

Path  Integrity

# S-Series

*Integrity in Research  
and Society*



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### List of abbreviations

|              |  |
|--------------|--|
| <b>P2I</b>   | Path2Integrity   |
| <b>P2ILC</b> | Path2Integrity Learning Cards                          |
| <b>ECoC</b>  | The European Code of<br>Conduct for Research Integrity |

## The purpose of the Path2Integrity Handbook

Do you want to teach your students how to do research, as well as impress upon them the importance of reliable research results for society? This handbook accompanies the **Path2Integrity Learning Cards (P2ILC)** on 5 topics (<https://www.path2integrity.eu/ri-materials>) and introduces you to an easy and fun learning programme that has been evaluated in over 25 training sessions. The P2ILC S-series is especially designed for secondary school students and undergraduates. 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 closer 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:


**S0**

**Learning Card S0:**  
**Good research is based on honesty!**  
<https://doi.org/10.5281/zenodo.3383652>




**S1**

**Learning Card S1:**  
**Researchers, research institutions, scientific journals, government and regulatory agencies, and funding agencies all safeguard good research and ensure reliable research results!**  
<https://doi.org/10.5281/zenodo.3383671>




**S2**

**Learning Card S2:**  
**Researchers follow their quest in a careful and well-considered manner! (cf. ECoC 2017, 5)**  
<https://doi.org/10.5281/zenodo.3383805>




**S3**

**Learning Card S3:**  
**Researchers comply with codes and regulations!**  
<https://doi.org/10.5281/zenodo.3383817>




**S4**

**Learning Card S4:**  
**Research groups work as transparently and openly as possible!**  
<https://doi.org/10.5281/zenodo.3383827>




**S5**

**Learning Card S5:**  
**Researchers ensure appropriate authorship and citation! (cf. ECoC 2017, 5)**  
<https://doi.org/10.5281/zenodo.3383833>



**S9**

**Learning Card S9:**  
**A researcher is responsible for conducting reliable results!**  
<https://doi.org/10.5281/zenodo.3383835>



## What the P2ILC programme offers

P2ILC empowers people to demand evidence-based decisions from others and to 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, different perspectives, and creativity. You can use the cards as a guide for teaching

a lesson or as an exercise sheet in class. Furthermore, the length of the exercises and sessions can be adapted to meet the individual needs of your class; the flexibility of the programme allows you to choose and incorporate particular cards that you consider suitable for your teaching area.

