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Bridging Cultures

WHY ARE WE HERE?

advocates of arts and humanities

see the value of integrating art/humanities and sciences

former Cornell University president David Skorton:

“our nation’s future may depend on our creativity and our ability to understand and appreciate the cultures around the world as much as on our proficiency in reading and math.”



STEM OR STEAM?

Steve Jobs, in 2010, while introducing the iPad:

“It’s in Apple’s DNA that technology alone is not enough. It’s technology married with liberal arts, married with the humanities, that yields the results that make our hearts sing.”

Einstein stressed the importance of the creative mind, once saying,

“I’m enough of an artist to draw freely on my imagination, which I think is more important than knowledge. Knowledge is limited. Imagination encircles the world.”

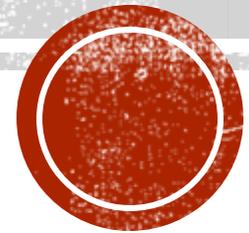
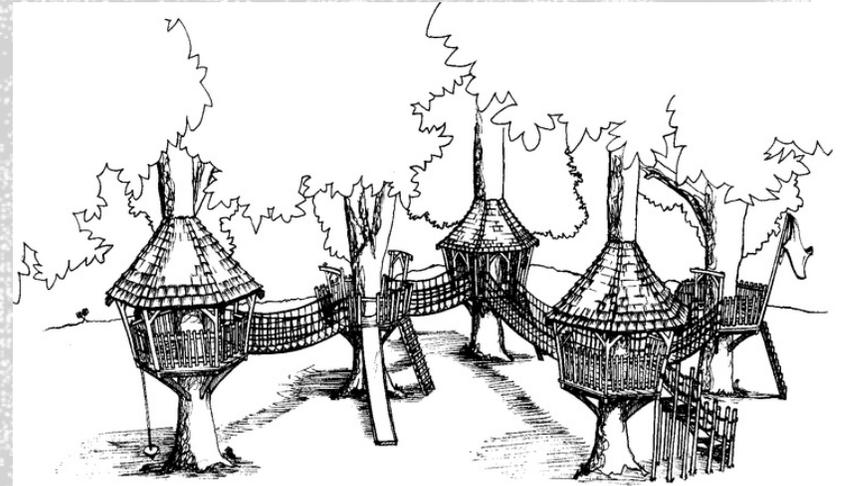
it’s not STEM vs. STEAM—it’s about making every student a fully-literate 21st-century citizen.





Companies and organizations that want to stay globally competitive realize they need employees who are **multi-disciplinary, creative thinkers** able **collaborate** with other team members. Those qualities are at the heart of staging a play or performing in a jazz quartet.

MY BRIDGE(S)



Using **design thinking** and **ideation methodologies** to understand and diversify thought processes, in creative problem solving.

