread out in the room, holding up your paper. Read what others have written on their papers and find someone whose message goes well with yours. Together, brainstorm a research landscape for your discipline.

Draw the landscape on a piece of paper, and have it photocopied so that it can be passed around.

Meanwhile, start a question-and-answer circle around the room. One person should ask their neighbour: *How and why do you foster research integrity?* The neighbour should answer as clearly as possible and then ask the next student the same question. This should continue until everyone has both asked and answered.

5 Reflect on the research environment:

Move the tables and chairs back to discuss the activity as a class.

Together, agree on the most important part of the research landscape for your discipline.

Who was missing in your portrayal?

Where was there a lack of clear infrastructure, rules or procedures in your discipline?

Formulate three statements with the words: *The research environment in our discipline should* _____*!*

Copy these statements into your notebook.

How can you handle these leaps in your upcoming research? Find solutions together!

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3383856

Path 2 Integrity

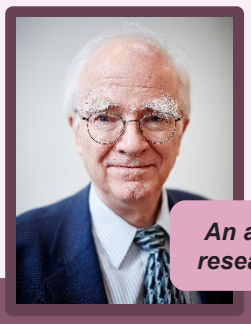
M2

"Researchers design, carry out, analyse and document research in a careful and well-considered manner." (ECoC 2017, p. 5)

Description and background

This learning unit:

- ***Introduces (future) researchers to research procedures and reliable research results***
- ***Builds the competency to discuss (questionable) research procedures and research results***
- ***Challenges (future) researchers to explain and justify complex research norms***



An advocate for research integrity

Philippe Grandjean

Keywords

Responsible research conduct; reliable research results; questionable research practice; misconduct

This unit has been prepared for disciplinary learning groups.

Learning objectives

1. ***Accept ambiguity: be open and unprejudiced***
2. ***Explain and justify research procedures***
3. ***Compare and prioritise different research procedures***
4. ***Adjust research procedures, if necessary***

Learning stages

1. ***Become familiar with the topic***
2. ***Dive into an interesting challenge***
3. ***Engage in role play***
4. ***Explain and justify research rules***
5. ***Evaluate different arguments, face dissent and achieve consensus***

"We must be neutral and represent the best of science to help make this a better world for all of us. We have to figure out how we can do that."
(Philippe Grandjean, an advocate for research integrity)

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488.

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3383856

1 Become familiar with the topic:

Homework (before the unit starts) or reading session

Read the paragraph on good research practice in "The European Code of Conduct for Research Integrity"

Discuss the meanings of any unknown words.

European Code of Conduct for Research Integrity

2 Dive into an interesting challenge:

To prepare the following exercise, please choose a situation in which some of you are unsure about how to proceed.

This challenge, regarding model procedures in the natural sciences, shows some uncertainty as to how best to proceed: *A new approach on modelling particle behaviour has been introduced to a researcher at a conference; however, it conflicts with the model he currently uses. Does he have to address this in his next paper and presentation or can he just let it go, as the model he uses is already well accepted within the community?*

Likewise, the following challenge demonstrates a questionable situation with vulnerable populations: *You are running a social media experiment and receive a request from a colleague: "Please let Paul attend your experiment as he needs the money." Should you invite Paul to attend?*

In the field of research on self-driving cars, an expert questions the following: *Is it necessary to check the alarm system for distance control before every test run in the city?*

If one of these challenges is relevant to your discipline, you are welcome to use it. If not, please select an equivalent challenge from your research. Display it with one or two sentences on the chalkboard.

3 Engage in role play:

Go through the next steps in groups of four to six people:

- Flesh out your challenge with details;
- Imagine a conflict happens between two parties in this challenge, and perform it in a role play;
- Describe the conflict and write it down (each group member needs a text version).

4 Explain and justify research rules:

Reflect on your own and answer the following questions:

Which rules do the parties explicitly or implicitly refer to in your conflict?

Did the parties explain rules in the role play?

If not, can you imagine which rules justify the actions of the two parties?

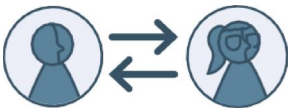
Which rules exclude or at least hinder each other? Write down the relevant rules.

