

Implementing the Engineering for One Planet (EOP) Framework in the Civil Engineering Technology Program

Introduction

Civil engineers design, build, operate, and manage building and infrastructure projects and systems that are part of the built environment. The Engineering for One Planet (EOP) Framework was developed to equip engineers with the skills, knowledge, and understanding to protect the planet and the life it sustains. This project focused on introducing students in the Civil Engineering Technology Program at Rochester Institute of Technology to sustainability concepts using the EOP framework. Curricular adaptations were implemented for two courses in the Civil Engineering Technology Program reaching 102 students. The two pilot courses served as examples to incorporate sustainability concepts into other technical courses within the program to ensure the students are well-grounded and prepared to be sustainability change agents in their future careers in the civil engineering and construction industry.



Engineering for One Planet Framework (Source: The Lemelson Foundation, 2022)

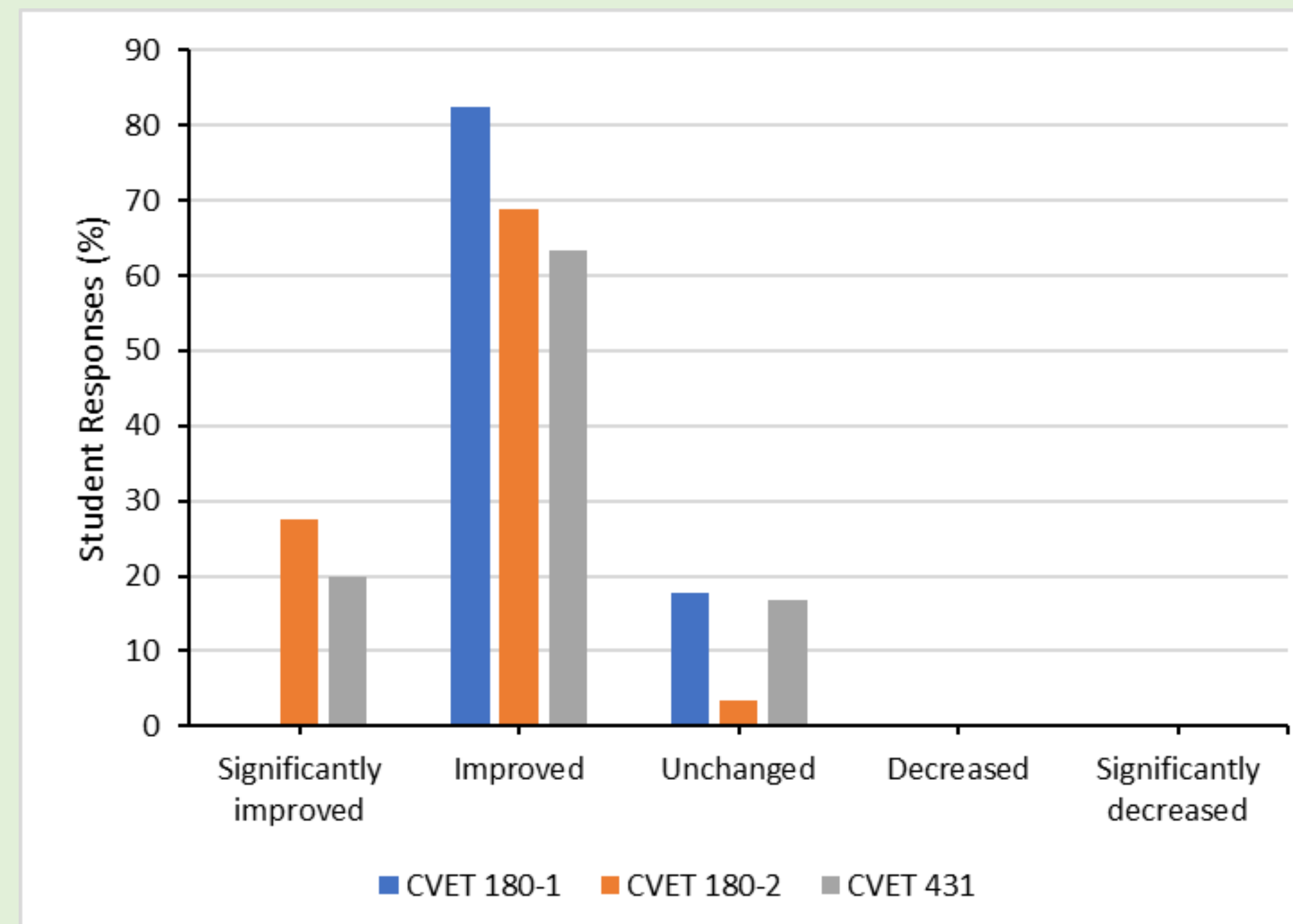
Methodology

Students participated in learning activities that provided opportunities to deepen their understanding of sustainability and imbibe core concepts. Surveys were provided to gather feedback from students enrolled in both courses to evaluate their understanding and confidence in applying key EOP concepts mapped to the course learning objectives. The environmental impact of engineering decisions was emphasized to promote “sustainability” more broadly in solving complex engineering problems.

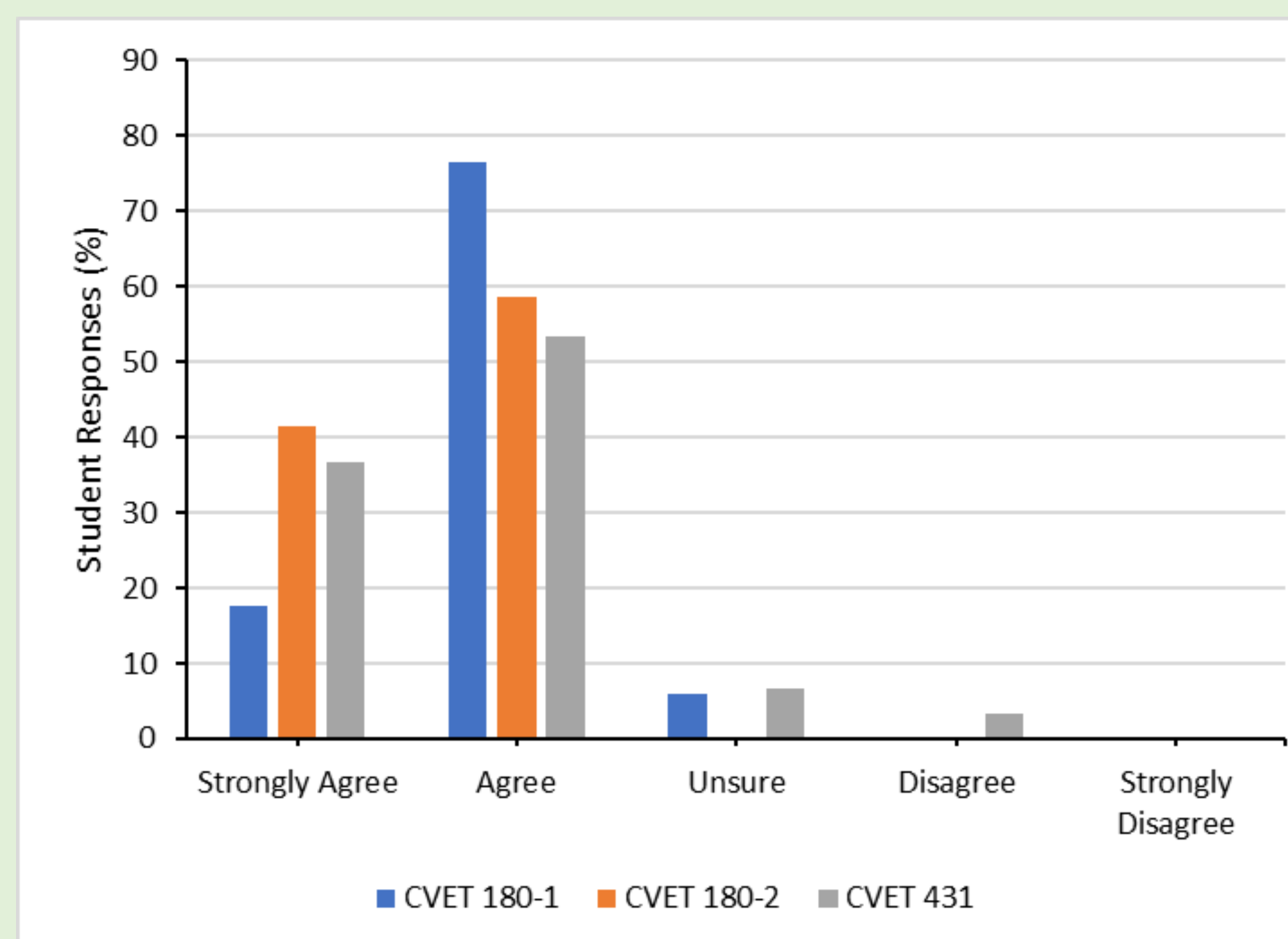
Courses with EOP Curricular Changes	Level	Number of Students Enrolled	Number of Survey Responses	Types of Sustainability-related Course Activities
CVET 180-1 Introduction to Civil Engineering	First year	38	17	Guest lectures, mini field trips, assignments, exam questions, discussions, and group exercises
CVET 180-2 Introduction to Civil Engineering	First year	34	29	
CVET 431 Structural Steel Design	Fourth year	30	30	

