

Teaching Responsible Research Practices (RPP)

Challenges and Strategies in the Context of a Technical University

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How can key challenges in teaching Responsible Research Practices be met? What resources and attitudes are useful for bridging, and making use of, different disciplinary perspectives in often interdisciplinary teaching settings?

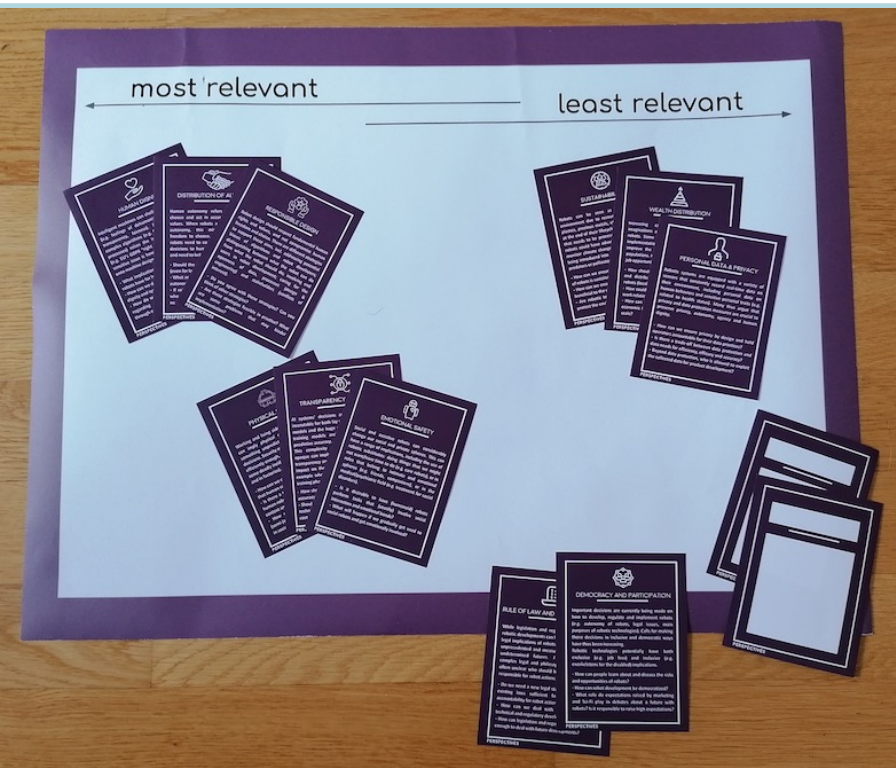

This poster focuses on two, potentially mutually reinforcing, challenges related to teaching Responsible Research Practices at a technical university:

First, the challenge of keeping the barrier to engage with concepts like Responsible Research and Innovation (RRI) low, while at the same time conveying the systematic, scientific character of analyzing societal and environmental implications of new technologies.

The second challenge relates to facilitating learning processes in interdisciplinary teaching contexts, as RRP courses usually harbor different disciplinary perspectives: students often come from different (technical) disciplines, and teaching staff often comes from disciplines like science and technology studies, research ethics, gender studies, or law. This diversity can be an important resource for learning processes, but it can also be challenging for teachers and students to bridge different ways of thinking.

If not tackled in systematic ways, these two challenges can be mutually reinforcing. There is a broad range of existing resources to do so, as well as potential to innovative approaches to teaching RRP. This poster gathers resources for making use of the diversity of perspectives in teaching RRP, and in facilitating sustainable learning processes, both on *why* it is important to reflect on societal responsibility in research, and for understanding *how* to conduct research in responsible ways.

Repertoire of tools & methods

 <p>Card-based reflections & discussions</p>	 <p>Recognising complementary thought styles</p>
<p>Responsible Research and Innovation (RRI), Research Ethics, Science and Technology Studies (STS)</p> <p>Aims at supporting: ability to reflect on and deliberate on societal aspects in research, consider societal aspects in strategic decisions in research, anticipate societal implications</p> <p><u>Focus on:</u> self-reflection, T-shaped skills, engagement, understanding social shaping of science & technology development, awareness of ethical concerns, deliberation, responsiveness</p> <p>(e.g.: Felt et al. 2018, Vakkuri et al. 2021, RRItools.eu, interactionaldesign.com)</p>	<p>Inter-/Transdisciplinarity Studies, Integration and Implementation Science (I2S) / Team Science (TS)</p> <p>Aims at supporting: ability to exchange and work together in inter-/transdisciplinary teams, produce knowledge / technologies in more integrated ways</p> <p><u>Focus on:</u> communication skills, relational and social skills, appreciating complementarity of knowledges and perspectives, integration skills, changing perspectives</p> <p>(e.g.: Hall et al. 2019, Pohl/Wuelser 2020, I2Insights.org, td-academy.org, Shape-id, td academy)</p>

