Team-Based Term Projects in Undergraduate Engineering Mechanics
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Abstract

- UM Mechanical Engineering Program Educational Objective:
  Upon graduation, our students are prepared for successful careers because of their integrated introduction to teamwork, communications, and problem-solving
- Student teams used effectively in laboratory and design courses
- Engineering mechanics courses taught using traditional format of lecture, textbook problems, and examinations
- Can student teams assist learning in engineering dynamics?
- How can student teams be constructed for effective learning?
- Pilot study conducted at the UM-SJTU Joint Institute in Spring 2008 with a mix of UM and JI students

Research Questions

- How does the inclusion of a team-based term project affect student understanding of undergraduate engineering dynamics?
- How do students learn to apply their engineering dynamics knowledge to a term project?
- How do teams impact student learning of engineering dynamics?

Methodology

- Students grouped randomly into 5-6 person teams
- Teams divided into two equal groups
  - Term design project
  - No term design project
- All teams given bi-weekly team-based homework problem
- All students given introduction to teamwork
- Assessment
  - Dynamics Concept Inventory (DCI) Test (Gray et al. 2005)
    - Administered first and last days of class
    - Tests identified by team number
  - Exit interviews
    - Questions on effectiveness of student teams, term project and multicultural teaming
    - Administered by UM students (not class students)

Results

- Class size: 94 students
- Number of student groups: 16
  - 8 Teams assigned design project
    - Including 3 multicultural UM-JI teams
  - 8 Teams with no design project
- Term design project: Design an automatic door opening for handicapped assist
  - Smallest possible motor
  - Door opening and closing timing requirements
- Oral presentation and written report of team designs on last day of class

Discussion

- DCI test results
  - Pre-test average: 44%
  - Post-test average: 66%
  - No difference seen between two groups
- Student exit interview responses
  - Mixed views on bi-weekly team-based HW problems
  - Design project helpful, but
    - More time/grading weight desired for project
  - Multicultural experience both desired and challenging
- To be included in Fall 2009 offering of ME 240
  - One section of ME 240
  - Continue use of DCI Test
  - Team design project with increased grade weighting

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