Service Learning: Engineering Design and Build

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A form of experiential education that uses community service experiences to enhance the academic classroom experience. This teaching process involves the students in the identification and analysis of real community needs, developing solutions to meet those needs, and then implementing those solutions. It also requires that students evaluate their work and assess their service experience and its impact.

http://www.clemson.edu/public/servicealliance/faq/what_is_service_learning.html (June 30, 2012)
Senior Design

- Clemson University – Mechanical Engineering
  - ME 4010 (Senior Design Methods)
    - First semester (~17 weeks) of Senior Design Sequence
    - Single project (all teams work on same guided project); weekly lectures
    - Community sponsored projects (relevance, customer)
    - Small scope
    - Goal: Prepare students for ME 4020
  - ME 4020 (Internship in Engineering Design)
    - Second semester (~17 weeks) of Senior Design Sequence
    - Single project (4 teams of 5 students per project); weekly seminars
    - Industry sponsored projects (relevance, customer, professionalism)
    - Large scope
    - Goal: serves as an “exit exam”
Goals

• Want to increase “interest” in the design projects…
  – Faculty “made up” problems are of no interest to students

• Want to create “customer” centric experience…
  – Faculty “playing” customer is not believable to students

• Want to provide a “low pressure” project…
  – Industry sponsored projects include significant pressure for delivering

Solution: Design and Build mechanical devices for elementary classrooms (such as wind tunnels)
Project Structure

- **Course Structure**
  - Lectures for four weeks on design process (Tues/Thurs)
  - Lectures for twelve weeks (Tues)
  - Design Reviews for twelve weeks (Thurs)

- **Class divided into teams (6-7 students each)**
  - Each team was assigned a classroom (teacher + students)
  - Each team presented every other week on progress
  - Each team scheduled own classroom visits
  - Each team defined problem and requirements
  - Each team designed own solution
  - Each team built own solution
  - Each team developed teaching/experimentation material
Handoff Event

- Classes brought to Clemson for field trip
  - Tours of the engineering labs
  - Pizza (and fruit + water) for lunch
  - Handoff – Deliver wind tunnels to classes
  - Each class demonstrated their tunnels for others

- Example videos
  - http://www.youtube.com/watch?v=ay2wHGEI_UA
  - http://www.youtube.com/watch?v=zCSzoqKbMek
  - http://www.youtube.com/watch?v=vG8kNMQUUBo
  - http://www.youtube.com/watch?v=gP_-13uEA-c
  - http://www.youtube.com/watch?v=CN2JQjIKtPw
Coolant Footprint and Pathlines

Low Coolant Flow Rate