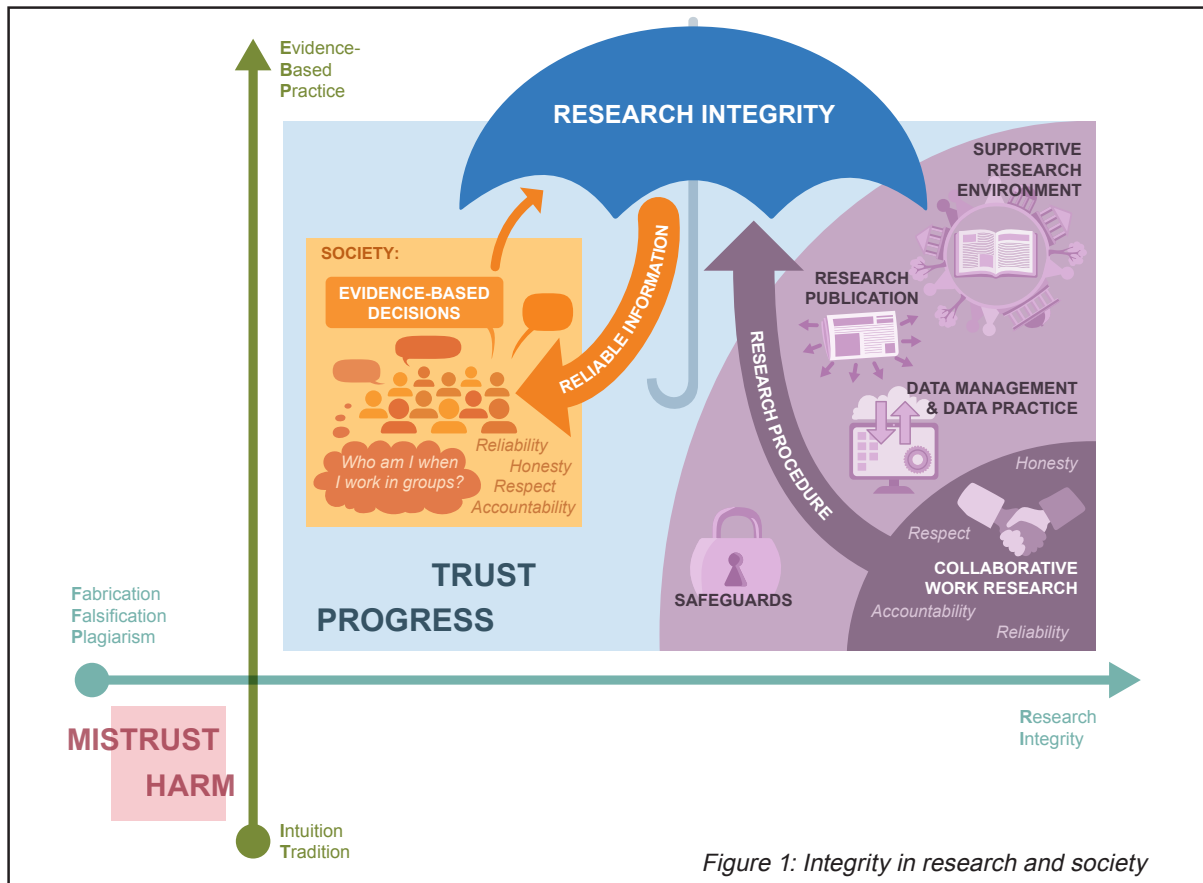


Figure 1: Integrity in research and society

“ I introduced my students to the topic of good research practice when I used the cards in a course for bachelor students of electronic engineering in 2019. They didn’t know anything about responsible research at first. But they immediately understood the connection by looking at our knowledge-based society. I showed them how they themselves rely on the results of research in many ways, both in everyday life as well as in their studies; they realised that we as a society have to demand that the research community follow certain principles that guarantee reliable research results.

As a cornerstone of the P2ILC programme, students “learn how to conduct a dialogue on the rejection or acceptance of norms in research integrity”<sup>1</sup>; 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 students’ ethnic, cultural and religious backgrounds. The following chapters show you how to foster your students’ understanding of good research practice and its importance to society by using the P2ILC from the S-series. If you are interested in material prepared for

graduates or post-graduates, switch to the handbook for the M-series for disciplinary settings or the Y-series for interdisciplinary settings.

The P2ILC highlight student-centered interactions help participants address challenging questions through role-playing, storytelling and reaching an agreement with one another. By using P2ILC, you enable your students to understand the significance of reliable research results, to develop their own opinions and to be able to demand integrity in research and society.

“ The design of the cards and the step-by-step procedure especially motivated my students when I used four learning cards from the S-series last semester. They also liked the active exercises, and found these exciting and engaging. In the session “Good research is based on honesty!”, however, they found it difficult to relate the scenario to their everyday lives and studies. I realised that they did not yet define themselves as researchers or as decision-makers. To open the door for them to integrity in research and society, I explained the exercises from the sheet in detail, outlining the instructions clearly, and assisted them whenever questions arose; that has helped a great deal.

1 Prieß-Buchheit et al. 2019, 19, <https://www.path2integrity.eu>.

## How to prepare your teaching with the P2ILC

To orientate yourself and to prepare P2ILC sessions the **first page** of each card tells you what the respective learning card is about.

Using the P2ILC gives you both structure for your session as well as additional information for composing of your lesson individually. With the cards, the time you save time 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 P2ILC session you should:

1. be acquainted with the card;
2. know the story: *What happened at LONA Science Centre?*;
3. be familiar with a code of conduct for research integrity; and
4. have a plan how to navigate your group through the card.