Pick out one rule that you agree with, and a second one that you reject.

Describe why you agree with the first, and why you disagree with the second. If possible, refer to The European Code of Conduct for Research Integrity or another guideline on research procedures, e.g. from your institution or country.

5 Evaluate different arguments, face dissent and achieve consensus:

Discuss your rules in the plenum. Start by arguing in favour of specific research procedures and then turn to your denials.



In the discussion you can use the terms: ***responsible research conduct; reliable research results; questionable research practice; misconduct.***

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3383859

Path 2 Integrity

M3

"Researchers comply with codes and regulations relevant to their discipline." (ECoC 2017, p. 6)

Description and background

This learning unit:

- ***Introduces (future) researchers to codes and regulations at their institution***
- ***Enables an understanding of compliance and of potential complications***
- ***Challenges (future) researchers to demand compliance in research codes both from themselves and others***
- ***Emphasises how to switch to help mechanisms when an open and transparent dialogue about research rules is not possible***

An advocate for research integrity

Nanda Rea

Keywords

Openness and transparency; research codes and regulations; ombudsperson; research ethics committee; person of trust

This unit has been prepared for disciplinary learning groups.

Learning objectives

1. ***Refer to codes and regulations***
2. ***Realise that aggressive behaviour hinders research integrity***
3. ***Establish an environment for complying with research codes and regulations***
4. ***Switch to help mechanisms by contacting guardians of research integrity, if necessary***

Learning stages

1. ***Become familiar with the topic***
2. ***Immerse yourself in rules relevant to your discipline***
3. ***Engage in rotatory role play***
4. ***Find solutions at your institution***
5. ***Reflect on conditions and help mechanisms for an open and transparent dialogue***

"If research is not based on and governed by integrity and ethics, the outcome of research would be bad for society and its progress." (Nanda Rea, an advocate for research integrity)

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488.

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3383859

1 Become familiar with the topic:

Homework (before the unit starts) or reading session

Read the paragraph on safeguards in "The European Code of Conduct for Research Integrity"

Find at least two codes or regulations that affect your discipline.

Read them and bring them to your class.

In class, discuss the meanings of any unknown words.

European Code of Conduct for Research Integrity

2 Immerse yourself in rules relevant to your discipline:

Working in pairs, discuss which codes and regulations from your discipline you brought with you and decide together which rule you value as most important.

Write your chosen rule on a chalk board or flip chart. As a class, agree on the most important rule relevant to your discipline out of all the recommendations. Write this rule in your notebook!

Together with your partner, recall or read Hannah's protocol. Imagine meeting her; you have two minutes to tell her the rule within your discipline that you have decided on as a class.

3 Engage in rotatory role play:

Go through the next steps in pairs, choosing one student to play A and one to play B:

- A has a conflict with their superior B, because B is not adhering to the rule (from your notebook); in fact they have instructed A to ignore this rule. *Flesh out your conflict with details.*
- Write down a dialogue of your conflict in which A explains to B that it is both necessary and reasonable to follow this rule. Perform your dialogue in role play! *Refer to codes and regulations.*
- Go through this dialogue at least four times with B using different forms of aggressive verbal behaviour to try to prevent A from following this rule. A should continue to address the conflict in an open and transparent way. *Rotate roles for every turn.*
- Reflect on the differences between the four turns.

4 Find solutions at your institution:

Come together as a class. Discuss where A can find help in your institution in a situation in which an open and transparent dialogue is not possible.

Guardians of research integrity are:

1. **Ombudspersons** are officially elected to represent the codes and regulations of research integrity at your institution;
2. **Research ethics committees** are elected to assess ethical issues in research projects;
3. **Persons of trust** are trustworthy and experienced in the field of research integrity, in some cases officially appointed by your institution.

5 Reflect on conditions and help mechanisms for an open and transparent dialogue:

Answer these questions together as a class, and copy them into your notebook:

- How should an open and transparent dialogue about research rules look like?
- At what point in a conflict is it necessary to stop attempting a dialogue and instead switch to help mechanisms and contact a research integrity guardian?
- What can happen when somebody seeks help from a research integrity guardian?
- Why should every student and researcher feel responsible for ensuring that research rules are complied with?

