



Frame Reflection Lab: A Playful Tool to Reflect on Views of Science

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Me Ellen, You Jane?

- Student 1: *“I don’t know any Janes; do they really exist? Nobody thinks that way, do they?!”*
- Student 2: *“I used to be a Jane, it’s how science was taught in my Bachelor’s education. In my Master’s education, I was forced to become an Anthony. But now I want to be an Ellen; I want my research to be relevant straight away! So, where should I position myself? I think I am still an Antony, and deep down even a Jane”.*

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This is a typical conversation when students or early career researchers reflect on research characters representing different views of science in the Frame Reflection Lab (FRL) videos.

In this chapter, we present FRL and show how it can be used in practice. We share insights from our own experiences to inform its use in various contexts, such as inter- and transdisciplinary research teams and education for inter- and transdisciplinary research. We hope to inspire and offer some guidance for those engaging in or facilitating inter- and transdisciplinary teamwork to implement FRL and similar approaches in their own context. We invite readers to adapt and use FRL in their own research and teaching. All FRL materials are openly available online.¹

18.1 INTERDISCIPLINARY CONSCIOUSNESS FOR TRANSDISCIPLINARY TEAMWORK

We developed the FRL tool in the context of two inter- and transdisciplinary courses for Master's students (Tijmsma et al., 2023). In these courses, namely, students from the full breadth of the VU University Amsterdam collaborated in teams to work on complex societal issues such as circular economy and digitalisation. As is characteristic of transdisciplinarity, this diversity was imperative in order to address those complex issues that are not confined to disciplinary boundaries.

At the same time, however, this very diversity also presented some of the main challenges to their teamwork. The students' differences were rooted in different values and assumptions of how to conduct research, what makes good scientific knowledge, and how science should contribute to addressing societal issues; in different 'views of science'. And often they were not aware of their own nor of their team mates' diverse views of science. This could cause miscommunications in their teamwork, resulting in either conflict or in the overgeneralisation of project work.

We aimed to better prepare collaborators for inter- and transdisciplinary teamwork, preventing miscommunications that are rooted in differences in how they view science and developed the FRL tool to scaffold this. The FRL tool supports the development of awareness of one's own and others' views of science—and hence of *interdisciplinary consciousness* (Horn et al., 2022).

¹ <https://vu.nl/en/employee/toolbox-for-stakeholder-engagement/frame-reflection-tool-for-inter-and-transdisciplinarity>.

18.2 WHAT IS ‘FRAME REFLECTION LAB’?

We developed FRL in order to support the development of interdisciplinary consciousness. It is a playful tool (van der Meij et al., 2018), in which we aimed to make conversations about different views of science less cognitive and more personal, and to expose the diversity of views that is present in inter- and transdisciplinary teamwork in a structured and safe manner. In earlier attempts to spark reflection on views of science, we saw, for instance, that students often did so in an abstract, impersonal manner, took moderate stances in conversations that tended to conceal the diversity of views represented among students of widely varying backgrounds, and lacked the vocabulary to speak about views of science and underlying value systems.

The playful approach of FRL centres around three videos of four semi-realistic, fictitious researchers, who represent different views of science. Through those characters, different views of science are given names and faces. In interactive workshops, participants in FRL reflect on how they relate to the different characters to open up conversations about the views of science that they represent. In the following sections, we explain in more detail what the videos and workshop format look like.

18.2.1 *The Frame Reflection Lab Videos*

FRL centres around three videos that portray four fictitious researchers who all work on research projects related to climate change: Anthony, Ellen, Jane, and Marc. Those characters were based both on experiences with students leading to the development of FRL and on science philosophical theories (for more details, see: Horn et al., 2022). Figure 18.1 gives a simplified insight into the characters and their main characteristics.

In three videos, the fictitious researchers gradually reveal more about themselves, their research work, and their views of science by answering three questions:

Video 1: *What is your climate change research about?*

Video 2: *What do you consider ‘good scientific knowledge’?*

Video 3: *How do you think knowledge should be generated to make a social impact?*



Fig. 18.1 Introducing the four FRL characters—Anthony, Ellen, Jane, and Marc—and their core messages

The videos serve as the starting point to reflect on views of science in an interactive workshop and in written reflection exercises before and after the workshop.

18.2.2 *The Frame Reflection Lab Workshop*

Groups of four to six participants watch the three FRL videos and do the interactive group exercises in supervised workshops of 90 to 120 minutes.

