OURS
- **O**pen **U**ndergraduate **R**esearch **S**ystems

A holistic framework for learning through course-based Open Science

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Students doing research
Student learning can be coupled to academic knowledge building by providing opportunities for early research engagement (Figs. 1-2).

The freedom of students in developing a project varies across cases. Yet, some autonomy in shaping aspects of a project is essential as it provides opportunities for creatively applying and developing individual knowledge and skills in collaboration with other students.

Figure 1. Students investigating post-fire heather regeneration in on of several biology course projects. Photo: Christian Bianchi Strømme

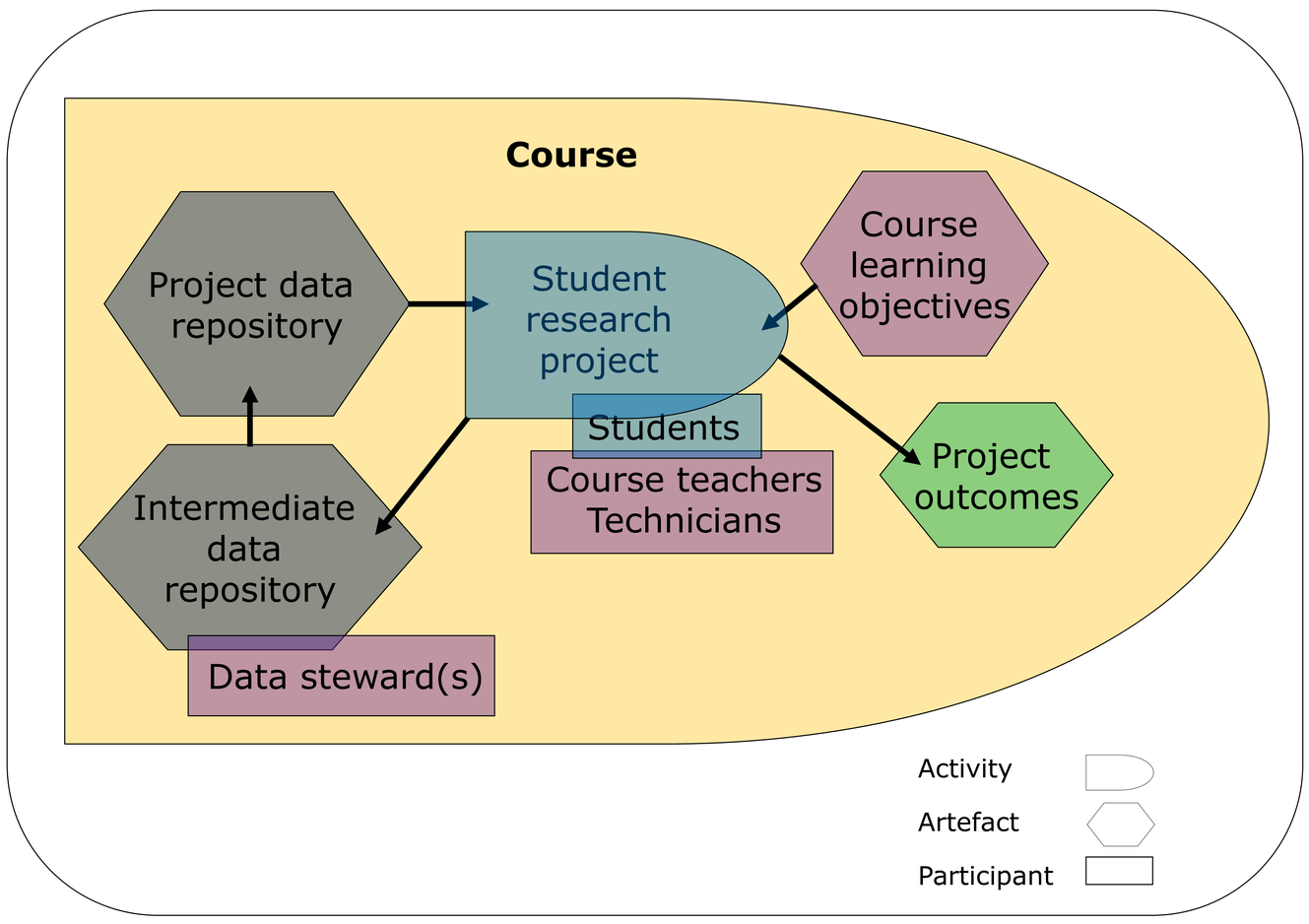

Figure 3. Conceptual diagram of the Open Undergraduate Research Systems framework.

