Creating Multimedia Resources for Engineering Curriculum on Environmental and Social Impacts and Sustainability Aspects of Transportation Projects

CTIPS-039 – Full Project Description
Approved 11/26/2024

University

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Description

Transportation projects have significant environmental impacts including air, water and noise pollution, habitat disruption and land use alterations, to name a few. All of these also affect the communities, some (e.g., minorities) more than others. As (ethical) engineers, it is our responsibility to be guardians of public safety and to protect the environment. It is also clear that, to be able to ensure future generations have access to the resources we currently have, sustainable development and sustainable practices are critical. Transportation projects have great potential in engaging in and promotion of sustainable practices such as use of sustainable materials, integrated land use planning, green infrastructure and eco-friendly construction practices. Even though faculty may do an effective job covering the technical concepts, we often miss discussing the environmental and social impacts, and the sustainable transportation practices. This is often due to lack of easily accessible and interactive resources. This project aims to fill this gap, through development of educational multimedia resources that faculty can easily access, adopt and share with their students.

The proposed project aims to integrate essential content on transportation projects with environmental impacts assessment of transportation applications, sustainability considerations of

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materials used for transportation projects, and the ethical and social justice dimensions of transportation projects. Existing transportation engineering curriculum will be enriched by development and creation multimedia resources to be adopted by the faculty. The educational resources will include materials (active learning activities, student handouts, examples, discussion prompts), short informative videos, resources list for already available related content, interviews with the experts in transportation, environmental impact assessment and sustainability and social justice in transportation. Faculty from CTIPS universities and others will be invited to participate in the creation of the content as guest speakers and experts. The input from faculty in other disciplines (e.g., philosophy, sociology, urban planning, economics) will be sought and incorporated to enhance the content and perspectives presented. The multimedia materials will be hosted through the website created by the CSU Civil and Environmental Engineering Department and YouTube channel created for this project.

Project Objectives

1. Develop Comprehensive Educational Resources: Create a suite of multimedia resources (active learning activities, handouts, examples, discussion prompts, short videos, resource lists, expert interviews) that address the environmental impacts, sustainability considerations, and ethical/social justice dimensions of transportation projects.

2. Increase Adoption of Content by Faculty: Enable easy access, adoption, and integration of the developed multimedia resources into existing transportation engineering curriculum. Track the number of faculty utilizing these materials, request feedback through the survey link on website.

3. Enhance Student Learning Outcomes: Improve student understanding of: i) environmental impact assessments of transportation projects; ii) sustainable materials and practices in transportation; and iii) ethical and social justice considerations in transportation decision-making. The improvement in understanding may be measured through pre- and post-activity assessments or surveys.

4. Promote Interdisciplinary Collaboration: Foster collaboration between transportation engineering faculty and experts from philosophy, sociology, urban planning, and economics to provide a richer, multi-faceted perspective within the developed resources. This may be measured by tracking the number of collaborating faculty from other disciplines.

5. Increase Accessibility: Establish a dedicated website within the CSU Civil and Environmental Engineering Department and a YouTube channel to host the multimedia materials, ensuring broad dissemination and ease of access. This may be measured by tracking website and channel usage metrics.

Relevance to Strategic Goals

This initiative aligns with the U.S. Department of Transportation's long-term strategic goals, particularly in the areas of Safety, Climate and Sustainability, and Equity. By integrating sustainability, ethics, and social justice considerations into our curriculum, this project aims to contribute to a safer, more equitable, and environmentally sustainable transportation infrastructure and practices. As presented in the above sections, the project objectives and expected outcomes overlap well with the U.S. DOT's strategic goals. Creating and covering new course content on social and environmental justice, ethics, and sustainability will allow us to

educate the next generation of transportation engineers and make them aware of the considerations beyond the technical content.

Outputs through Technology Transfer

1. Educational Multimedia Resources: Development of an online repository of educational materials:

   - Short informative videos on environmental impact assessment, sustainable transportation practices, and ethical decision-making.