The Association of American Colleges and Universities Embraces Design Thinking

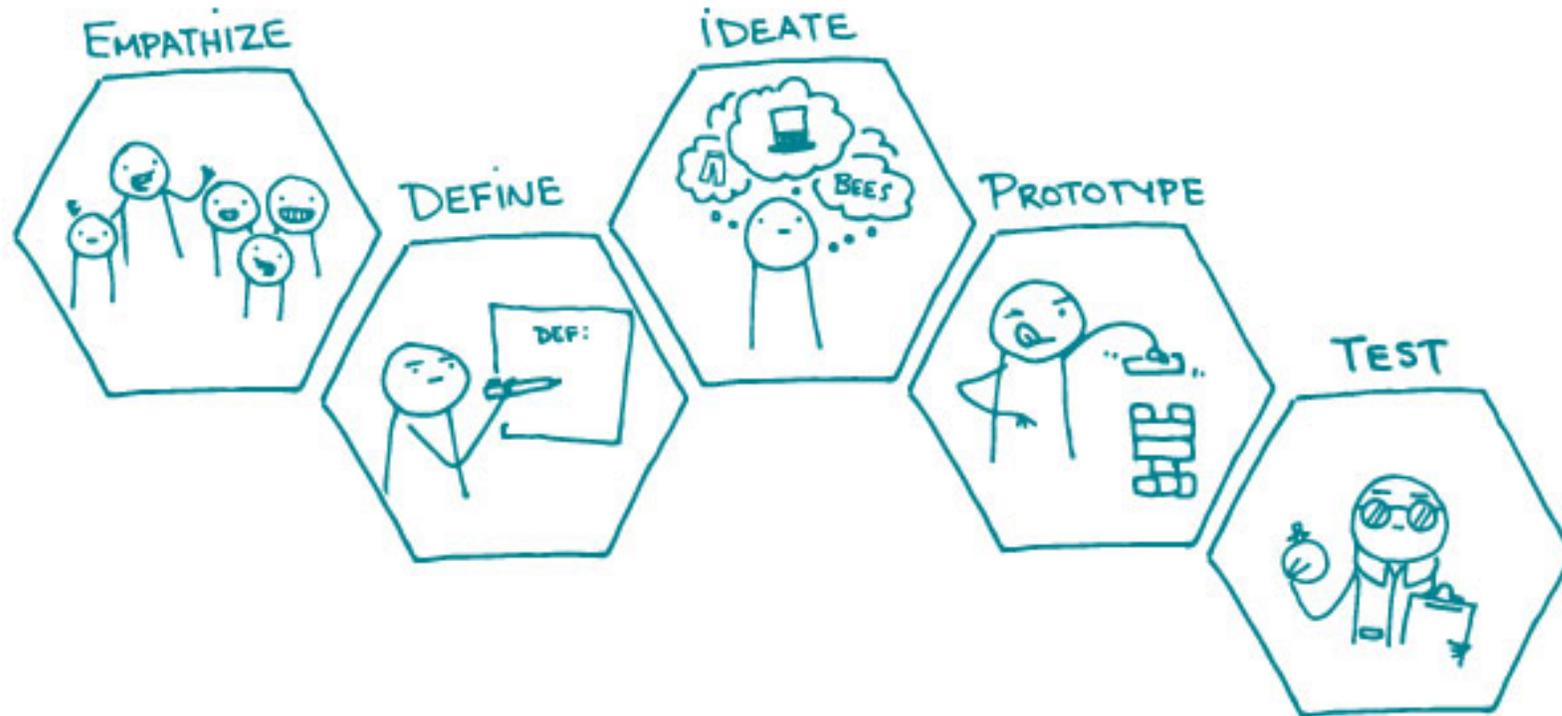
The Association of [American Colleges and Universities \(AACU\)](#) meeting this month (February 23-25) in Phoenix announced its upcoming General Education and Assessment Conference. The focus: “Design Thinking for Student Learning.”

But what is design thinking and why now is it so important?

According to AACU, “General education sits at the intersection of an array of demands facing higher education—demands for more intentionally scaffolded, integrated, and engaged approaches to teaching and learning; more campus-community partnerships; more mentoring and advising; more multimodal learning experiences; and, above all, more meaningful assessment of student learning across these efforts.”

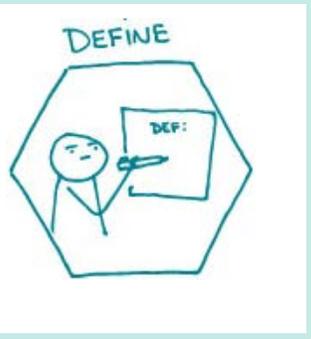


DESIGN THINKING!



Design thinking is the methodology we use for creative problem solving—it's a roadmap for routine innovation. It relies on the natural—and coachable—human ability to be intuitive, to recognize patterns, and to construct ideas that are emotionally meaningful as well as functional. It's a process you can apply and hold onto in the face of a daunting challenge.





NSF IUSE: TACKLING THE 'RIGHT' PROBLEM: INVESTIGATING COGNITIVE STRATEGIES USED IN UNDERSTANDING ENGINEERING PROBLEMS



Presented Problem

In refugee settings like Darfur, women and girls are made more vulnerable to sexual violence because of the almost daily need to leave camps in search of firewood.