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3384713

Path 2 Integrity

M4 Research groups work as transparently and as openly as possible!

(cf. ECoC 2017, pp. 6–7)

Description and background

This learning unit:

- *Introduces (future) researchers to norms in research collaborations*
- *Builds the competency to set common goals and norms in research collaborations*
- *Challenges (future) researchers to choose norms, which all research partners agree on when working collaboratively*
- *Emphasises openness and transparency*

An advocate for research integrity

Kristina Bliznakova

Keywords

Roles and responsibilities; research agreements; transparency; openness; research groups; research collaboration; common goals

This unit has been prepared for disciplinary learning groups.

Learning objectives

1. *Listen actively and present own wishes, aims and goals*
2. *Accept and learn to respect others' wishes, aims and goals*
3. *Practice understanding and being understood in a dialogue*
4. *Learn to discard arguments that cannot be justified*

Learning stages

1. *Become familiar with the topic*
2. *Face an interesting problem*
3. *Write down your wishes, aims and goals*
4. *Discuss and come to an agreement*
5. *Reflect on reaching an agreement*

"Research collaborations open doors for joint scientific activities that can provide amazing results that benefit our society."
(Kristina Bliznakova, an advocate for research integrity)

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488.

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3384713

1 Become familiar with the topic:

Homework (before the unit starts) or reading session

Read the paragraph on collaborative working in "The European Code of Conduct for Research Integrity".

Discuss the meanings of any unknown words.

Look up the Path2Integrity comic "Building a Foundation". What does it show? Which values play a role in building a foundation for collaborative work?

European Code of Conduct for Research Integrity

Building a Foundation (Path2Integrity)

2 Face an interesting problem:

To learn about research integrity in research groups, please select an example from your discipline. Choose a situation in which collaborative work is common. Here are two possible examples:

1. "To promote more female speakers at high-level European conferences, three partners decided to work together on project X3. X3 supports high-level conference hosts by conducting and publishing the results of a survey about the most pressing needs of women while they are at conferences."
2. "To tackle health challenges in Europe, 15 institutions from different European countries support an experiment with different randomised trials to improve patient care."

These examples are similar in that they refer to collaborative teams pursuing scientific results using known and state-of-the-art research procedures. If one of these examples is relevant to you, you are welcome to use it. If not, please select an equivalent example from your discipline. Write it down in one or two sentences.

3 Write down your wishes, aims and goals:

1. **Working alone, imagine that you take on the role of a researcher in the example you have chosen. Flesh this out in detail. What are your tasks and responsibilities?**
2. **You do not know who your partners will be. Write down which research practices they might use that would jeopardise the research collaboration.**
3. **Consider what you would need from your project partners so as not to step into this pitfall.**
4. **Write down on what you and your partners should agree together in advance of the project so that you can confidently start your project without hesitation or discomfort.**

Be transparent and open!

What are the roles and responsibilities of the different partners in research collaborations?

Think about processes such as research reporting on findings and problems, collecting and storing information, changing research design or models etc.

In addition, think about intellectual property rights and ownership issues for research data and publication.

When does the collaboration start? When does it end? To which code of conduct should the different partners adhere?

4 Discuss and come to an agreement:

In groups of two or three, go through the next steps:

Present your request for collaborative work to each other, starting with one partner and following the instructions below:

STEP 1: Greet your partner and explain the wishes you have. What should they include in the agreement?

→

STEP 2: Ask every partner to explain in their own words the actions you are requesting from them while working together.

→

STEP 3a: If the explanations do not match your request, rephrase your wishes and ask again starting with Step 1.

↕

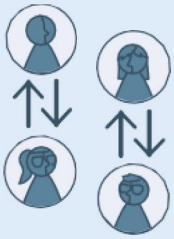
STEP 3b: If the explanations do match your request, ask them if they can accept this in a written contract.

→

STEP 4a: If no, ask them why they would not sign it and consider as a team how to solve this problem. Write your answers down and conduct it if applicable.

Switch to the next partner starting again from Step 1.

STEP 4b: If yes, thank this partner and switch to the next partner, starting again from Step 1.