Key Findings

How has your understanding of sustainability-related concepts changed since the beginning of the semester?



As a result of this course, I have a better understanding of how civil engineers can contribute to a sustainable world.



What is your understanding of sustainability?



Most commonly used words by students in CVET 180



Most commonly used words by students in CVET 431

Key Findings

Students' engagement and confidence in the top 3 competencies for each course

	CVET-180-01	CVET-180-02	CVET-431-01
1	Communicates through audience-specific written, graphic/visual, oral and interpersonal communication skills. 82.4% engagement, 100% confidence.	Communicates through audience-specific written, graphic/visual, oral and interpersonal communication skills. 82.1% engagement, 92.9% confidence.	Design for the environment based on light-weighting and material efficiency. 100% engagement, 100% confidence.
2	Understand that every person has a role in being environmentally responsible. 94.1% engagement, 100% confidence.	Understand that every person has a role in being environmentally responsible. 89.3% engagement, 100% confidence.	Understand the connection with other disciplines and initiate effective collaboration and consultation. 96.7% engagement, 100% confidence.
3	Aware of civil engineering disciplines and career options in civil engineering. 88.2% engagement, 93.3% confidence.	Aware of civil engineering disciplines and career options in civil engineering. 86.2% engagement, 96.6% confidence.	Understand the role of social responsibility in the engineering profession. 93.3% engagement, 100% confidence.

Percent engagement indicates engaged moderately or largely with the content
 Percent confidence indicates high, very high or moderate confidence in using the competency

Progress

- Incorporated relevant key concepts in the course content, directly reaching 102 students and involving 3 faculty across two courses.
- Organized two guest lectures, one introducing students to the civil engineering discipline and the other introducing students to how they can work towards promoting a sustainable world.
- Presented the EOP framework to faculty in the civil engineering technology department.

Conclusions

- For the two courses involved in this project, the course learning objectives were mapped to the EOP learning objectives and the students' ratings of engagement and confidence in applying the competencies align with the level of the students and types of activities implemented in each course.
- Overall, more than 80% of the students indicated an improvement in their understanding of sustainability-related concepts and over 90% of the students said they had a better understanding of how civil engineers can contribute to a sustainable world.
- Future plans include incorporating the EOP framework into other technical courses taught in the civil engineering technology program and promoting the adoption by other faculty.

Reference

The Lemelson Foundation (2022). The Engineering for One Planet Framework: Essential Sustainability-focused Learning Outcomes for Engineering Education (2022). Retrieved [January 2, 2022] from <https://engineeringforoneplanet.org/>, accessed 1/02/23.

Acknowledgments

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