

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

Acknowledgments

The *Investigating Student Learning* program was funded by the University of Michigan Office of the Provost, the College of Engineering, and the Center for Research on Learning and Teaching. Appreciation extended to the UM-SJTU Joint Institute for its interest and support of this initiative.