During the workshops, participants position themselves relative to the ideal-typical characters (Anthony, Ellen, Jane, and Marc) on a flipchart or online canvas, and make sense of the corresponding views of science in their own words and by using cards with predefined values and assumptions and knowledge production strategies (see Fig. 18.2 for the cards). The instructions on how to conduct the workshop are shown in Box 18.1,

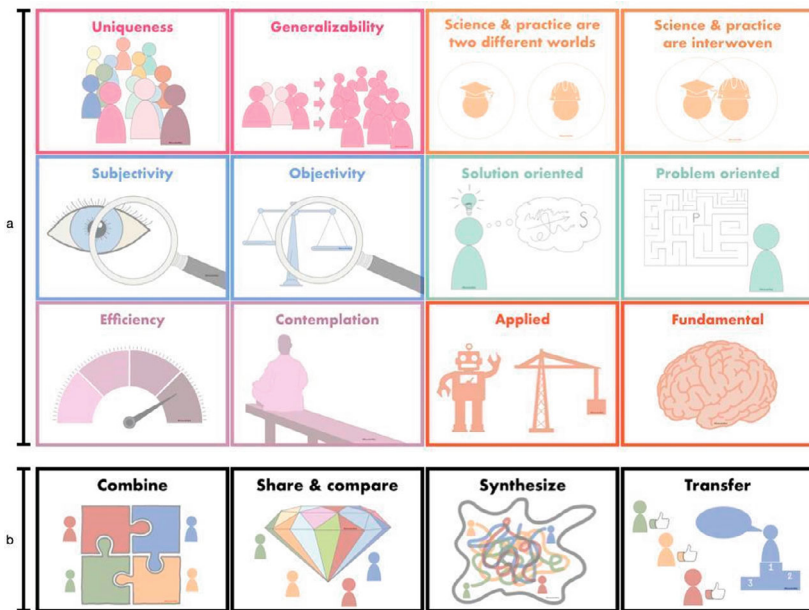


Fig. 18.2 Cards for FRL workshop; (a) value and assumptions cards for step (4) of the workshop; (b) knowledge production strategy cards, corresponding to step (6) of the workshop

and the FRL website provides a more elaborate manual for how to run the workshop, as well as printable versions of the cards, and a digital template for running the workshop online.

Box 18.1: Step-by-step instructions for conducting the FRL workshop

Watch video 1

Step 1: Exploration: as a group, briefly describe and define what keywords could be assigned to each character.

Step 2: Position yourself: individually, position yourself on the canvas relative to the four characters and explain to each other the position that you have chosen.

Watch video 2

Step 3: Differences and similarities: as a group, make sense of the similarities and differences between the characters that stood out to you. Indicate them on the canvas by using, for instance, text, arrows, circles, or lines.

Step 4: Value and assumption cards: as a group, place the 12 assumption cards on the canvas relative to the characters (see Fig. 18.2).

Step 5: Reposition yourself: return to your initial positioning of step (2). After discussing the characters in more detail, is that still where you would place yourself? Explain to each other.

Watch video 3

Step 6: Knowledge production strategy cards: as a group, place the four knowledge production strategy cards, each with one of the characters.

Step 7: Reposition yourself: return to your positioning of step (5). After discussing the characters in more detail, is that still where you would place yourself? Explain to each other.

We designed and implemented FRL in online, offline, and hybrid formats. In classrooms, we use flipcharts as a canvas, and printed value and assumption cards. In online settings, the participants collaborate remotely in the online workspace Mural. And in hybrid settings, in-class and online participants work in Mural on their own devices while viewing the videos in plenary or via their computer. Figure 18.3 shows some impressions of the online materials and the on-site workshops.

