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Dalla letteratura internazionale: qualche spunto interessante (open access)

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An unlikely bifurcation: history of sustainable (but not Green) chemistry
Marcin Krasnodębski
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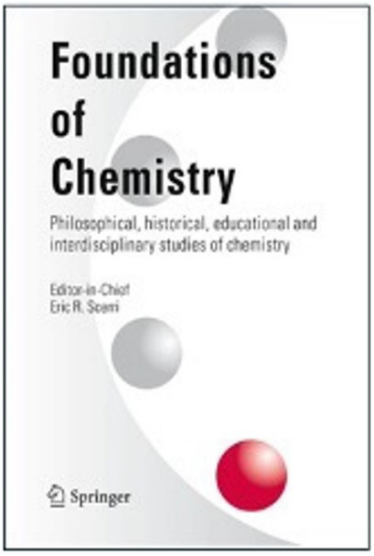

Abstract. The concept of green chemistry dominated the imagination of environmentally-minded chemists over the last thirty years. The conceptual frameworks laid by the American Environmental Protection Agency scholars in the 1990s constitute today the core of a line of thinking aimed at transforming chemistry into a sustainable science. And yet, in the shadow of green chemistry, a broader, even if less popular, concept of sustainable chemistry started taking shape. Initially, it was either loosely associated with green chemistry or left undefined as a distinct but generaly different approach. In such a vague form, it was endorsed by the organizations such as OECD and the IUPAC in the late 1990s. It was not until the 2010s however, when it solidified as a separate more embracing and more overarching tradition that could compete with green chemistry by offering insights that the latter lacked. Sustainable chemistry seeks to transcend the narrow focus on chemical synthesis and embrace a much more holistic view of chemical activities including social responsibility and sustainable business models. Due to an interesting historical coincidence, it was in Germany where sustainable chemistry took roots and became institutionalized for the first time. It was thanks to German exceptionalism and the unwillingness of German scholars to embrace the "green" terminology originating from the US, the concept of sustainable

chemistry could safely mature and develop in the German-speaking world, before reaching a high degree of formalization with dedicated journals, founding articles, and programmatic principles aspiring to transform the entire chemical enterprise in the years to come.

Keywords: Green chemistry; sustainable chemistry; sustainability history; history of chemistry; narratives in science

Children's emergent mechanistic reasoning in chemistry: a case study about early primary students' reasoning about the phenomenon of thermal expansion of air

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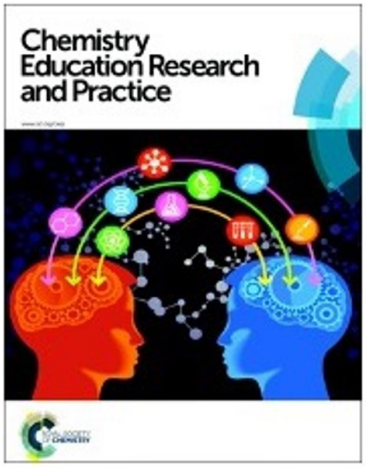

Abstract. The importance of introducing students to mechanistic reasoning (MR) early in their schooling is emphasised in research. The goal of this case study was to contribute with knowledge on how early primary students' (9–10 year-olds) MR in chemistry is expressed and developed in a classroom practice framed by model-based inquiry. The study focuses on the first lesson in a sequence of six that was developed as part of a design study. The teaching was designed to ensure student agency and create conditions for the students to develop, test, and evaluate simple particle models in interaction with observations cooperatively and under teacher guidance. During the lesson, students were encouraged to express their tentative explanatory models in drawing and writing, and to act as molecules to dramatize the expansion of air. A mechanistic reasoning framework based on the characterisation of system components (entities, properties, activities, organisation) was developed and used to analyse children's mechanistic reasoning. The framework included multimodal analysis of communication (speech, gestures, writing, drawing, bodily motion) and evaluation of student reasoning based on *e.g.*, the presence of gaps in terms of explanatory black boxes or missing pieces. The results show that: (1) In model-based inquiry, young children can navigate across different representational levels in their reasoning and engage in MR; (2) children's black-boxing can be seen as an indication of epistemic work in the process of model-based inquiry; and (3) asking students to engage in multiple modes of representations support the development of student MR in model-based inquiry.

A design-based research approach to improving pedagogy in the teaching laboratory

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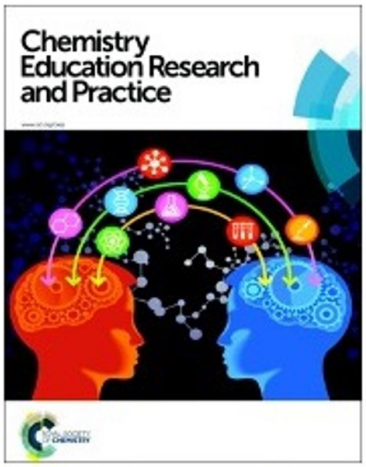

Abstract. The laboratory is a complex environment where the three levels of the chemistry triplet coincide. As the laboratory environment places a large demand on the working memory of students, cognitive load theory can address overload which causes barriers to learning. Breaking down barriers requires iterative phases of analysis/exploration, design/construction and evaluation/reflection over multiple cycles which are the hallmarks of design-based research. In a complex setting, managing change and redressing teaching approaches can be difficult to navigate. Design-based research incorporates iterative phases in which theory informs decision making. This paper uses the context of a laboratory exercise of emission spectra to illustrate how the cognitive load theory can be used in tandem with design-based research to support student learning in the exercise. Using this approach, it was possible to show how barriers to student understanding, including task demands and conceptual demands were supported through proposed approaches focusing on extraneous, intrinsic and ultimately germane cognitive load.