The **Heading** outlines the main topic of the session.

The **Description and background** box describes the broader spectrum of the learning content.

The **Learning Stages** box outlines the different phases of the session, as well as the different classroom interactions they entail.

The **Learning Objectives** box outlines a series of expected skills that should be achieved through the P2ILC session; these skills will enable students to engage in dialogue surrounding norms within various subfields of reliable research results (such as research procedures, complying with codes and regulations, and academic writing).

“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 S-series ([https://www.youtube.com/watch?v=79Z\\_n-z5i5U](https://www.youtube.com/watch?v=79Z_n-z5i5U)) 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 students were 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 students, my only task was to inform them what to read. In just three minutes, I had sent my students 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 “Research groups work as transparently and openly as possible!” and started to prepare myself with the help of the second page. I worked it through, thought about how I could lead my students through the card’s various exercises and tasks using their

specific knowledge and habits, and made a copy of the second page for each student.

Because my students often get self-conscious in situations in which they worry they will be laughed at, I concentrated on preparing the second and third tasks of the card. I decided to prepare a sort of bridge to ease them into a good working mood. Using staples and tape, I designed an avantgarde – well, okay, ugly – stick figure, which I showed my students right at the start of task two. It worked! Ms Stick Figure sparked some smiles and helped get my students into a creative mood.

The session was a complete success! In class we introduced ourselves to Rebecca, Emma and Prof Weis at LONA Science Centre, and performed an engaging storytelling exercise about reluctant behaviours that emerge during cooperation. Using the card, we practiced and overcame disagreements and disrespectful accusations by establishing a strong collaborative base. 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 students were to exchange their thoughts and arguments.

# How to effectively accompany your students step by step using a P2I learning card and adapting it to your teaching: Get started!

## 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 students to engage with the subject without losing motivation<sup>2</sup>. It's great that the P2ILC already contain material that I could supplement with guiding questions. I'm lucky that my students 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 student 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 phases (see the section “5 sessions on integrity in research and society” on page 10 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/>).



## II. You can introduce Emma's chat: What happened at LONA Science Centre?

Emma's chat (*What happened at LONA Science Centre?*) is a narrative from the P2ILC programme, in which reliable research results are at stake. The narrative is introduced in S0 and subsequently used in each card while developing in different directions.

“The story of Emma, Rebecca and Prof Weis at LONA Science Centre, which is used in many of the cards, fascinated us. From session to session, students 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 the LONA Science Centre narrative.

With *What happened at LONA Science Centre?*, you can reflect as well as express different points of view and start a reciprocal learning process. If you want, you can either use the visually appealing graphic (<http://doi.org/10.5281/zenodo.3384744>) or the video (<https://www.youtube.com/watch?v=e4-TbZIMvto>) at the beginning of each session. To ensure that your students 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.



2 For further information see Nimmerfroh 2016.

“When we reviewed what Emma’s chat entailed, my students noticed that Emma had overheard an argument in which different motivations are involved. For my students, it was evident that the story displayed a clash between Prof. Weis’ obedience towards the head of the institution and her inclination towards good scientific practice. 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 S4, my students listened to different statements from their peers, outlined their knowledge, and started to discuss power structures in the context of Emma’s chat. 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”<sup>3</sup>, ethical reflection and comprehension of others, as well as vivid, reflective and experiential responses.<sup>4</sup> Through storytelling, students 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.<sup>5</sup>

guidelines being disregarded, or the use of a raised voice as a symbol of discord in research cooperation. Learning with storytelling invites students 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 my students to write a scene from the script of a screenplay in our S1 session, they got really into it, presenting reliable research results and facts, as well as opinions and judgements as to how this might compare to real-life conditions<sup>6</sup>. At one point, I intervened and pointed out that ‘What happened at LONA Science Centre?’ is a fictional narrative that can develop in different ways. Students enjoyed looking for alternative solutions and justifying their decisions to one another. Working in small groups, they found themselves at the centre of a process in which both interaction and problem-solving skills were required.

