

Multidisciplinary Teaming in Senior Design: Lessons Learned, Better Practices?

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How did this start?

- ISPE
- Teaching assignment
- Richard Felder

Teaching Assignment: Senior Design

- 15-Week Capstone Project
 - ➔ Chemical Engineering, Computer Science, Food Science, Industrial Engineering, Materials Engineering, Economics, Aerospace Engineering, Pulp and Paper Technology
- Realistic Experience - Multidisciplinary (MD) teams
- Active Industrial Mentorship
 - ➔ International Society of Pharmaceutical Engineering Members (ISPE)

Multidisciplinary Course Management

- Issues

- ➔ Uncertainty About Purpose
- ➔ Confusion About Language
- ➔ Disciplinary Disconnect



- Common Course Superstructure

- ➔ Calendars/Syllabi Coordinated
- ➔ Team training
- ➔ Parallel Development Processes

Phase I: Generic Teaming Module

- Teaming instruction occurred in a weekly module
- 5 MD and 0 non-MD teams received instruction
 - ➔ Creating team ground rules
 - ➔ Stages of team development
 - ➔ Establishing team roles
 - ➔ Writing team minutes

In Class Lecture Module Developed with CWSP

- Teaming - roles and responsibilities
- Maximizing Team Productivity and Cohesiveness
- Identifying Personal Strengths and Weaknesses
- Peer evaluation
- Presenting in Multidisciplinary Teams
- Writing Collaboratively
- Exploring disciplinary conventions
- Better Managing the Question and Answer Session

Phase I: Generic Teaming Module

- Assignments/**Assessment**
 - Team minutes and logs
 - Peer review (Felder, 1997)
 - Written reflection
 - **Pre- and post-course surveys: competence and confidence**
 - **Performance on written and oral reports**

Phase I: Generic Teaming Module

➤ Lessons Learned

- ➔ MD teams need a common time to meet for instruction
- ➔ **MD teams need instruction on integration of information into a coherent team voice**
- ➔ MD teams have difficulty addressing interpersonal issues with members from other disciplines

Adjustment After Phase I

- Teaming instruction focused on unique needs of MD teams: Integrated Teaming, Writing and Speaking
- Instruction model changed to consultation format so all team members can attend

Phase II: MD Teaming Focus

- Teaming instruction occurred via consultation 4 times during the semester
- 4 MD and 4 non-MD teams received instruction
 - ➔ Creating team ground rules
 - ➔ Facilitating team roles
 - ➔ Establishing team cohesiveness and productivity
 - ➔ Collaborative writing
 - ➔ Addressing feedback as a multidisciplinary team

Phase II: MD Teaming Focus

- Assignments/**Assessment**
 - Team minutes and logs
 - Peer review
 - Written reflections were eliminated but reflection occurred in team meetings to address interpersonal issues
 - **Pre- and post-course surveys: competence and confidence**
 - **Performance on written and oral reports**

Phase II: MD Teaming Focus

➤ Lessons Learned

- ➔ MD teams receiving teaming instruction found it difficult to manage multiple sources of input
- ➔ MD teams struggled with project management issues
- ➔ MD teams saw the project management assignments (minutes and logs) as “busy work” that detracted from “real” technical work

Adjustment After Phase II

- Adjust the focus of teaming instruction to develop project management skills
- Maintain consultation format and tailor training to the specific needs and experiences of individual teams: outcome trumps process
- Implement teaming-focused peer evaluation

Conclusions

- Students on MD teams face unique challenges
 - ➔ Processing feedback
 - ➔ Project management
 - ➔ Collaborative writing & speaking
- Iterative assessments led to a competence-driven model for instructing MD teams
- Preliminary results indicate MD outperforms SD on final oral and written reports
 - ➔ Teaming rubric tests connection between performance and teaming effectiveness



New Design Initiatives: Engineers Without Borders Request For Power At Village Learning Center

- Located in Lower Allentown, Sierra Leone
 - ➔ The LemonAID Fund made request to EWB in 2005 to establish power at their VLC
- Accommodate 500 students 24 hours a day all year long
- Grades K-12
- Multidisciplinary design aspects
- Multicultural
- Service learning