5 Reflect on reaching an agreement:

As a class, discuss:

- What did different groups agree on, and why?
- What was challenging in the process?
- If groups could not come to an agreement, how did they proceed?
- Why is an agreement necessary in research collaborations?

Authors: Lisa Häberlein and Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3384715

Path 2 Integrity

M5

Researchers ensure appropriate authorship and citation!

(cf. ECoC 2017, p. 7)

Description and background

This learning unit:

- ***Introduces (future) researchers to academic writing***
- ***Challenges (future) researchers to learn rules in academic writing***
- ***Emphasises how important honesty in academic writing is***

An advocate for research integrity

Kristina Bliznakova

Keywords

Academic writing; quotation; paraphrasing; summarising; plagiarism; misconduct; citation rules

This unit has been prepared for disciplinary learning groups.

Learning objectives

1. ***Explain the importance of citation***
2. ***Weigh criteria for good academic writing***
3. ***Prioritise appropriate academic writing***

Learning stages

1. ***Become familiar with the topic***
2. ***Dive into an interesting story***
3. ***Compare citations and prioritise appropriate academic writing***
4. ***Engage in storytelling about rules for appropriate citation***

"Future researchers need instructions on how to correctly quote sources in order to avoid plagiarism."
(Kristina Bliznakova, an advocate for research integrity)

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488.

Authors: Lisa Häberlein and Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3384715

1 Become familiar with the topic:

Homework (before the unit starts) or reading session

What is plagiarism? The Glossary for Academic Integrity describes plagiarism as the presentation of works / contents / ideas from other sources without proper recognition or accurate reference to the sources (cf. Tauginienė, L et al. Glossary for Academic Integrity. ENAI Report 3G [online]: revised version, October 2018).

Find a code for academic writing for your discipline, read it and bring it with you to class. Discuss the meanings of any unknown words and contents.

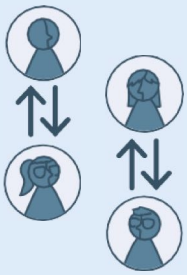
2 Dive into an interesting story:

Read or recall Hannah's protocol and briefly flesh out what happened in the meeting. Now imagine the story continues as follows:

During a seminar, Hannah's lecturer had informed the students that their final papers would be subjected to a plagiarism test, as incidents of misconduct had been increasing. Hannah did not believe she was guilty of plagiarism, but when the lecturer mentioned correct quoting and references, as well as acknowledging important work and intellectual contribution of others, Hannah began to feel nervous. "What exactly is appropriate citation?", she wondered.

Write Ethically from Start to Finish:

3 Compare citations and prioritise appropriate academic writing:



Hannah once heard that 40% of the content of students' submissions was taken from other sources. Take your time and think about this. Does it count as plagiarism if students refer to a text and...

copy word for word with no quotation marks, reference to the original source or author .....?	◯ yes	◯ no	◯ not sure
copy word for word with no quotation marks, but reference to the original source and author ....?	◯ yes	◯ no	◯ not sure
copy word for word with quotation marks, but no reference to the original source or author .....?	◯ yes	◯ no	◯ not sure
tell statements in their own words with no quotation marks but references at the end of the paraphrased section .....?	◯ yes	◯ no	◯ not sure
describe the basic idea of a piece of work in their own words with reference to the original source and author .....?	◯ yes	◯ no	◯ not sure
describe the basic idea of a piece of work in their own words with no reference to the original source and author .....?	◯ yes	◯ no	◯ not sure

Discuss your choices in class. Why is it so important to cite correctly?

This exercise is taken in modified form from Glendinning, I (2011), adapted by Dlabolová, D; Foltýnek, T; Schäfer, A (2016): Where is the borderline between poor academic practice and plagiarism? 2018-06-21. https://www.academicintegrity.eu/wp/all-materials

Tips for Avoiding Plagiarism:

4 Engage in storytelling about rules for appropriate citation:

In groups of three or four, imagine you are tutoring Hannah.
She has written you an email asking for tips on academic writing.

Before you answer her, discuss the specifics of your discipline:
Which code of academic writing do you use?
What are the most important academic writing rules?
What citation style do you use?

European Code of Conduct for Research Integrity

Pick one important sentence from the European Code of Conduct for Research Integrity and quote it correctly.
Use this example in your email to Hannah to exemplify which academic writing rules are important.