I’m a fan of encouraging discussion in the class-room. Still, I did moderate controversy in the students’ discussions to prevent emotions flaring. I wanted to keep the balance between what Retzmann, an economics education expert, calls “involvement and distance”<sup>7</sup> 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.



In the storytelling exercises contained in the P2ILC, students 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 the importance of citation methods, difficult working conditions that lead to research

3 Nussbaum 1997, 85 and 95.

4 Frank and Osbeck 2016; Nussbaum 1990; Nussbaum 1997; Phillips 2010; Zipes 2005.

5 cf. Nussbaum 1990, 5.

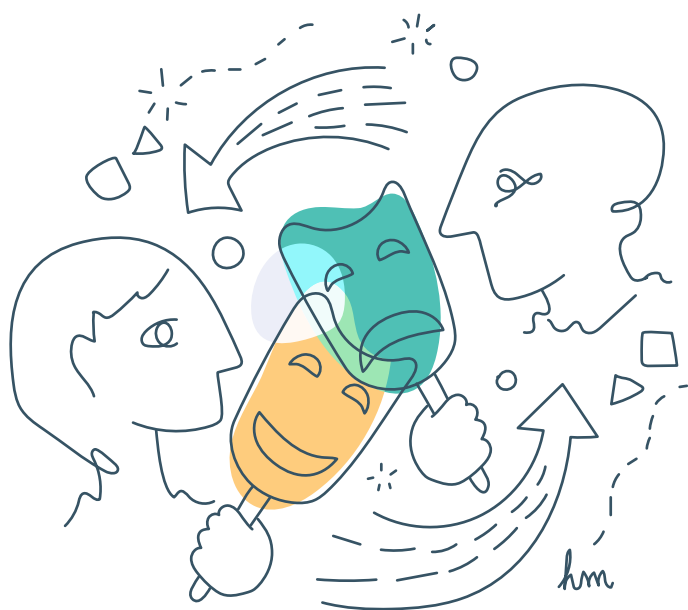
6 cf. Kaiser/Brettschneider 2015, 146f.

7 Retzmann 2007, 43 quote Reinhard 1999, 10ff. [translated by Lisa Häberlein].



#### IV. You can promote role-play

Role-playing is an exploratory game in which students assume an “as-if character”.<sup>8</sup> 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.<sup>9</sup>



“It is this experience of putting oneself into different roles that helped my students develop a deeper understanding of their own and others’ positions, and to engage questionable research results and 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 making sure that my students engaged with the learning content of learning card S3 “Researchers comply with codes and regulations” in a thoughtful 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 students to spend some time discussing the screenplay. I asked them to imagine themselves as researchers in a team in which misconduct is suspected. How would they react? 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.

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

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

#### To get started with role-play in the P2ILC, you can orientate yourself using the following steps:

1. Preparation: **You know your students best.** Get them in the right mood thematically and emotionally. Read the instructions together and help your students 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.<sup>10</sup>
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: 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 students out of the scenario by allowing them to summarise and evaluate what they have experienced.<sup>11</sup> 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 students 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.

10 cf. Fürstenau 2015, 96.

11 cf. Fürstenau 2015, 104.

## V. Refer to a code of conduct for research integrity

The Path2Integrity project implements *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, students are able to recognise standards of honest research as such and refer to them in specific cases when they need guidance. This document, like other codes of conduct such as the Singapore Statement (2010), the Montreal Statement (2013), the National Research Council of Canada (NRC) Code of Conduct (2013) etc., 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 students towards basic principles of good research practice.

## VI. Evaluating what students know about conducting research and how they defend good scientific practice

The P2ILC programme additionally includes one card each for pre- and post-testing (S0 and S9). If you prefer to evaluate without the cards, you can use the following two links:

### Post-test:

<https://path2integrity.eu/limesurvey/index.php/714871?newtest=Y&lang=en>



### Pre-test:

<https://path2integrity.eu/limesurvey/index.php/714871?newtest=Y&lang=en>



The pre- and post-tests each take approximately 15 minutes. The test evaluates the effectiveness of the learning cards in your class and examines in open and closed questions (1) how to act as a researcher, e.g.

