



CARTHAGE COLLEGE

Sustainability as a System: Introducing the EOP Framework through Reverse Engineering in a First-Year Design Course

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Introduction:

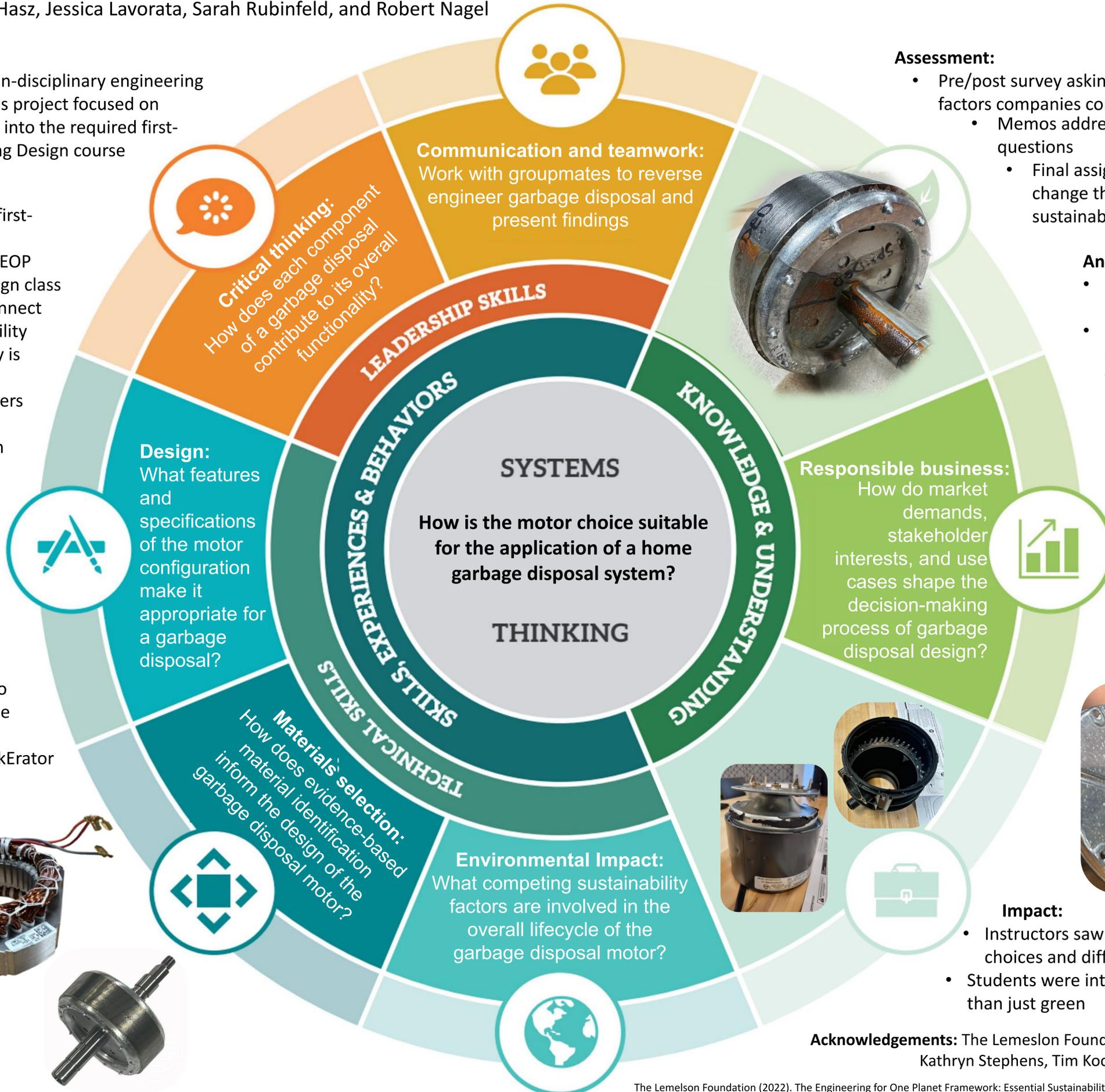
Carthage College has a new, non-disciplinary engineering program rooted in practice. This project focused on integrating the EOP framework into the required first-year Introduction to Engineering Design course

Goals:

- Introduce EOP framework to first-year design class
- Embed sustainability and the EOP framework into first-year design class
- Help students identify and connect different aspects of sustainability
- Understand that sustainability is more than being "green"
- Work with real industry partners
- Build strong foundation for viewing future design through EOP framework

Methods:

- Class designed around reverse engineering a garbage disposal
- Greater focus on motor
- Broken into 5 sub-questions
- Sub-questions map to areas of the EOP framework
- Students worked as teams to deconstruct and research the garbage disposal motor
- Students presented to InSinkErator engineers



Assessment:

- Pre/post survey asking students to identify and rank factors companies consider when designing a product
- Memos addressing each of the 5 class sub-questions
- Final assignment asking to identify one change that would improve the sustainability of the garbage disposal



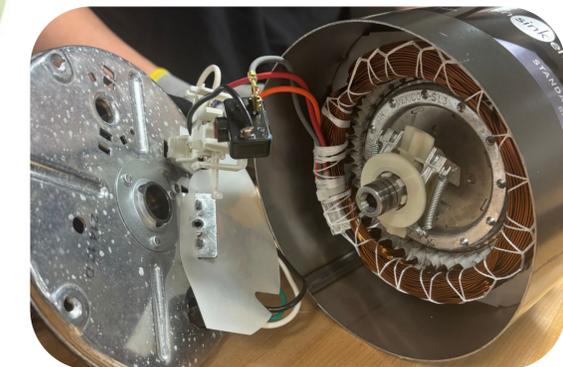
Anecdotal preliminary results:

- Students connected more topics with sustainability
- Students identified business practices as part of the design framework

Further assessment results pending. Details will be in ASEE paper (accepted 2025)

Continuation plan:

- Emphasize language of sustainability throughout first-year course
- Evaluate project ideas through the EOP framework in the sophomore-level design course



Impact:

- Instructors saw more connections between design choices and different aspects of sustainability
- Students were introduced to sustainability being bigger than just green

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