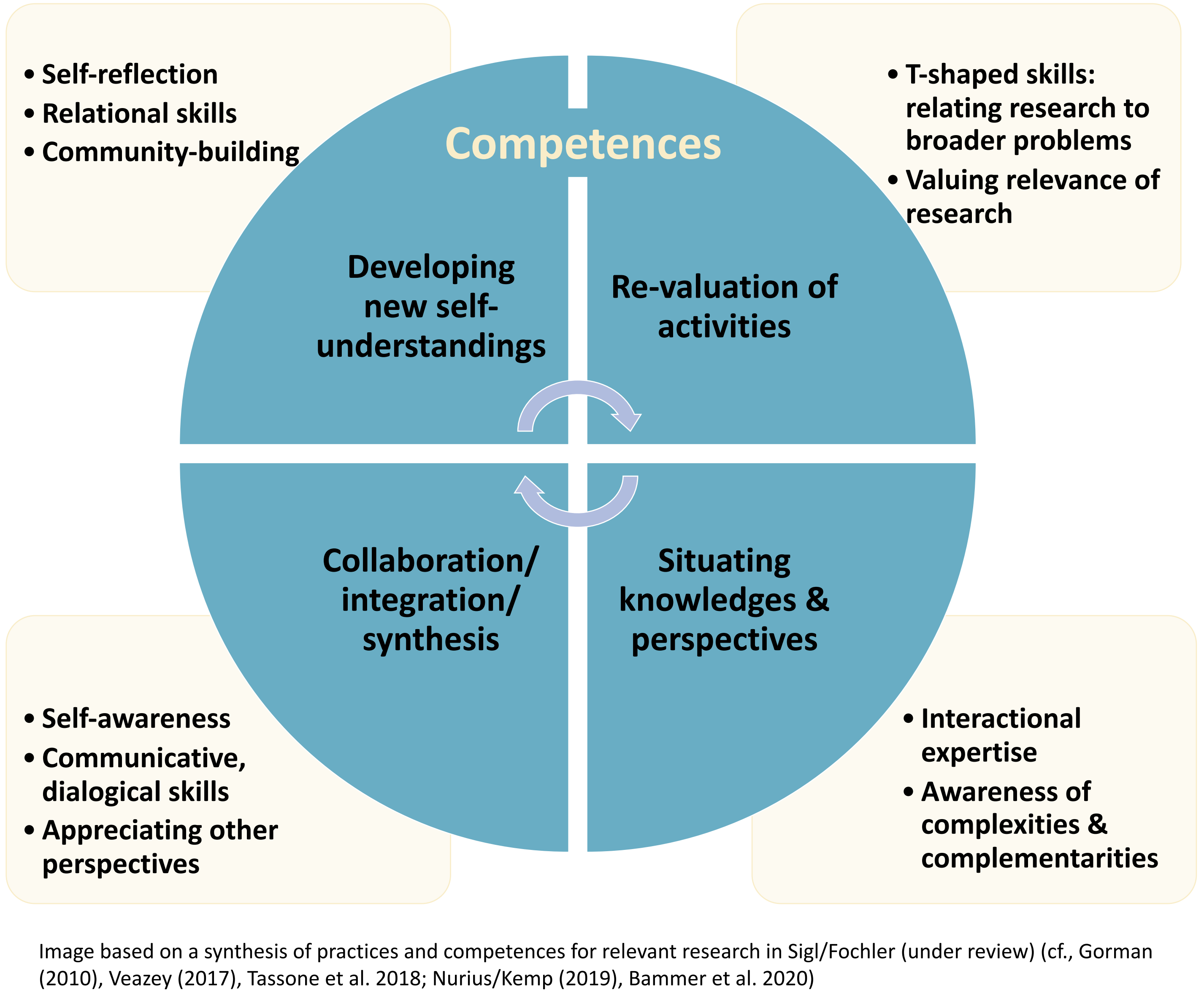
Further sources:

- HEIRRI-project: Training modules for different levels
- Constructive Technology Assessment (CTA)
- Socio-technical Integration Research (STIR)
- Higher Education Didactics
- Creativity Techniques
- Foresight / Future Studies

(Rip et al. 1995, Fisher et al. 2015, Inguaggiato et al. 2023)

Teachers as facilitators of transformative learning processes

“Transformative learning” centers around reflections of value-based attitudes and their implications for professional practices (cf. Varela-Losada et al. 2022; Avsec et al. 2022), which are key components of learning the responsible conduct of research (Inguaggiato et al. 2023). In this approach, the role of the teacher is a facilitator of student’s learning processes, enabling students to deal with the complexities related to the societal responsibility of research and technology development in different contexts, by building a range of **competences** for responsible research practices.