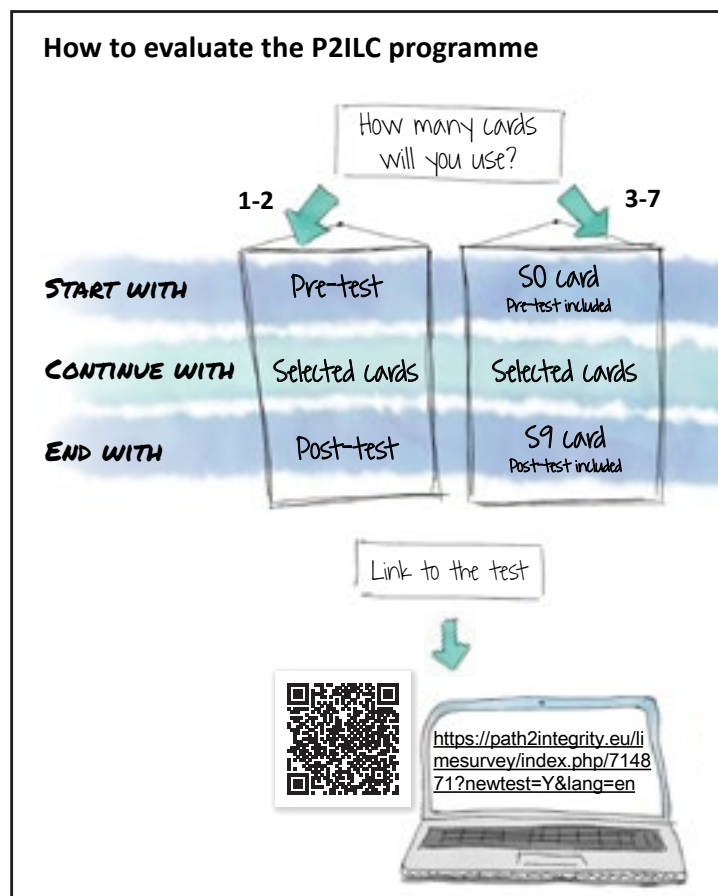


Figure 2: Evaluation of learning units

how to cite 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 students' 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 S9, you only need to send an email to [zollitsch@path2integrity.uni-kiel.de](mailto:zollitsch@path2integrity.uni-kiel.de) to receive your results. The results are reliable 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.<sup>12</sup> These results are anonymised and also used to improve the learning cards.

The P2I project recommends starting with S0 and ending your teaching with S9 if you intend to use three or more learning cards (cf. figure 2).

12 cf. Wilder et al. 2020, 15.

## How to support a dialogical learning setting

The P2ILC use dialogical methods to provide an active and sustainable learning environment. The sections marked in pink on the exercise sheets indicate that students 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, students 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 students sit together (though not 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 students are not used to actively contributing, trainers can facilitate a smooth transition into the exercise by allowing the students to choose between being an observer or player during the dialogical exercises, thus giving students 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 pink highlighted tasks, you can discuss all or some of the following rules with your students to take a new direction<sup>13</sup>:

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 force anyone to agree with an ambiguous argument.
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.
10. Share your prior knowledge if necessary.

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13 These are ten out of 14 rules on how to conduct a rational dialogue. cf. Klare, T., & Krope, P. 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 (cf. 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 dialog can be conducted (cf. Gethmann 2005, 191).

A dialogical approach in teaching and learning builds common language and enables students 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 and deceptions are eschewed, as well as promises that cannot be fulfilled (Janich 2009, 20–21).

## A piece of advice from gender expert Katharina Miller:

One challenge within the dialogical learning setting can be the lack of eye-level conversations between different genders. Within the P2I 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 a lower speaking percentage and experience more speech interruptions in gender-mixed discussion groups [...]”<sup>14</sup> 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”<sup>15</sup> 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 provide you with more information and accompany your learning experience. You can send an email to Katharina Miller (miller@3ccompliance.com) and I will provide you with more information.