Define setting

Firewood is located outside camps

Roads are dangerous

Find the root cause

Why do they make so many trips to gather firewood?

Inefficient stoves

Determine user needs

Refugees need fire resources



Add safety patrols

Increase fuel efficiency

Find alternative fuels





NSF TUES: EVIDENCE-BASED PEDAGOGY IN ENGINEERING EDUCATION: DESIGN HEURISTICS FOR CONCEPT GENERATION

[the Cards](#) | [the Research](#) | [the Guidelines](#) | [to Purchase](#)

DESIGN HEURISTICS STRATEGIES TO INSPIRE IDEAS

Designers want to create many, varied concepts to choose among. Design Heuristics provide **77 specific strategies** to help you generate novel designs that are different from each other, leading to innovative concepts.

Design Heuristics push you to think beyond your initial ideas

the Cards

Each card includes a description of the heuristic, an abstract image depicting the application of the heuristic, and two sketches that show how the heuristic is evident in consumer products.

WATCH the VIDEO

Design Heuristics are easy to use with just a little instruction. Download this podcast for a short video covering the "why" and how of using Design Heuristics to generate ideas.

MEET our TEAM

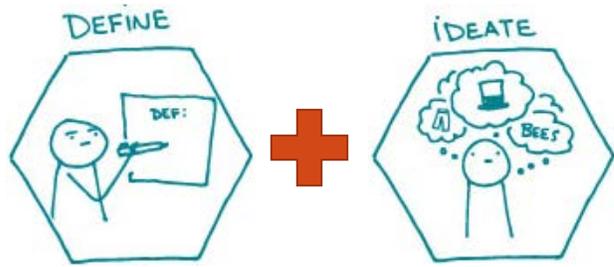
Our team consists of researchers from diverse disciplines, including Industrial Design, Engineering, and Psychology.

CONSIDER YOUR OWN IMPLEMENTATION

What lesson version(s) make the most sense in your teaching context?
 How will the lesson be integrated with your existing course plan?
 What modifications might you need to make to the lessons?
 How will you balance individual ideation and team ideation?