Let each group member check the email, and especially the quote.
If you all agree that the email you have written is both informative and correct, send it to Hannah@path2integrity.uni-kiel.de (voluntary task).

How to quote directly

Use someone's text (or image, chart, table etc.) word-for-word, stating the source and original author. Indicate where the original text starts and ends by enclosing the quoted section in quotation marks. Add a reference at the end of the quote.

How to paraphrase

Take a statement, idea or text of somebody else and tell it in your own words. Acknowledge the original source by using a reference at the end of the paraphrased section.

How to summarise

Describe the basic idea of a piece of work in your own words. State the original source of the summarised ideas.

Authors: Tom Lindemann and Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3965692

Path 2 Integrity

M8

Researchers, research institutions and organisations ensure access to data is as open as possible and as closed as necessary.
(cf. ECoC 2017, p. 6)

Description and background

This learning unit:

- *Introduces (future) researchers to norms of proper data management*
- *Builds the competency to explain and justify proper data management*
- *Challenges (future) researchers to choose practices that respects the rights of others as well as support their own work*
- *Emphasises the principles of findable, accessible, interoperable and re-usable (FAIR) data while describing their limitations*

An advocate for research integrity

Tymon Zieliński

Keywords

Data management; FAIR; open science; informed consent

This unit has been prepared for disciplinary learning groups.

Learning objectives

1. *Be open, unbiased and accepting of ambiguity*
2. *Explain and justify arguments for proper data management*
3. *Compare and prioritise different handlings of proper data management*
4. *Be ready to choose norms together with the dialogue group and for your target group*

Learning stages

1. *Become familiar with the topic*
2. *Choose an interesting challenge*
3. *Engage in role play*
4. *Explain and justify data management*
5. *Evaluate different arguments, face dissent and achieve consensus*

"Reliable data must first be collected, then processed accurately in order to draw reliable conclusions and present them fairly."
(Tymon Zieliński, an advocate for research integrity)

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488.

Authors: Tom Lindemann and Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3965692

1 Become familiar with the topic:

Homework (before the unit starts) or reading session

Read chapter 2.5 of "The European Code of Conduct for Research Integrity"

and

Wilkinson M, Dumontier M, Aalbersberg I, Appleton G, Axton M, Baak A, …, Mons B (2016): The FAIR Guiding Principles for scientific data management and stewardship. In: Scientific Data, 3:160018. https://doi. org/10.1038/sdata.2016.18

FAIR Principles:

Research data and related meta-data should be findable, accessible, interoperable and re-usable (FAIR), unless legal obligations dictate otherwise. Research data are the data on which findings and arguments are based. Meta-data are data describing other data.

GoFAIR Website: www.go-fair.org

2 Choose an interesting challenge:

A researcher has come across an interesting journal article that is underpinned by data that could be relevant for her own new research project. According to a statement at the end of the article, "The datasets generated and analysed during the current study are available from the corresponding author on reasonable request."

She decides to contact the corresponding author to request access to the data, outlining how she plans to use them. As her research project has just started, some questions are still open and will only be settled once the project has progressed further. A few days later she receives this reply: "Unfortunately I cannot follow your request. Because you cannot specify precisely what you will do with the data, the request is unfounded and, therefore, unreasonable." This answer leaves the researcher wondering: "What then is a reasonable request? Of course, I cannot tell in every detail what I will do with the data, what insights the analysis might generate and so on. Research is open-ended and risky, after all."

If this challenge is relevant to your discipline, you can use it in the following exercise. If not, please select an equivalent challenge from your discipline. Equivalent challenges may, inter alia, relate to questions on where to store data, how to describe data, whether or not to retain data, whether or not to make data publicly accessible, or choosing meta-data standards and file-formats. The selected challenges should clearly relate to the FAIR principles.

3 Engage in role play:

Go through the next steps in groups of four to six people:

- Flesh out your challenge with details
- Imagine a conflict happens between different parties in which the FAIR principles can be invoked.
- Perform the challenge in a roleplay.
- Describe the conflict and write it down (each group member needs a text version).

4 Explain and justify data management:

Reflect alone and answer the following questions:

Which rules do the parties implicitly reference in your conflict?