14 Prieß-Buchheit et al. 2019, 16. <https://www.path2integrity.eu>.

15 Prieß-Buchheit et al. 2019, 17.

## How to improve the learning curve

To improve the learning curve, the P2I project recommends using a **learning journal** after each session. To implement a learning journal in your P2I teaching, you can follow these steps:

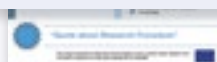
1. Review the learning objectives box on the respective P2ILC.
2. Create a writing prompt for your students that requires them to summarise the lesson. Start the prompt with, **“Write between five and ten sentences starting with the words ‘how did you...’”**
3. Then list the objectives of the respective card, e.g. from card S5:
  - a) **understand academic writing pro-cedures;**
  - b) **describe criteria for good academic writing;**
  - c) **explain the importance of citation;**
  - d) **weigh different evaluation criteria you can use when writing academic or non-academic papers such as fiction.**
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 students with the writing prompt at the end of the session and decide when they need to return their response.

## 5 sessions on integrity in research and society



**Learning Card S0:**  
**Good research is based on honesty!**

<https://doi.org/10.5281/zenodo.3383652>



**Links from learning card S0:**

**Evaluation of the learning units:** <https://path2integrity.eu/limesurvey/index.php/714871?newtest=Y&lang=en>



This learning card **introduces** learners 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 five learning steps, students learn basic values that characterise good research, formulate reasons for honest 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.

**S1**



**Learning Card S1:**

**Researchers, research institutions, scientific journals, government and regulatory agencies, and funding agencies all safeguard good research and ensure reliable research results!**  
<https://doi.org/10.5281/zenodo.3383671>

This learning card draws learners' attention to the research environment that ensures reliable research results for society. This exercise sheet enables learners to acknowledge safekeepers in research and challenges learners to value and request good and reliable research for society. In five steps the learners engage in storytelling and reflect on how to require researchers to adhere to the norms of honest research.

**Links from learning card S1:**

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 class, you can also use the following additional material:

The Research Integrity Office (ORI) provides an infographic on "The research community safeguards" addressing the responsibility of the research community in promoting research integrity: [https://ori.hhs.gov/sites/default/files/2018-04/3\\_Should\\_You\\_Trust\\_Science.pdf](https://ori.hhs.gov/sites/default/files/2018-04/3_Should_You_Trust_Science.pdf)



“ Before I assigned students to do the preparation task from S1, I introduced them to the terms ‘ethics commission’, ‘ombuds-person’ and ‘data management officer’ using the definitions in the yellow highlighted box from the learning card. This was a good move, because my students were not yet familiar with the idea of a ‘research environment’. For example, they had no idea that a noteworthy regulatory institution exists that contributes to securing reliable research.

**S2**



**Learning Card S2:**

**Researchers follow their quest in a careful and well-considered manner! (cf. ECoC 2017, 5)**  
<https://doi.org/10.5281/zenodo.3383805>

This learning card introduces learners to research procedures that are necessary for careful and well-considered research and for producing reliable results. The exercises stress how important the responsible conduct of research is for society. In four learning steps, students describe the criteria of responsible research and, when telling stories, argue in favour of the importance of reliable research results for both science and society.

**Links from learning card S2:**

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 class, you can also use the following additional material:

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](https://hochstenbach.files.wordpress.com/2017/02/scientific_bias_600dpi_rgb.jpg?w=710)



"What is scientific research?" is a 3-minute video that gives students a brief introduction to research procedures. You can ask students to watch the video and take notes: Which procedures might follow George's experiment before he actually gets to the final product? <https://www.youtube.com/watch?v=RYLsKM3lkrA>



“ When I asked my students to continue the story of the LONA Science Centre and give advice to Prof. Weis in my S2 session, we took another look at the norms and values mentioned in the ECoC. Where they could only think of one solution at a time, the document provided us with alternative arguments. Heterogeneity really improved multidimensional thinking in my class.

