

CARNEGIE MELLON UNIVERSITY

BME 2025 SPRING SEMINAR SERIES



Enhancement of transfer of design thinking in undergraduate bioengineering students



PRESENTED BY

Ruth Ochia Ph.D., P.E.

Elected Fellow, AIMBE

Elected Fellow, BMES

Professor of Instruction, Department of Bioengineering

Director of Assessment and Evaluation, College of Engineering

Temple University

SCHEDULE

Doherty Hall (DH) 2315

Thursday,

March 27, 2025

(11:00-12:00 PM)

A central goal in engineering education is developing students' design thinking for creative real-world problem solving. Design thinking provides engineers a comprehensive set of principles for approaching diverse and emergent authentic challenges through deep needs assessment, contextualized problem definition, creative idea generation, and constructive iterative phases of implementing, testing, and improving a solution. It is expected that engineering students will transfer principles of design thinking (DT) they learn in their courses to new situations and problems. Yet, decades of research demonstrated people commonly fail to transfer, and that promoting transfer is very challenging.

We use the Dynamic Systems Model of Role Identity (DSMRI) to conceptualize the use of DT strategies based in the person's situated role identity—who they believe they are in a particular situation, and whether their role calls for using design thinking. Correspondingly, use of design thinking in a new situation occurs when the person transfers strategies learned in one role identity to another role identity. We hypothesized that engaging students who learn design thinking in one role identity (Biodesign student in Biodesign course) in imagining using those design thinking strategies in other role identities (future Capstone student, future Engineer, another concurrent life role) would promote transfer of these DT strategies into those other role identities when students occupy them.

The analysis of the six students' data pointed to five main themes: (1) Students' Biodesign role identity reflected beliefs, goals, self-perceptions, and actions that lacked agency and ownership over their designs and the design process; (2) Students manifested partial, simplistic, or erroneous understanding of DT; (3) Students considered DT transfer to senior capstone only minimally; (4) When considered, students' imagined DT transfer to the capstone was direct/concrete rather than conceptual; and (5) students did not value the reflection activities.