Learning the language of Open Science
Research is currently undergoing a transition towards Open Science. Associated practices include the **FAIR** principles for scientific data management and stewardship that are aimed at improving the **F**indability, **A**ccessibility, **I**nteroperability and **R**euse of research data and metadata. Taken together, enacting the FAIR principles require a set of computational skills that can be included in higher education teaching and learning.

Facilitating student engagement with data in line with FAIR has multiple benefits, including

- student sharing and accessing data from a variety of projects for curricular- and extracurricular purposes.
- students learning the standards and procedures for the emerging knowledge landscape.
- students being rightfully credited for the data they gather as part of course-based research projects.

Facilitating students doing research
The learning-research interface can be summarised in terms of how research is emphasised and the roles of the students (Fig. 2).

Giving students opportunities to engage in research as a part of their learning experiences requires scaffolding and coaching from associated teachers and researchers.

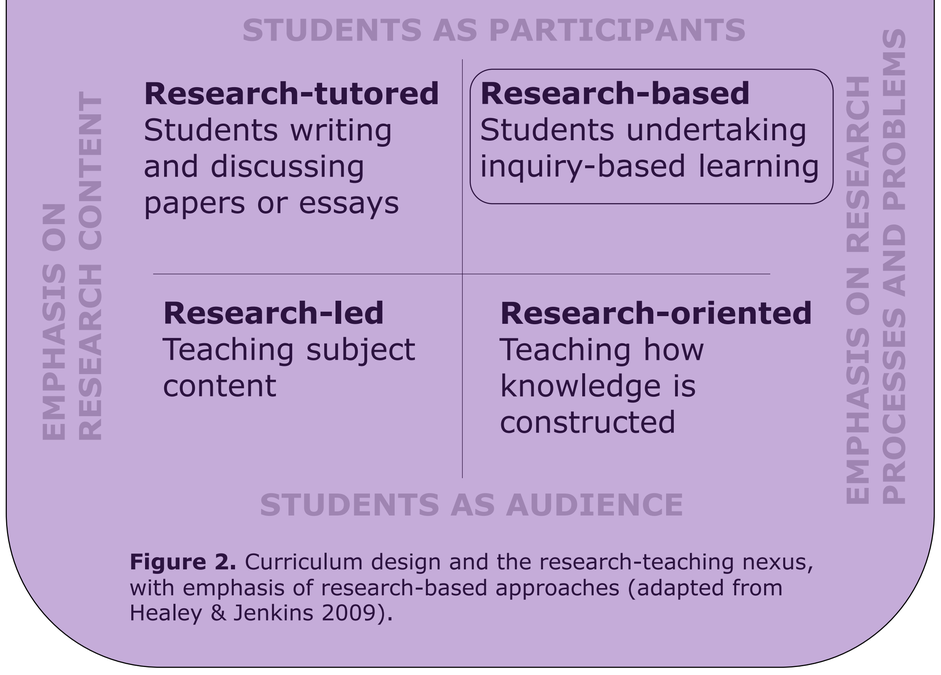

Figure 2. Curriculum design and the research-teaching nexus, with emphasis of research-based approaches (adapted from Healey & Jenkins 2009).

Students communicating research
Undergraduate research projects can yield multiple outcomes that can be shared with the community of scholars, future employers and society more broadly.

Communicating course-based student research can involve a variety of modalities and formats and can strengthen the relevance of the learning experience. As an example, Bikuben is a student-driven journal at the Department of biological sciences where students can publish research-based coursework.

Figure 4. Front cover of the first Bikuben issue, a journal driven by students at the Department of biological sciences.

The OURS framework (Fig. 3) is intended for amplifying the outcomes and relevance of course-based learning experiences. It integrates a suite of scholarly approaches associated with active learning, inquiry-based learning and Open Science practices and principles.

Figure citation: Healey, M., & Jenkins, A. (2009). Developing undergraduate research and inquiry. Innovations in Education and Teaching International. York: The Higher Education Academy. p. 7

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