

ASCILITE 2025

Future-Focused:

Educating in an Era of Continuous Change

Transforming energy and pedagogy – more than a metaphor

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This poster presentation provides a visual/graphical analysis of the design and implementation of two iterations of an interdisciplinary engineering capstone project. The poster provides a graphical representation of the core project concepts using the analogous circuit for a loudspeaker system as a metaphor for transforming pedagogy (Buskes et al., 2023; Cochrane, Harris, et al., 2024). The poster also graphically maps the project against two analysis frameworks: Activity theory (Cochrane, 2024; Cochrane, Galvin, et al., 2024) and Kolmos et al., (2024) model of interdisciplinary project types in engineering education, mapped to the metaphor of the transformation of energy in a loudspeaker system as an illustration of transforming pedagogy to inform the discussion with participants.

An important part of the engineering design process is to understand the interface with other disciplines of engineering and to be able to specify appropriate requirements and verify that those requirements are being met. If groups of engineering students do not interact while at university, they are ill-prepared to do such design across disciplinary boundaries in the workplace. Moreover, if they are incapable of being able to formally specify what they require from other engineers, then they would not be able to verify that the design meets those specifications. The project implemented an educational design project to develop a multi-disciplinary final year capstone project involving students from the Department of Electrical and Electronic Engineering as well as the Department of Mechanical Engineering.

Designing a loudspeaker system, which contains electrical and mechanical systems that interact in a complex transfer of energy from electrical to mechanical to acoustic energy, is an inherently multidisciplinary endeavour consisting of both electrical and mechanical engineering concepts. The equivalent circuit of a loudspeaker system also serves as a metaphor of how the project aims to not only transform energy from electrical to acoustic, but fundamentally transform pedagogy (Mezirow, 2018) from teacher-centred to student-centred design teams to develop learner agency (Hase & Blaschke, 2021).

The project case study is informed by a scoping review of the literature around interdisciplinary education projects, with an a priori protocol. The project is framed using Educational Design Research (McKenney et al., 2022) that involves collaboration from key stakeholders. As well as the Poster the project methodology will be shared with conference participants through an accompanying PADLET page to share the presentation links and resources, as well as engage the participants in a Poll and invite questions and contributions from the participants, including sharing examples of their own case studies of designing and implementing interdisciplinary real world educational projects.

Keywords: Interdisciplinary project, Engineering education, Heutagogy, Transformative learning

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