

Interdisciplinary Capstones

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Engineering the future

To develop the increasingly
complex systems
which support our
technological society,
and meet user expectations for flexible and
usable systems,
development teams
are necessarily increasingly
interdisciplinary and intercultural
in nature.



Why interdisciplinary projects?

- Skills for a global workplace
- Competitiveness and employability
- Recent developments
 - NSF's report "*Educating Engineers as Global Citizens: A Call for Action*"
 - Global Engineering Excellence Initiative - Global Eng. Internship Program
 - Online Journal for Global Eng. Education
- European dimension of engineering education



A quote from Sherra Kerns, Olin College

Assumptions revisited:

- ~~2. There are single-discipline problems~~
 - authentic problems cross disciplines
 - fac from different disciplines teach together
 - students work in teams early & often
 - culminate with year-long industry problem
- Olin has 3 curricula yet no academic departments.



Integrated Approaches

- Holistic PBL, e.g. Roskilde and Aalborg University, Denmark
- Interdisciplinary integrated curriculum, e.g. Olin College, USA.

Holistic approaches require high level policy support!



Capstone/Project designs

Using integrative projects is a more achievable model for many institutions

- Open Ended Group Projects (OEGP)
(Daniels et al. 2010)

- Course level PBL
 - (A/E/C Global Teamwork)
 - (Pears and Daniels 2010)
 - (Bannerot et al. 2010)



Challenges

- courses that involve students from several degree programs in an interdisciplinary context are quite hard to establish

(Bannerot 2010)

- grading non-technical aspects is complex, and schemes vary widely

(Dutson et al. 1997)

- interdisciplinary work practices and solution formulation are not highly regarded or appreciated

(Pears 2009)



A successful interdisciplinary project

- Integrates knowledge and skills from participants
- Builds additional competence in
 - project management
 - virtual development teamwork
 - cultural and interdisciplinary teamwork
- Allows student to experience a full project cycle from conception to delivery
- Provides opportunities to learn professional skills with close mentorship in a secure setting



Take home messages

- Students with a strong technical focus in their studies have a tendency to under-rate the potential contribution of other key skill areas and disciplines.
- The value of skills from other disciplines are often first acknowledged after the project, during debriefing.



Conclusions

- There are well established models for developing interdisciplinary teamwork skills
- Devising appropriate grading strategies is crucial
- Students need to experience interdisciplinary work at least twice during their education, since it seems that many need to experience partial failure in order to understand the value of skills with which they are unfamiliar, and have traditionally undervalued.