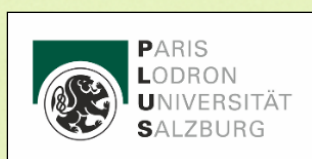


Interdisciplinary Challenges

Bridging Philosophy & Science Education

10.11.2025

Location: University of Salzburg
Unipark, Erzabt-Klotz-Str. 1, Raum 2.407



FWF Österreichischer
Wissenschaftsfonds

KNOWLEDGE
in An FWF Cluster
of Excellence **Crisis**

WORKSHOP SCIENCE AND SOCIETY

Interdisciplinary Challenges: Bridging Philosophy and Science Education

Educational systems and the lifeworld today are confronted with huge transformational processes placing unprecedented emphasis on questions concerning science and its nature. This was one reason to bring the Cluster of Excellence *Knowledge in Crisis* into the world. The goal for this workshop is to foster the collaboration between philosophy and science education enabling each discipline to build upon the other's research findings and to jointly address new challenges.

Philosophy and science education share a common field of work: reflecting on the nature of science (NoS). NoS is an extensive field of research in science education while largely neglected in philosophy education. This is because philosophy educators mainly focus on ethical and other areas of their field, often delegating science reflection processes to their colleagues in scientific disciplines, while philosophers of science, when dealing with education, usually look at the findings of science education. To build a bridge between the disciplines the workshop will address key questions such as the following:

1. What aspects of NoS are best to be developed by science and philosophy education? Are epistemic competencies a promising candidate?
2. How can science education reflect the current research in history and philosophy of science?
3. Should we put more focus on teaching the history of science, and if yes, in what way and within which subjects?
4. Which empirical findings from teaching research and student beliefs are available that need to be taken into account?
5. Which interdisciplinary competencies are needed and have to be developed when we do empirically informed philosophy and philosophically informed science?
6. What are the most important problems in science communication for the broad public (e.g. media, citizen science etc.) and what can philosophy and science education contribute?

This workshop presents talks from experts of different disciplines that work on the mentioned questions. A representative essay or longer abstract will be sent out to all the speakers in advance to deepen the discussion round.

ABSTRACTS AND TIMETABLE

9.00 -10.00

Towards Interdisciplinary Education in Philosophy and Science Teaching

Bettina Bussmann, University of Salzburg

Building on a scientifically oriented approach to philosophy education, I argue that interdisciplinary collaboration must go beyond mere thematic overlaps. It should involve the systematic integration of scientific knowledge into philosophical education while at the same time fostering a philosophically informed science education, capable of addressing conceptual, normative, and epistemic dimensions that are often left implicit. I would like to offer three fields of research that are promising candidates

1. *Epistemic competence as a bridging concept*: Philosophy education should integrate empirically validated insights (e.g., from cognitive science or science studies) to cultivate students' capacities for critical inquiry, epistemic self-reflection, and argument evaluation.

2. *Interdisciplinary openness as a key educational virtue*: The division of school education into discrete subjects emerged in the late eighteenth and nineteenth centuries as part of the institutionalization of modern schooling and is no longer adequate for today's educational challenges. Interdisciplinary openness names an educational virtue that resists the confinement of thought within disciplinary paradigms. It requires intellectual flexibility, epistemic humility and other dispositions, yet to be specified.

3. *Developing core concepts*: Core concepts are are still relatively underdeveloped in philosophy education. They can be deliberately developed in the interplay between philosophy and science education, functioning as shared epistemic reference points rather than as isolated disciplinary notions. I will present a core concepts that can be applied and adapted to different contexts.

This dual integration has the potential to reshape both fields: making philosophy education more empirically grounded, and science education more conceptually and normatively aware.

Reference paper: <https://reference-global.com/article/10.23770/rt1819?tab=download>

10.15 -11.15

What is the Fundamental (Epistemic) Aim of Science Education?

Anjan Chakravartty, University of Miami

Science education has multiple aims. However, it seems especially contentious – in the public domain – regarding its epistemic aims. In society at large, the sciences are both commonly viewed as arbiters of matters of fact and, conversely, with significant skepticism. Often, the latter is connected to forms of ideological opposition to science and, compounding the challenge to education this represents, it is also the case that there is often no consensus among philosophers, historians, and other scholars of the sciences, including scientists themselves, regarding the precise epistemic status of science. I argue that these considerations, as well as further concerns about epistemic paternalism, respect for epistemic autonomy, and a dose of realism about the limits of persuasion, support the contention that acceptance, not belief, is properly considered the primary (epistemic) aim of science education.

Corresponding paper: extra attachment

11.30 -12.30

Bridging Lifeworld Images and Scientific Images in Nature of Science Education

Kerstin Kremer, University of Giessen

The Synoptic Transfer Framework (STF) aims to connect factual and affective discursive resources (Scheffer et al., 2021). NOS provides a conceptual foundation to systematically address the epistemic, social, and narrative dimensions of scientific practices (Erduran & Dagher, 2014). Mapping NOS onto four STF “hotspots” illustrates this potential: In Engagement Contexts, the NOS Family Resemblance Approach supports connections between science and learners’ lived experiences and interests. Within Scientific Integrity, NOS contributes to understanding scientific methods, validation processes, and the epistemic boundaries of science. For Scientific Application, explicit reflection on NOS strengthens problem-solving, and argumentation. Finally, in Narrative Shaping, NOS enables the embedding of scientific insights into identity- and value-laden discourses, fostering critical reflection and agency. Taken together, a synoptic perspective reveals how NOS functions not in isolation but as a unifying reflective

instrument that bridges different visions of scientific literacy—from factual understanding to application and ultimately to transformative societal engagement.