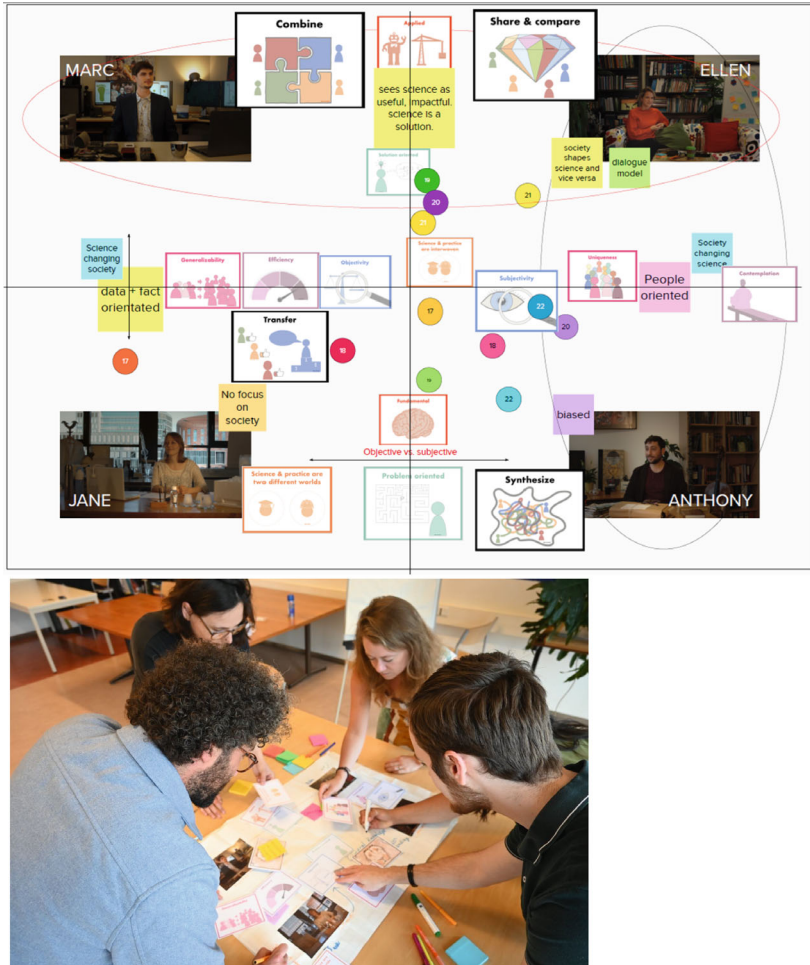


Fig. 18.3 Mural canvas from an online FRL workshop (top) and flipcharts and cards of an in-person workshop (bottom)

18.3 USING FRAME REFLECTION LAB IN PRACTICE AND LESSONS LEARNED

Between 2020 and 2024, we have developed and run FRL workshops in a university context with over 400 participants. This included Bachelor's, Master's and PhD students, and on some occasions more experienced researchers, from social to natural science-related (inter-) disciplinary backgrounds. We derive the following four main lessons from the experiences of teachers and students.

Lesson 1: Integrate FRL into Interdisciplinary Teamwork Practice

When we embedded FRL as just one intervention in the context of a larger inter- and transdisciplinary learning process, rather than as a one-off event, it helped bring home the lessons from the workshop(s) and further support inter- and transdisciplinary learning. We gave participants written reflection assignments before and after the workshop, which helped to both broaden and deepen their engagement with the topic beyond the workshop(s).

In one course, we integrated reflection on views of science in the full five months of the course duration. We explicitly connected the FRL approach to teamwork in a practical project and returned to the FRL lessons and terminology repeatedly. In this case, we offered FRL as two interactive workshops covering steps 1–5 and 6–7, respectively, and complemented the workshops with repeated individual written reflection assignments. Figure 18.4 gives a schematic timeline of a longer-term FRL process, in which FRL activities are implemented at different time points.

Students reported that the integration of FRL into the course, and explicitly linking the lessons from FRL to their teamwork, shaped how they made sense of the interactions in their team. As one student put it:

I think that it [engaging in the FRL workshops] made me very aware of the different ways of doing research and I also think that that subconsciously contributed to the collaboration. I could place others relative to the FRL characters and understand their perspectives better.

The terms from FRL knowledge production strategies cards (see Fig. 18.2) gave the teams a shared understanding and the vocabulary to discuss desired and actual levels and forms of knowledge integration.

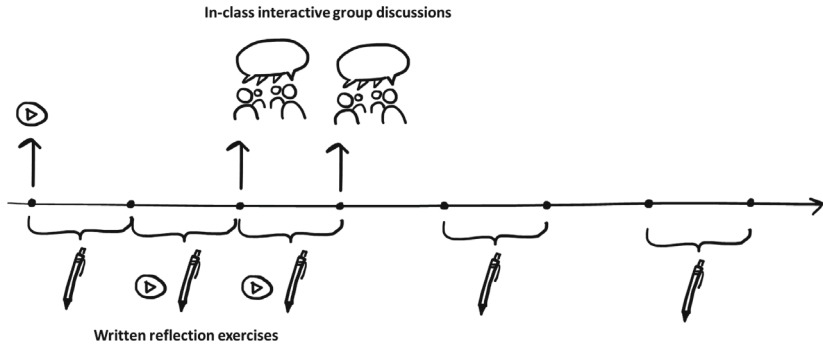


Fig. 18.4 Schematic timeline of implementing FRL as a continuous process over a longer period of time: videos, written reflection assignments, and interactive group discussions are combined and incorporated at different points throughout the process as a means to leverage one another

We also used reference to the FRL terminology in discussing the forms and levels of integration in the products on which the students worked, for instance in instruction, making sense of the assignment rubric, and feedback. Beyond the conversation about values and beliefs in the FRL workshop, the knowledge production strategy cards and corresponding terms in this case also served as a shared understanding to link explicitly to their joint work.

