

Game-Based Learning for Engineering Decision Making

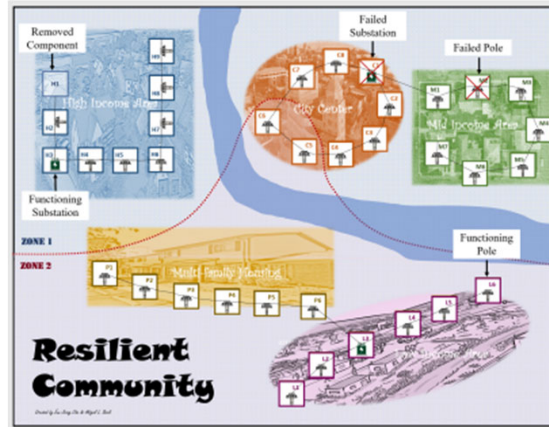
This project aims to develop and implement an engineering decision-making game as an introductory course module for the topic of societal impact-based structural engineering risk management.

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Learning Objectives

1. Understand factors influence community resilience.
2. Apply multi-criteria decision-making.
3. Understand how equity considered.
4. Assess impact of decisions across community.
5. Collaborate with peers to make informed decisions.
6. Reflect and apply knowledge and skills gained to real-world infrastructure decisions.



Board Game Design

Pilot Tests

3 Summer camps
2 Game nights



Computer Game Design

Classroom Test

Game Effectiveness Assessment

Classroom Implementation

Entrepreneurial Mindset

Curiosity

Randomness in the game challenges students to consider multiple possibilities

Connections

Facilitates system thinking between physical infrastructure, social, and economic systems

Creating Value

Encourages reverence for broader community impacts of engineering decisions

Assessment Methods

Learning Objectives

Observation



Self Assessment



Log Data



Assignment



1 Community Resilience	✓		✓
2 MCDM	✓	✓	
3 Equity	✓		✓
4 Decision Impact	✓		✓
5 Collaboration	✓	✓	
6 Application	✓		✓

Learning Objectives	Pre	Post	Change
understand different factors that influence community resilience. (LO1)	3.28	3.95	+ 0.67
apply multi-criteria decision-making for infrastructure systems. (LO2)	3.09	3.93	+ 0.84
understand how equity can be considered in infrastructure decision-making. (LO3)	3.12	4	+ 0.88
assess the potential impact of different decisions on various stakeholders in the community, including marginalized groups. (LO4)	3.09	4.03	+ 0.94
collaborate with others to make informed and equitable decisions based on multiple criteria and perspectives. (LO5)	3.47	4.03	+ 0.56
understand the challenges of considering multiple criteria in infrastructure decisions. (LO6)	3.28	4.1	+ 0.82
Average	3.22	4.01	+ 0.79