Components of professionalising RRP education

- Systematising competences**
 - Build on existing repertoires of tools & methods
 - Explore creative concepts, tools & methods that enable students to engage in and develop responsible research practices
- Considering future professional roles within and outside academia**
 - Most students (even PhD students) will not stay in academia; technology development mostly takes place in companies (e.g. AI) (cf. Erickson et al. 2020)
 - Reflect potential future professional roles and practices within broader responsible research ecosystems? (Smolka/Böschchen 2023, Stahl 2023)
- Considering the technological field and its societal configurations**
 - Enable students to be responsive to context-specific requirements of RRI and “ethics by design” (Brey/Dainow 2023)
 - Adapt / integrate tools & methods into standard work procedures (e.g. design cards)
- Bridging different disciplinary ways of thinking**
 - Between teachers (often in social sciences, ethics) and students
 - Continually explore creative concepts, tools & methods to facilitate competence-building
- Developing context-aware tools & methods to support responsible creativity**
 - Supporting self-motivated learning to unleash individual and collective creativity (Lutnæs 2015, Rodriguez et al. 2018)
 - Dramatization / storytelling as means to understand complex phenomena and problems and to avoid epistemic injustices (le Guin 1989, Fricker 2007, Schildermans 2021)

References:

Bammer, G., O’Rourke, M., O’Connell, D., Neuhauser, L., Midgley, G., Klein, J. T., Grigg, N. J., Gadlin, H., Elsum, I. R., Bursztyn, M., Fulton, E. A., Pohl, C., Smithson, M., Vilsmaier, U., Bergmann, M., Jaeger, J., Merx, F., Vienni Baptista, B., Burgman, M. A., . . . Richardson, G. P. (2020). Expertise in research integration and implementation for tackling complex problems: when is it needed, where can it be found and how can it be strengthened? *PALGRAVE COMMUNICATIONS*, 6(1), 5.

Dressel, G., Kohn, J. & J. Schnelle, J. (Hg.) (2023): *Erzählcafés. Einblicke in Praxis und Theorie*. Wien, Basel: Beltz Juventa.

Felt, U., Fochler, M., & Sigl, L. (2018). IMAGINE RRI. A card-based method for reflecting on responsibility in life science research. *Journal of Responsible Innovation*, 5(2), 201-224.

Fricker, M. (2007). *Epistemic Injustice. Power and the Ethics of Knowing*. Oxford University Press.

Gorman, M. E. (2010). *Trading Zones and Interactional Expertise*. MIT Press.

Hall, A. L. Vogel, & R. T. Croyle (Eds.) (2019), *Strategies for Team Science Success: Handbook of Evidence-Based Principles for Cross-Disciplinary Science and Practical Lessons Learned from Health Researchers* (pp. 171-189). Springer International Publishing.

Inguaggiato, G., Labib, K., Evans, N., Blom, F., Bouter, L., & Widdershoven, G. (2023). The Contribution of Moral Case Deliberation to Teaching RCR to PhD Students. *Science and Engineering Ethics*, 29(2), 7.

Lutnæs, E. (2015). Imagining the unknown. Responsible creativity for a better tomorrow. *www.FORMakademisk.org* 8(1), 1-15.

Nurius, P. S., & Kemp, S. P. (2019). Individual-Level Competencies for Team Collaboration with Cross- Disciplinary Researchers and Stakeholders. In K. L. Hall, A. L. Vogel, & R. T. Croyle (Eds.), *Strategies for Team Science Success: Handbook of Evidence-Based Principles for Cross-Disciplinary Science and Practical Lessons Learned from Health Researchers* (pp. 171-189). Springer International Publishing.

Pohl, C., & Wuelser, G. (2019). Methods for Coproduction of Knowledge Among Diverse Disciplines and Stakeholders. In *Strategies for Team Science Success: Handbook of Evidence-based Principles for Cross-disciplinary Science and Practical Lessons Learned from Health Researchers*.

Rip, A., Misa, T. J., & Schot, J. W. (1995). *Managing technology in society. The approach of constructive technology assessment*. Pinter.

Schildermans, H. (2021). *Experiments in Decolonizing the University: Towards an Ecology of Study*.

Sigl, L., & Fochler, M. (under review). Towards a “hinterland” for doing relevance. A typology of practices and competencies to guide the development of more relevant research and career paths.

Smolka, M., & Böschchen, S. (2023). Responsible innovation ecosystem governance: socio-technical integration research for systems-level capacity building. *Journal of Responsible Innovation*, 10(1), 2207937.

Stahl, B. C. (2023). Embedding responsibility in intelligent systems: from AI ethics to responsible AI ecosystems. *Scientific Reports*, 13(1), 7586.

Tassone, V., O’Mahony, C., McKenna, E., Eppink, H., & Wals, A. (2018). (Re-)designing higher education curricula in times of systemic dysfunction: a responsible research and innovation perspective. *Higher Education*, 76.

Vakkuri, V., Kemell, K.-K., Jantunen, M., Halme, E., & Abrahamsson, P. (2021). ECCOLA — A method for implementing ethically aligned AI systems. *Journal of Systems and Software*, 182, 111067.