Lesson 2: Tailor to Different Learning Goals and Needs

FRL can achieve different learning outcomes (see also Horn et al., 2022) and can thus be used for different purposes. We found that at Bachelor's level, FRL contributed mostly to developing basic awareness about the existence of diverse views of science and to providing a vocabulary to reflect on such views. This growing awareness is well illustrated in this Bachelor's student's words:

I learned that there are different approaches to research. I mostly thought that all research is close to Jane's.

At the Master's and PhD level, FRL was more likely to stimulate deeper reflection on academic identities. When we used FRL among PhD candidates in inter- and transdisciplinary projects, we adapted the workshop and asked them to position their past, current, and aspired future selves, rather than choosing a single position. The following quote from a PhD student illustrates how this sparked reflection on identities, as well as changes and tensions in identity:

Ellen is a side that I have been running away from, because I think it is very hard, so I need to have the skills, and I need courage.

So, we found that FRL could be applied in a range of settings to achieve various learning goals provided it is adapted appropriately.

Lesson 3: Facilitate the Discussions

In all contexts, we found that facilitation of the group dialogues supported more substantial reflection. Follow-up questions about the meaning of statements and the reasoning behind certain decisions (e.g. in relation to positioning on the canvas) helped participants to be more explicit about and further question their reasoning. To give an example, we saw that participants quite commonly identified with Ellen because they aspired to make a contribution to addressing major issues in society, while at the same time they argued from quality criteria for scientific rigour more in line with Jane's view, which clashed with Ellen's. In such instances, we posed follow-up questions aimed at stimulating deeper engagement with the views of science that the characters represent. Other topics that commonly required such further disentanglement included the difference between societally relevant and applied research, and between personal beliefs and one's understanding of the role of science and scientists.

Lesson 4: Create and Nurture a Safe Space

FRL invites participants to disagree with one another, even when they hardly know each other, or, conversely, when they know each other very well and assume that they all think alike. At the same time, we saw that not all participants were eager to express disagreement or share potentially

contested views. As the participants' willingness to express their views even when those may be different from those of others, and the openness to question and potentially change their views are imperative to the FRL learning experiences, facilitators must create a safe space in which participants can disagree and explore different perspectives. In running the workshops, we emphasised that there are no right or wrong answers and that different perspectives and approaches can exist alongside and need each other.

In addition, in rethinking their own positioning on the FRL canvas, psychological safety seemed to play a role. Some participants indicated that revising their position felt like admitting a mistake in their initial position. Once we observed this dynamic, we framed the repositioning stages explicitly as an opportunity to view one's position differently based on the newly acquired information rather than to 'correct' an earlier 'mistake'. Students said that this framing made them more inclined to rethink and adapt their positioning.

We should note that the experience of a safe space could also depend significantly on online or offline participation. We saw that online workshops best exposed differences when the participants knew each other well. Interestingly, a student who indicated to often struggle with social situations mentioned that an offline session in which each student used their own device (instead of a canvas and cards) felt safer, because it did not require eye contact with other students.

18.4 CONCLUSION

Based on our experiences, we believe that FRL is a useful instrument to spark conversation about views of science and train (teams of) researchers in interdisciplinary consciousness, as a key competency for transdisciplinary collaboration. Returning to the example with which we opened this chapter, we see that FRL provided a framework to talk about views of science, and the identity-first language—“*I used to be a Jane*”—which indicates that participants also experienced an opening to reflect on academic identities, and go beyond a merely cognitive engagement with their views of science. We are pleased to make the materials for the workshops openly accessible for others to use in their own contexts. In presenting what we have learnt, we have attempted to provide insight into how the FRL format can be adapted to other contexts—and invite readers to do so.

REFERENCES

- Horn, A., van der Meij, M. G., Willems, W., Kupper, F., & Zweekhorst, M. B. M. (2022). Developing interdisciplinary consciousness for sustainability: using playful frame reflection to challenge disciplinary bias. *Sustainability: Science Practice & Policy*, 18(1), 515–530. <https://doi.org/10.1080/15487733.2022.2095780>
- Tijmsma, G., Horn, A., Urias, E., & Zweekhorst, M. B. M. (2023). Training students in inter-and transdisciplinary sustainability education: Nurturing cross-faculty staff commitment and continuous community collaboration. *International Journal of Sustainability in Higher Education*, 24(4), 765–787. <https://doi.org/10.1108/IJSHE-02-2022-0049>
- Van der Meij, M. G., Heltzel, A. A. L. M., Broerse, J. E. W., & Kupper, F. (2018). Frame reflection lab: A playful method for frame reflection on synthetic biology. *NanoEthics*, 12(2), 155–172. <https://doi.org/10.1007/s11569-018-0318-9>

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