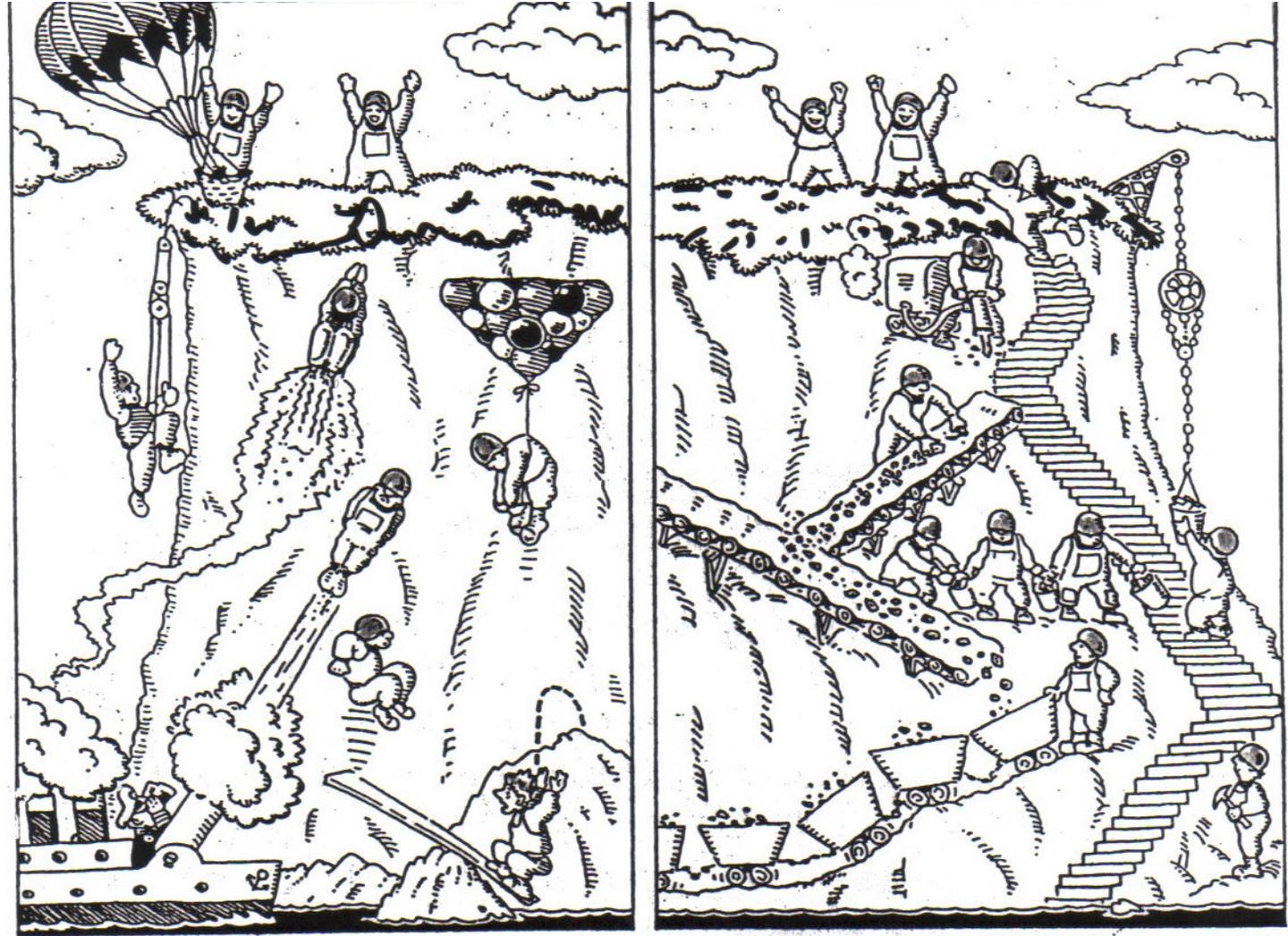
Lesson 1	Lesson 2	Lesson 3
Idea Initiation	Idea Transformation and Development	Subcomponent Design (Functional Decomposition and Recombination)
Teaming		

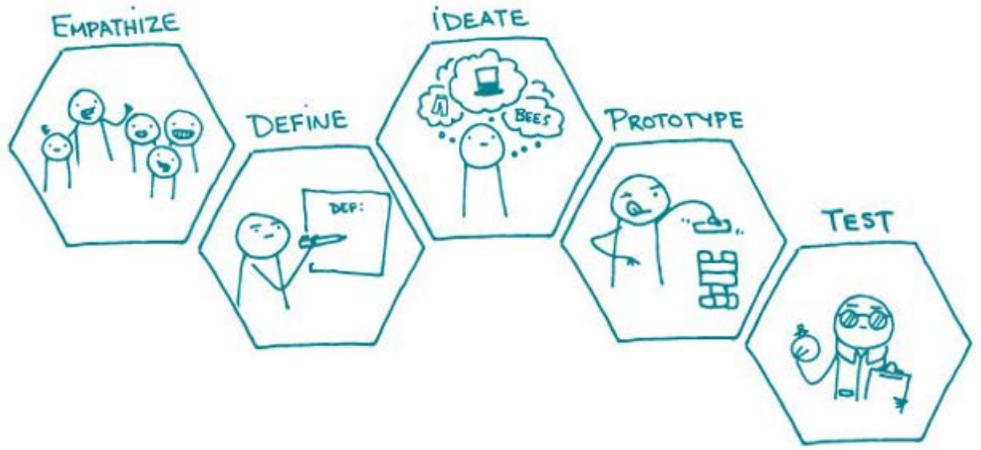




NSF REE: INVESTIGATING IMPACT ON THE IDEATION FLEXIBILITY OF ENGINEERS

Differences in how we approach our work





NSF RED: REINVENTING THE INSTRUCTIONAL AND DEPARTMENTAL ENTERPRISE (RIDE) TO ADVANCE THE PROFESSIONAL FORMATION OF ELECTRICAL AND COMPUTER ENGINEERS