Did the parties explain the rules in the role-play?

If not, can you imagine which rules justify the actions of each of the two parties?

Which rules conflict? Which rule(s) should take precedence? Why?

5 Evaluate different arguments, face dissent and achieve consensus:

Discuss in class, why you have decided to award priority to the rule you have chosen to follow.

Explain why you disagree with alternative courses of action.

Is it because you disagree with other rules or because you hav ranked the rules according to their relative importance?

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3384719

Path 2 Integrity

M9

Research integrity is a professional, ethical and legal responsibility!

(cf. ECoC 2017, p. 3)

Description and background

This learning unit:

- ***Gives (future) researchers time to reflect on personal values***
- ***Challenges (future) researchers to confirm the importance of professionalism***
- ***Emphasises self-awareness as an important cornerstone for researchers***

For insight into the learning progress after Path2Integrity sessions, please send an email with your two-letter group code to evaluation@path2integrity.uni-kiel.de.

An advocate for research integrity

Anna Wójcicka

Keywords

Self-awareness; professionalism; ethical and legal responsibility; research values

This unit has been prepared for all learning groups with a university degree.

Learning objectives

1. ***Raise self-awareness about your own research integrity***
2. ***Outline professional values for your own research***
3. ***Make a research pledge to follow research principles together with the dialogue group***

Learning stages

1. ***Reflect on research integrity cases***
2. ***Connect to your own research***
3. ***Reflect on research integrity***
4. ***Phrase a research pledge***

"Just as we, as researchers, introduce people to the world, they will see this world through our eyes. And it is crucial that we base everything we present on solid evidence that we gather in the course of our scientific work." (Anna Wójcicka, an advocate for research integrity)

This project receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 824488.

Author: Julia Priess-Buchheit
https://doi.org/10.5281/zenodo.3384719

1 Reflect on research integrity cases:

Homework (before the unit starts) or reading session

Together with the rest of your class, go online and answer the questionnaire with everyone starting at the same time:
https://path2integrity.eu/limesurvey/index.php/238122?newtest=Y&lang=en
Your two-digit group code is required to link relevant data in an anonymised manner. Before you begin, repeat the group code you created earlier and use it in the questionnaire. How sure or unsure were you in answering this time? Discuss any interesting cases in class.

2 Connect to your own research:

Use post-its or similar and write down research integrity issues you have already experienced or issues you will likely face in future. Use one post-it per research integrity issue.
Stick the post-its on a wall in your classroom, putting similar issues one beside the other. You can use the eight categories from the ECoC to help organise them. Together, review whether your issues are research integrity issues or something else. Take down all the post-its not related to research integrity, as well as the ones you are not sure about.

Research integrity categories

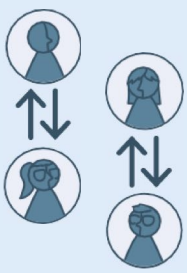
Researchers with research integrity produce reliable research results and are able to comprehensively convey how their research network is interlinked, by referring to the standards of their research discipline.
The ECoC's categories describe the many faces of research integrity (cf. ECoC 2017, pp. 5–7):

1. Research environment
2. Training, supervision and mentoring
3. Research procedures
4. Safeguards
5. Data practices and management
6. Collaborative work
7. Publication and dissemination
8. Reviewing, evaluating and editing.

3 Reflect on research integrity:

Go through your class' research integrity issues. Read them and consider what values somebody might need in order to overcome these issues. Write these down and compare them with your own values. Which of these values do you also have? Write the values that match on post-its and stick them on the wall.

Everybody picks somebody's value from the wall. Describe this value to your class by giving an example of various actions conducted by a researcher who embodies this value. Let the individuals who wrote down the values add any examples of researchers' actions, if they want.



4 Phrase a research pledge:

Stick the values back up on the wall in a row. Consider how you can express a promise to follow these values in one statement.

Be creative. Rearrange the post-its and try to create a statement. Rearrange them and try again... Put together multiple possible statements. Which one do you prefer and why?

Decide together which statement you would choose as researchers and then copy it in your notebook. Using your statement, make your Path2Integrity research pledge to follow research principles!