**S3**

**Learning Card S3:  
Researchers comply with  
codes and regulations!**

<https://doi.org/10.5281/zenodo.3383817>



This learning card familiarises learners with guidelines for good research practice. The exercises emphasise that aggressive behaviour hinders good research. In five learning steps, role-players are asked to take account of the rules of honest research, to enable reliable research results by establishing an open, transparent, logical and reasonable dialogue.

“ When I used learning card S3, I changed the lesson plan and introduced my students to German rules and regulations for good research practice first. Before we started role-playing, I pointed out what it means to be tolerant in the case of ambiguity, to communicate openly, to listen actively and to trust one another. Together we practiced how to provide rational arguments and how to weigh the pros and cons of different actions. That was a good idea, because my students had initially not known anything about the German code of conduct or about how to conduct a dialogue.

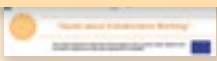
**Links from learning card S3:**

**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>

**S4**

**Learning Card S4:  
Research groups work as  
transparently and openly  
as possible!**

<https://doi.org/10.5281/zenodo.3383827>



This learning card introduces learners to research collaborations and corresponding principles. In five learning steps, students learn what collaborations are and why it's necessary to be able to reach an agreement. Students act as if they are researchers, express their wishes and needs through storytelling and practice mutual understanding and respect in a dialogue.

“ I explained research agreements by linking them to open and transparent communication. That went well, because my students overcame their initial assumption that group work is just talking to one another. They started to think about group work from a new angle and discovered that transparency and openness are preconditions for good research collaborations.

**Links from learning card S4:**

**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>



**Collaborative Research Solutions:** <https://www.youtube.com/watch?v=NTtAeiWKgDs>



**Building a foundation:** [https://www.path2integrity.eu/teaching-RI/content/collaborative\\_work](https://www.path2integrity.eu/teaching-RI/content/collaborative_work)



**S5**

**Learning Card S5:**  
**Researchers ensure appropriate authorship and citation!**  
 (cf. ECoC 2017, 5)

<https://doi.org/10.5281/zenodo.3383833>



This learning card covers the topic of scientific writing and authorship and introduces learners to the rules of academic papers in five learning steps. Through storytelling, students develop an understanding of which processes have to be taken into account when writing academic papers, and learn to name various criteria for good scientific writing as well as explain the importance of citing sources. They also learn to be able to distinguish academic papers from non-academic papers.

“When we worked on the S5 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.

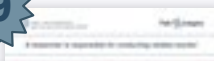
#### Links from the learning card S5:

**Refairance:** [https://www.kim.uni-konstanz.de/typo3temp/secure\\_downloads/68748/0/d217e531e6405cdc07605d5f264c03a7addc0a4f/film\\_zitieren\\_engl.mp4](https://www.kim.uni-konstanz.de/typo3temp/secure_downloads/68748/0/d217e531e6405cdc07605d5f264c03a7addc0a4f/film_zitieren_engl.mp4)



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

**The science comic from the digital architect Patrick Hochstenbach “Plagiarism” illustrates clear messages regarding research values in scientific writing:** [https://hochstenbach.files.wordpress.com/2017/02/plagiarism\\_600dpi\\_rgb.jpg?w=710](https://hochstenbach.files.wordpress.com/2017/02/plagiarism_600dpi_rgb.jpg?w=710)

**S9**

**Learning Card S9:**  
**A researcher is responsible for conducting reliable results!**

<https://doi.org/10.5281/zenodo.3383835>



#### Links from learning card S9:

**Evaluation of the learning units:**  
[https://path2integrity.eu/lime\\_survey/index.php/714871?newtest=Y&lang=en](https://path2integrity.eu/lime_survey/index.php/714871?newtest=Y&lang=en)



“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.

With this learning card, students reflect on the importance of reliable research results for science and society. In four learning steps, they recognise codes and regulations as an obligation to good scientific practice, require researchers to commit themselves to the such 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 S-series. With the post-test and the request in learning card S9 to send an email to [zollitsch@path2integrity.uni-kiel.de](mailto:zollitsch@path2integrity.uni-kiel.de), you will be able to gain insight into your students' improvement.