PI: David Jiles
 Disciplinary leads: Phillip Jones and Joe Zambreno (co-PI)
 Engineering education researchers: Brian Burt (co-lead), Doug Jacobson, Mani Mina, Serah Rajala (co-PI), Diane Rover (co-PI), and Seda Yilmaz (co-lead)
 Social scientists: Lisa Larson (co-lead), Sarah Rodriguez (co-lead), and Mack Shelley (co-PI)
 Inclusion coaches: Lore Leigh Chrystal and Kristen Constant | Evaluator: Mani Kemis

the RIDE vision:

Collaborative department structures and innovative, inclusive practices for teaching and learning
 Advances in scholarly teaching and education research department-wide;

ECE student professional formation and inclusion in the middle years with an emphasis on design thinking and professional engineering identity

An agile department able to respond to industry and society needs, sustain innovations, and serve as a model for ECE, computing and engineering departments across the country.

the RIDE goals:

Reshape core technical ECE curricula through pedagogical approaches that (a) promote design thinking, systems thinking, professional skills such as leadership, and inclusion; (b) contextualize course concepts; and (c) stimulate creative, socio-technical-minded development of ECE technologies for future smart systems. (Professional Formation Pedagogy)

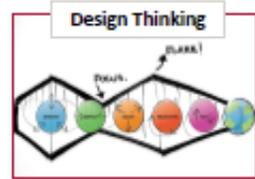
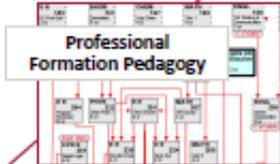
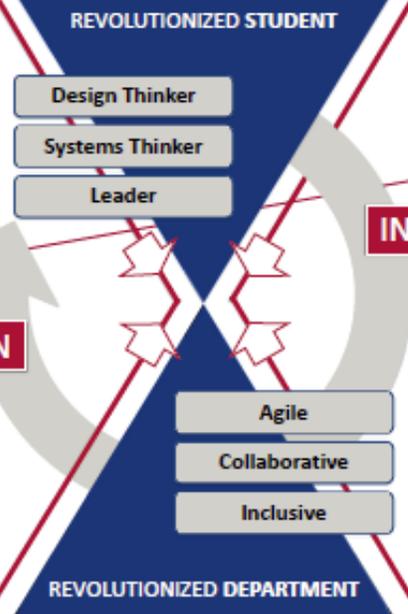
Develop X-teams, a revolutionary cross-functional, collaborative instructional model for course design and professional formation.

Support an iterative design thinking process for X-teams to enhance their understanding and integration of RIDE PFP strategies.

Implement a transformation process for the department through Y-roles, bridge the engineering education research-to-practice gap, and build an organizational culture that fosters and sustains innovation.

Advance engineering education research as a domain in the department, college and university.

Collaborate with national networks and major partners for dissemination and adaptation.



**PROMOTION/TENURE
CHALLENGES**

**COMMUNICATION
CHALLENGES**

**COMMUNITY
CHALLENGES**

"LEARNING TO WORK WITH A DESIGNER"



HOW TO OVERCOME THE CHALLENGES?

**REQUIRE CROSS-DISCIPLINARY
RESEARCH AS PART OF PRS
FOR TENURE-ELIGIBLE FACULTY**

**EQUALIZE
TEACHING LOAD
ACROSS
DISCIPLINES**

**PROMOTE CROSS-
DISCIPLINARY
PUBLICATION
VENUES**

**SUPPORT CROSS-
DISCIPLINARY
PHD EDUCATION**

**INCENTIVIZE
RESEARCH
PROJECTS THAT
INCLUDE
ARTS/HUMANITIES**