   - Active learning activities such as case studies and group discussions that engage students in analyzing real-world transportation projects.

   - Discussion prompts and examples designed to foster classroom conversations on equity, sustainability, and social justice in transportation.

   - Interviews with experts in environmental impact assessment, sustainability, and social justice in transportation, providing students with diverse perspectives.

   - Resource lists for further exploration of related topics.

2. New Teaching Modules: Creation of teaching modules on the social and environmental justice aspects of transportation projects, integrating technical content with ethics and sustainability.

3. Collaborative Partnerships: Establishment of partnerships with transportation agencies, environmental NGOs, and academic experts outside of the CSU community to provide guest lectures and real-world project data for classroom use.

Expected Outcomes and Impacts

1. Short-term Outcomes

   a. Enriched Curriculum: Development of multimedia resources (active learning activities, handouts, examples, discussion prompts, videos, etc.) that integrate environmental impact assessment, sustainable practices, and social justice considerations into transportation engineering curricula, which is not typically covered.

   b. Faculty Resources: Resources provided to faculty on effectively incorporating the new multimedia materials into their teaching, encouraging them to adopt a wider perspective related to transportation projects and implementation.

   c. Student Engagement: Increased student access to interactive and informative content about the complex nature of transportation projects, going beyond purely technical aspects.

2. Long-term Outcomes

   a. Informed and Ethical Engineers: Students will graduate with a deeper understanding of the environmental, social, and ethical complexities of transportation projects, fostering a generation of responsible engineers.

   b. Integrated Curriculum: Sustainability, environmental impact assessment, and social justice will be embedded within the transportation engineering curriculum, ensuring these considerations are standard practice.

c. Interdisciplinary Collaboration: New connections will be established between transportation engineering faculty and experts from other disciplines (philosophy, sociology, urban planning, economics), leading to a more holistic and comprehensive education approach.

d. Institutional Reputation: The university will gain recognition for its innovative and socially responsible approach to transportation engineering education, attracting high-caliber students (and faculty). The online resources will improve visibility of the university and the CTIPS program.

e. Workforce Development: The project will contribute to an informed and socially aware workforce equipped to design and implement transportation projects that prioritize sustainability, equity, and environmental protection.

Work Plan

To accomplish the goals of this project the tasks below were identified with the proposed deadline for the task completion.

1. Conduct literature review to identify the available resources to be utilized in the module content creation, to be completed by the end of third month
2. Identify existing resources to avoid duplicating efforts and enriching the content for the new modules, to be completed by the end of fourth month
3. Create learning activities based on the identified case studies and content obtained through literature review, to be completed by the end of eighth month
4. Create materials for the developed activities, such as handouts, slides, videos, etc. to support delivery of the content, to be completed by the end of eighth month
5. Identify and contact experts in the field (faculty and professionals) to involve them in the project, interview them to incorporate their expertise in content creation, record interview videos with the experts as applicable, to be completed by the end of tenth month
6. Consult with the experts to assess the content created, modify and improve the content as needed, to be completed by the end of eleventh month
7. Create the website, organize the content by topics, upload all material, to be completed by the end of twelfth month

Task/Timeline	1/25	2/25	3/25	4/25	5/25	6/25	7/25	8/25	9/25	10/25	11/25	12/25
Conduct literature review	■	■	■									
Identify existing resources		■	■	■								
Create learning activities			■	■	■	■	■	■				
Create materials for activities			■	■	■	■	■	■				
Contact experts for content			■	■	■							
Interview experts for content				■	■	■	■	■	■			
Record short videos					■	■	■	■	■	■		
Consult with faculty/experts							■	■	■	■		
Improve/Modify content									■	■	■	
Create and finalize website											■	■

Project Cost

Total Project Costs: $60,000
CTIPS Funds Requested: $30,000
Matching Funds: $30,000
Source of Matching Funds: Colorado State University