Research Directions: Biotechnology Design

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Incubating interdisciplinary biodesigners in the lab and the studio

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Extended Abstract

Introduction. Biodesign is an inherently interdisciplinary pursuit, where design and scientific knowledge and practices are come together to benefit human and planetary wellbeing. To grow a biodesigner requires nurturing disciplinary knowledge, providing interdisciplinary exposure and creating effective boundary objects (Akkerman and Bakker, 2011). However, research in education has noted that the term interdisciplinary itself is poorly defined (Lattuca et al., 2017), leaving a gap in knowledge around strategies for implementing an interdisciplinary learning program.

Background. The University of Sydney launched an undergraduate major in Biological Design in 2020, in which students were required to take classes in both life sciences and design. This approach intends to build interdisciplinary knowledge that goes beyond the school in which students have been enrolled.

Many approaches to interdisciplinary pedagogy focus on experiences within one knowledge domain, such as bringing together students in biology, chemistry, and history & philosophy of science (Luckie, Sweeder, and Bellon, 2013). These examples echo our experiences with interdisciplinary strategies in our own school, aiming to bring together students from disciplines of architecture, urban planning, and interaction design. The benefits of inter- and transdisciplinary education include building capability for critical thinking, creation of *third spaces* for learning at knowledge boundaries, and simulating professional experiences (Klaassen, 2018; Brassler and Dettmers, 2017).

Contribution. This paper uses the incubator, an important resource in many biodesign projects, as a metaphor for examining two knowledge cultures of science and design. Much like a classroom, the incubator provides a site to cultivate and develop, where multiple variables can be controlled to promote growth at different stages. We use this metaphor to examine the critical venues of learning from two distinct knowledge fields that come together in biodesign: the Design Studio and the Scientific Lab.

These learning spaces are separately used to build *epistemic fluency*–the ability to combine, switch between and understand different types of knowledge and ways of knowing (Markauskaite and Goodyear, 2017)–and have been separately studied in domains of science (Ramasundram and Surif, 2023) and design (McLaughlan and Lodge, 2019) education.

We use a co-constructed stories (CCS) participatory design approach (Buskermolen and Terken, 2012), to develop reflective and speculative stories for biodesign education with academics and alumni of the major program. These are used to create

narratives about the strengths and opportunities for Problem-based Learning approaches (Brassler and Dettmers, 2017) that were employed through the interdisciplinary biodesign classes. This approach allows participants to respond to narratives about biodesign education based on their lived experience, which offers new pathways for teaching and learning biodesign in an undergraduate tertiary program, showing new ways to combine and understand different kinds of scientific and design knowledge.

(**a**)

(**b**)

Figure 1.
Materials created from University of Sydney Biological Design major students in coursework and research projects. (a) Grown "Myco-material" samples by Annabel Faulkner. (b) Sewn mushroom leather material by Amy Mclean.

Connections references

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