Corresponding paper: extra attachment

12.30 - 13.30 LUNCHBREAK

Unipark Café basement

14.00 - 15.00

The Nature of Science, Consensus View and Social Contract for Science

T.Y. Branch, Leibniz University Hannover

The nature of science (NOS) is a central component of science education. Broadly, it is the practice, findings, social features and values of science (Clough, 2011). After initial calls from scientists, pedagogy scholars and philosophers to improve American public science literacy in the 1960s, the goal of teaching NOS became a staple of science education policy and is now embedded in classroom curricula around the world (McComas & Olson, 1998).

The proliferation of NOS, and its persistence throughout the decades, has resulted in recurring debates about what exactly NOS entails and which aspects of it should be taught. In this work, I examine a 1960s version of NOS called the “consensus” or “tenets” view. Even after the Cold War, and well into the 1990s and mid-2000s, the consensus view has been shown to persist in the literature (Chang, Chang & Tseng, 2010). As its name suggests, the consensus view proposes teaching the tenets of NOS with the most agreement around them. These tenets are: the tentativeness of scientific knowledge; science’s reliance on observations and inferences; the importance of subjectivity and objectivity in science; the use of creativity and rationality by scientists; science as a socially and culturally embedded pursuit; the development of scientific theories and laws; and, the use of scientific methods (see Lederman (2004), Lederman et al. (2002) and colleagues Abd-El-Khalick (2006), Bell et al. (2006), Cobern & Loving (2001), and Flick & Lederman (2004) who helped to establish the view). Though the consensus view might seem like a fairly comprehensive account of science, it is extremely rare that all the tenets actually arrive in the classroom. Instead, it is often the practice (scientific methods) and findings of science (theories, laws and empirical knowledge) that are presented

at the expense of the social aspects of science, like peer review or public discourse about science (Kelly, 2008). The narrow focus of the consensus view been challenged for its declarative statements about what science is (Clough 2007, Matthews 2012), providing no guidance for applying NOS ideals (Yacoubian, 2012), omitting how knowledge and practice evolve (Duschl and Grandy, 2011) and failing to consider the multiple socio-political dimensions shaping scientific practice (Allchin, 2011).

There are also important conceptual connections with respect to appropriate views on the relationship between science and society that should also be considered when challenging the consensus view. I argue that the actual version of the consensus view taught in classrooms is motivated in part by the mid-20th century social contract for science and the value-free ideal (VFI) for science. I will show this by highlighting how in practice the consensus view i) masks debate surrounding non-epistemic values in science, and ii) misrepresents basic science as a value-free endeavour. The result of the consensus view's alignment with the mid-20th century social contract for science and the VFI contribute to the ongoing resilience of the narrow consensus view taught in classrooms, with negative cognitive consequences for the retention of science information, and long-term implications for public trust in science.

15.15 - 16.15

The Dimensions of Epistemic Competence

Anna Breitwieser & Davis Lanius, University of Salzburg

Social and technological disruptions such as the digital transformation of the public sphere make it increasingly difficult for us – as individuals and societies – to gain knowledge and understanding of the world. This poses a specific problem for education: How can our schools and universities teach students the required epistemic competences to gain orientation and make informed judgements under such aggravated conditions? So far there are no systematic answers of how to conceptualize epistemic competencies for teaching it. To take first steps toward a systematic didactic account of epistemic competence, we start by asking: What skills does an epistemically competent person ideally possess? To answer this question, we draw on two existing proposals in the literature that have taken initial steps toward conceptualizing epistemic competence. Let us call them the knowledge-based conception (following Peterson et al., 2017) and the reflection-based conception (following Bussmann & Kötter, 2019). Building on their respective strengths, we develop a didactic model of epistemic competence that integrates

both the application of epistemic methods and the ability to reflect on them. The resulting rubric has two dimensions and includes descriptions, central questions and example exercises. Finally, we discuss how epistemic competences – understood in this way – can be taught in schools and who is it that could do the teaching.

Corresponding paper: extra attachment

16.30 - 17.30

Philosophy of Science Consensus as Orientational Knowledge in Science Education

Raimund Pils, University of Salzburg

Science education standards (e.g., the NGSS) often recommend providing students with orientation based on scientific consensus. Traditionally, this has been applied to scientific findings. However, many of the questions actually addressed in the classroom are also major questions in philosophy of science: Are our best scientific models true? How should uncertainty be handled? What role do ethical values play in theory choice? In this talk, I develop a conditional consistency argument: if one uses a consensus model to orient learners with respect to disciplinary content, one should apply the same strategy to the background HPS questions. As an example, I formulate five consensus statements for the scientific realism debate. It is often thought that philosophy education is incompatible with consensus-based teaching. I argue, however, that this rests on an untenable philosophy/science dichotomy and that, in my framework, consensus serves primarily to provide orientation; it does not replace reasons and thereby protects autonomous thinking.

Corresponding paper: <https://link.springer.com/article/10.1007/s11229-025-04916-9>

19.00 Dinner

Le Nimba, Petersbrunnstraße 9