Term-Based Team 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
◆ Data analysis of DCI test results in progress
◆ Student exit interview responses
  ■ Mixed views on bi-weekly team-based HW problems
  ■ Design project helpful, but
  ■ More time/grading weight desired for design project
  ■ Multicultural experience both desired and challenging
◆ Continuing study in Fall 2008
  ■ One section of ME 240
  ■ Continuing use of DCI Test
  ■ Student team design project (optional)

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