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## Codes of Conduct

European Code of Conduct for Research Integrity, Revised Edition, 2017, [https://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics\\_code-of-conduct\\_en.pdf](https://ec.europa.eu/research/participants/data/ref/h2020/other/hi/h2020-ethics_code-of-conduct_en.pdf), May 5th 2020.

Montreal Statement on Research Integrity in Cross-Boundary Research Collaborations, 2013, <https://wcrif.org/montreal-statement/file>, May 5th 2020.

National Research Council Canada Code of Conduct, 2013, [https://nrc.canada.ca/sites/default/files/2019-03/code\\_of\\_conduct\\_may\\_2013.pdf](https://nrc.canada.ca/sites/default/files/2019-03/code_of_conduct_may_2013.pdf), May 5th 2020.

Singapore Statement on Research Integrity, 2010, <https://wcrif.org/documents/327-singapore-statement-a4size/file>, May 5th 2020.

## List of links

<https://www.path2integrity.eu/ri-materials> All P2I Learning Cards and accompanying material

<https://doi.org/10.5281/zenodo.3383652> Learning Card S0

<https://doi.org/10.5281/zenodo.3383671> Learning Card S1

<https://doi.org/10.5281/zenodo.3383805> Learning Card S2

<https://doi.org/10.5281/zenodo.3383817> Learning Card S3

<https://doi.org/10.5281/zenodo.3383827> Learning Card S4

<https://doi.org/10.5281/zenodo.3383833> Learning Card S5

<https://doi.org/10.5281/zenodo.3383835> Learning Card S9

<https://www.path2integrity.eu/> P2I homepage

[https://www.youtube.com/watch?v=79Z\\_n-z5i5U](https://www.youtube.com/watch?v=79Z_n-z5i5U)  
An introduction video for the use of the P2I S-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

<http://doi.org/10.5281/zenodo.3384744> Graphic: Emma's Chat: What happened at LONA Science Centre?

<https://www.youtube.com/watch?v=e4-TbZIMvto> Video: Emma's Chat: What happened at LONA Science Centre?

<https://path2integrity.eu/limesurvey/index.php/714871?newtest=Y&lang=en> Pre-test to evaluate learning units

<https://path2integrity.eu/limesurvey/index.php/714871?newtest=Y&lang=en> Post-test to evaluate learning units

[zollitsch@path2integrity.uni-kiel.de](mailto:zollitsch@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](https://ori.hhs.gov/sites/default/files/2018-04/3_Should_You_Trust_Science.pdf) Infographic on "The research community safeguards"

[https://hochstenbach.files.wordpress.com/2017/02/scientific\\_bias\\_600dpi\\_rgb.jpg?w=710](https://hochstenbach.files.wordpress.com/2017/02/scientific_bias_600dpi_rgb.jpg?w=710) Science comic: "Anatomic of scientific bias"

<https://www.youtube.com/watch?v=RyLsKM3lkrA> Video: "What is scientific research?"

<https://www.youtube.com/watch?v=NTtAeiWKgDs> Video: „Collaborative Research Solutions“

[https://www.path2integrity.eu/teaching-RI/content/collaborative\\_work](https://www.path2integrity.eu/teaching-RI/content/collaborative_work) P2I comic: "Building a Foundation"

[https://hochstenbach.files.wordpress.com/2017/02/plagiarism\\_600dpi\\_rgb.jpg?w=710](https://hochstenbach.files.wordpress.com/2017/02/plagiarism_600dpi_rgb.jpg?w=710) Science comic: "Plagiarism"

[https://www.kim.uni-konstanz.de/typo3temp/secure\\_downloads/68748/0/d217e531e6405cd07605d5f264c03a7addc0a4f/film\\_zitieren\\_engl.mp4](https://www.kim.uni-konstanz.de/typo3temp/secure_downloads/68748/0/d217e531e6405cd07605d5f264c03a7addc0a4f/film_zitieren_engl.mp4) Video on citation rules

