

# SCIENCE LEARNING – A FUTURE

Contributions from Science Education Research 14

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# Creative Pragmatics for Active Learning in STEM Education

 Springer

I am in Copenhagen at the annual meeting of the European Science Education Research Association ESERA [Link].

Here is my summary statement for our plenary session that introduces *Creative Pragmatics* as a framework for reshaping science education [Link].



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The world our students face today is not stable, predictable, nor neatly divided into disciplines. It is complex, interconnected, and uncertain. Climate breakdown, technological disruption, social inequality – these are not problems that can be solved with technical knowledge alone. They require judgment, creativity, collaboration, and a willingness to act under conditions of uncertainty.

This is where our concept of Creative Pragmatics comes in.

My standpoint – an archaeologist, working in that most multi-disciplined, undisciplined of scientific fields. Exploring since the 1970s an archaeological engagement with the world where what one seeks to understand, the past, is actually all around us and in constant flux, where there is no “past as it was” to discover, where archaeologists don’t deliver knowledge of the past, but creatively work *with* what remains, with a care for the future.

An archaeologist in a design school, Stanford d.school, mobilizing research into the long-term history of making, design, innovation, as part of efforts to build better futures.

Creative Pragmatics is a synthetic framework for active learning-in-the-world. Its components are well-established; many will be familiar. Its novelty and value lie in what it assembles and gathers, how it does this, and in the consequent implications for action and policy.

CP builds on three foundations:

- pragmatist philosophy from William James and John Dewey, through A.N. Whitehead to Richard Rorty – knowledge is something made through experience;
- the field of science and technology studies – Isabelle Stengers and Simon Schaffer, Bruno Latour and Donna Haraway, Andrew Pickering and Annemarie Mol (among many others) – emphasizing the performative, dynamic, and material character of knowledge; raised are fundamental matters of ontology where we are part of what we seek to understand;
- the praxis (informed practice) of art and design, project management from located and applied research to ideation, improvisation and prototyping to testing – iterative learning through making.

What unites these components in CP is a simple but powerful premise: knowledge is not discovered; it is created through doing and making. Learning happens not by receiving facts and applying standardized procedures, but by designing, experimenting, reflecting, collaborating – by engaging actively in and with the world.

### **So—why does this matter? Why Creative Pragmatics, and why now?**

Because traditional models of STEM education are not enough. Too often, science is taken as if it offered stable truths. In a complex world, knowledge is only ever partial, contingent, evolving. Students need more than mastery of disciplinary content. They need the capacity to navigate uncertainty, to integrate different perspectives, to act creatively and responsibly in contexts where the stakes are high and the answers are not given.

Creative Pragmatics matters because it offers exactly this:

- CP bridges the divide between sciences and humanities through making and design;
- CP emphasizes agency – helping students see themselves not as spectators, but as participants shaping our world, where our agency is in symmetry with the non-human, where we are part of the ongoing coming-into-being of the world;
- CP is situated – where the actuality of knowledge-making is a context-sensitive

pragmatics;

- CP aligns with global policy frameworks—from the European Qualifications Framework to the OECD’s 2030 competencies—that call for education to prepare learners for complexity, not just for exams.

### **So, what next? What does Creative Pragmatics mean for actual practice?**

In the classroom, it means participation—from content delivery to active, student-centered learning. Project-based work, design studios, inquiry-based learning, phenomenon-based learning, and creative rehearsals all become central. Teachers are no longer transmitters of knowledge; they are designers of learning environments.

In the lab, it means that experiments are not just about testing hypotheses, but about making knowledge together – through collaboration, prototyping, iteration, and reflection.

And in policy, it means recognizing that innovation in education does not happen through standardized testing or rigid curricula. It happens through creating ecosystems that support interdisciplinary collaboration, experimentation, and adaptability.

All of these have deep tried-and-tested genealogies that confirm their renewed significance and urgency. In our CP research group, the Nordic tradition of student-centered learning meets Stanford’s design thinking – and much more.

If there is one takeaway from our book, it is this: there is no solid ground of science for science education to stand on. Scientific knowledge is time-bound – located historically, in the actuality of now, in iterative chains of projects. This contingency is not a weakness – it is opportunity. Science and technology can be reconfigured (they always have been), and education can help students develop the skills, competencies, and imagination to reconfigure them for the better. As Pickering puts it – acting *with* the world, not *on* it [Link].

That, in essence, is Creative Pragmatics: an invitation to rethink *again* how we build knowledge, how we learn, how we teach, and how we prepare students – not just to survive complexity, but to shape the future with creativity and agency.



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