

Project Title: Game for Community Resilience-Based Decision-Making Education and Entrepreneurially-Minded Learning

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Project Description	This project aims to integrate a game-based instructional module into a structural engineering course to help students develop decision-making skills related to community resilience and equity. The module includes either board or computer games simulating post-disaster infrastructure planning. In this project year, we focused on refining game mechanics and instructional design by incorporating feedback from past testing to support enhanced learning. Key efforts included the creation of multiple game versions with varying difficulty levels, improvements to instructional game components, creation of real-time data dashboards, development of supplementary learning activities, and a streamlined dissemination plan. The game has been implemented in classroom settings and shared through camps and academic presentations.
Project Objectives	1. To develop a dissemination plan for distributing the developed engineering decision-making game and the related outcomes, ensuring its success and impact in diverse educational settings. 2. To refine the design of the engineering decision-making game by incorporating feedback from classroom implementation and user testing to enhance its effectiveness and engagement. 3. To develop supplementary instructional activities to seamlessly integrate the developed engineering decision-making game into the introductory structural engineering course. .
Major findings/accomplishments during the current funding period (July 1, 2024 to present)	● Dissemination Readiness: A structured dissemination plan was developed to support broader use of the game upon

	request. ○ Board game artwork is currently in development, with production proofs being prepared so printed games can be distributed to users as needed. ○ Migration of the computer game to an Amazon Web Services (AWS) hosting environment is underway to streamline access and long-term distribution. ● Game Refinement and Expansion: The computer versions of the engineering decision-making game were revised based on feedback from classroom testing and expanded. ○ Multiple game versions were developed with varying difficulty levels to support differentiated learning and scalability across different student populations. ○ A non-player character (NPC) feature is being developed to offer context and guidance throughout the game, helping to reinforce players' understanding of key concepts. ○ A voting function has been added to promote active player engagement and collaborative decision-making. ● Instructional Integration: Key instructional components were improved to reinforce learning. ○ Real-time data dashboard was developed for the computer game to support in-game learning and reflection. ○ New post-game assignments were created to deepen learning and help students connect their gameplay experience to real-world engineering challenges. ● Implementation and Testing: The game is scheduled to be implemented in an undergraduate course (May 2) and used in a summer camp (July 25). Feedback from these settings will inform iterative improvements and help validate the game's effectiveness across learning environments.
Dissemination of work (papers, posters, presentations, etc.--previous or in progress; please provide direct hyperlinks to published work, if possible):	● ASEE paper: ○ Cha, E.J., Beck, A.L., Shaffer, E. & Paquette, L. Work-In-Progress: What Goes into an Engineering Decision: An Infrastructure Decision-Making Game for

	Exploratory Equity Learning - Phase 3 Video Game Version Development. The ASEE 2025 Annual Conference and Exposition. Montreal, CA, June, 2025. (Accepted) ● Summer Camp ○ Resilient Community - A Game for Engineering Decision-Making. The Grainger College of Engineering Worldwide Youth in Science and Engineering Program City Designers and Builders Camp. July, 2024. ○ Resilient Community - A Game for Engineering Decision-Making. The Grainger College of Engineering Worldwide Youth in Science and Engineering Program City Designers and Builders Camp. July, 2025. (Scheduled) ● Testing Events ○ Resilient Community - A Game for Engineering Decision-Making. CEE 360 Structural Engineering. May, 2025. (Scheduled)
Goals for future (additional objectives, spread of work, etc.):	Building on this year's progress, the project will continue evolving to support broader adoption, improved learning outcomes, and long-term sustainability. In the next phase of work, we aim to: ● Strengthen Dissemination Efforts: We will continue sharing the game and instructional materials through professional networks, workshops, and outreach events to reach a wider range of educators and learners. ● Expand Assessment Opportunities: We are exploring ways to gather assessment data from a broader set of students and classrooms, which will help evaluate the game's impact in diverse instructional settings. ● Document Design Methodology: We plan to begin formal documentation of the game development process to support adaptation, reproducibility, and future development by others. ● Support Continued Access and Use: We will pursue sustainable mechanisms to maintain access to both the board and computer game versions, while considering lightweight distribution and hosting options. These goals are intended to ensure the

	project's continued relevance and adaptability, while laying the groundwork for future development and potential collaborations.
Impact Statement (How has/will this project impact teaching and/ learning in The Grainger College of Engineering and beyond?):	This project introduces a game-based instructional module to address a key gap in the undergraduate structural engineering curriculum: the lack of emphasis on entrepreneurial-minded learning (EML). While structural engineering courses often focus on technical problem-solving, they rarely offer opportunities for students to explore stakeholder-centered decision-making, systems thinking, or value creation, skills that are increasingly essential in civil engineering practice. This module fills that gap by engaging students in post-disaster infrastructure planning scenarios that require balancing multiple objectives, navigating uncertainty, and incorporating community needs. Within the Grainger College of Engineering, the game has enhanced engagement and broadened the scope of learning in structural engineering education. Looking beyond UIUC, the project is positioned to advance EML nationally through multiple dissemination pathways. Planned efforts include dissemination through KEEN channels such as Cards, workshops, or webinars, as well as participation in national conferences. These efforts will support adoption by other educators and expand the project's reach to diverse student populations and institutional settings. As the game and its framework continue to evolve, the project aims to serve as a scalable model for integrating EML and stakeholder-centered thinking into civil and infrastructure engineering education.
Link to "Best of" artifact to illustrate the success of the project (something other than a published paper or poster listed above; student handout, photos, link to course materials, etc.):	• Engineering Decision-Making Game Portal – This site provides access to the digital version of the instructional game. It serves as both a demonstration of the project's core product and a resource for future dissemination. o https://revanjrf.itch.io/resilientcommunitytest

	• Game Manual – The manual provides a complete guide for instructors and students, detailing game rules, roles, procedures, and scoring systems. It supports independent implementation and reinforces the game's educational objectives. - o https://drive.google.com/drive/u/0/folders/1shnR6Xy6187YlQlp2qsks5f8fO1xvOrs • Instructional Materials and Lecture Notes – Lecture slides that support the integration of the game into a civil engineering course has been developed. These materials help contextualize the game within broader course objectives related to community resilience, systems thinking, and entrepreneurial-minded learning. - o https://docs.google.com/presentation/d/12GcStDdC3FmAx20XR9ImW5ti-xBnbloU/edit?usp=drive_link&ouid=108627342549389631719&rtpof=true&sd=true • Assessment Plan – Outlines the project's assessment strategy, including pre/post-game self-evaluations, gameplay data collection, and a structured post-game assignment used to evaluate student understanding and application of key concepts. - o https://docs.google.com/document/d/1nmKC1zzqsR_yJpEahpcxzTPrOrAC63zRW4hC1hZcQjw/edit?tab=t.0
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