What I Wish They Had Told Me About Teaching at WPI When I Was In New Faculty Orientation

John A. McNeill
ECE Department
Worcester Polytechnic Institute

September 10, 1999

Presentation Overview

- Background
- Lectures ("Traditional" Teaching)
- Project Advising
  - Grading
  - Balancing Challenge and Support
- Academic Advising
- Summary

Personal Background

- 1979-1983 A.B. Engineering Sciences Dartmouth College (Graduated in top 45% of class)
- 1983-1986 Design Engineer, Analogic Corp.
- 1986-1990 Design Engineer / Engineering Manager, Adaptive Optics Associates (AOA)
- 1990-1994 Graduate School (Univ. Rochester, Boston U.)
- 1994-1999 Asst. Professor, WPI

Unable to hold a job more than 5 years

Teaching: Set High Expectations

- Find a teaching mentor: WPI students expect a lot from us!
- Treat students with respect
- Lectures: Be prepared, organized
  - Shows you respect students
  - Shows you’re working hard, which gives you credibility to:
- Demand a lot of work of your students
- Have high expectations, AND
- Communicate expectations clearly!
  - Work, honesty, critical thinking
- Provide support to help students succeed
- Let them cry on your shoulder if they don't. Failure is OK.
  - (But don’t change a grade unless you made a mistake!)

Try to remember what it was like when you were a student (maybe...)

High Expectations in EE2011/2022

- Extensive homework sets
  - –calculation ("traditional" problems)
  - –computation with software tools
  - –written expression (e.g. meaning of basic concepts)
- Weekly labs
  - –preparatory assignments
  - –written lab reports
- Independent learning of software tools
- Small team projects with written and oral reports
- Challenging tests
  - –require critical thinking
  - –beyond "what was covered in class"

J. McNeill and R. Vaz, "High Expectations: A Passport to Student Success," Proceedings of the Ninth International Conference on the First Year Experience, July, 1996.

Support Services

- Instructor office hours
- Teaching Assistants (graduate students)
- Senior tutors (undergraduates)
- E-mail
- Web site
- Peer study groups

Student Evaluation Results

- **Written comments**
  - What did you particularly like about this course/lab?
  - **What did you particularly dislike about this course/lab?**
  - What strategy would you advise a friend to use to benefit from this course?

- **Quantitative evaluations**
  - **The material to be learned in this course was difficult**
  - **The instructor:**
    - **assigned homework that aided my learning**
    - **challenged me to extend my capabilities**
    - **stimulated my interest in the subject matter**
  - **I learned a lot in this course**

What did you particularly dislike about this course/lab?

– "Lots of work."
– "A lot of hard work - this isn't bad, but it's true. It's good that the course is hard - doesn't mean I have to like that fact."
– "Huge homework assignments."
– "The homeworks were lengthy, but with a head start they were not impossible."
– "Nothing, except the large homework assignments (guess it comes with the turf)."
– "Would have liked to do a few more labs - it is very helpful and rewarding to see things light up and work after theory is done."
– "Probably the only thing is the tests were a little difficult."

Quantitative Evaluations

	SD	D	A	SA
The material to be learned in this course was difficult	1	17	56	26
The instructor assigned homework that aided my learning	0	0	35	65
The instructor challenged me to extend my capabilities	0	1	26	73
The instructor stimulated my interest in the subject matter	0	2	34	64
I learned a lot in this course	0	2	43	55

- 91 responses of a possible 120 (76%)
- Report percentages that

Strongly disagree (SD), Disagree, Agree, Strongly Agree (SA)

Projects

- MQPs are just like projects you've done before
  - e.g. Ph.D. research, job experience

- MQPs are completely unlike any projects you've done before
  - Intent is to <u>teach design</u> (not necessarily get a result)
  - Also teamwork, communication, "process" aspects

Get a project advising mentor

- Find someone in your department who has advised award-winning MQPs
- Co-advise a project with them

Project Grading

- Never give an A the first term!
- No Fear: Give different grades to team members if warranted
- 1 paragraph e-mail to each student explaining grade, path to improvement next term
- Make it as much like a course as possible
  - Hand out criteria, procedures at first meeting
- Week-to-Week (Nicoletti)
  - At the end of each weekly meeting, identify 15 hours of work for each team member
  - At beginning of meeting, compare work done to last weeks goal; assign grade
  - No surprises at end of term
- End of Project (Vaz)
  - Confidential form on process issues, relative contribution level of partners

Sponsored Projects

Better Project Quality

- **"Real World" project credibility**
- **Better project definition**
  - **Expect more from first term!**
- **"Customer" = easier to motivate students**
  - **Professor not the bad guy**
- **Compete with sponsor's competitors**
  - **Students live with real cost / budget constraint**

`http://ece.wpi.edu/~mcneill/papers/sponsoredprojects.pdf`

Finding Contacts

Quantity Rules

- To get 1 good idea, you need 10 bad ideas
- To make 1 sale, you need to live through 10 rejections
- To get 1 project sponsored ...
- If a potential contact isn’t producing, spend time elsewhere!

`http://ece.wpi.edu/~mcneill/papers/startcenter.pdf`

Balance Challenge / Support

- **1st week: Minor hint**
- **2nd week: Major hint (make it obvious)**
- **3rd week: Tell them what to do**

Important to tell sponsors MQP is primarily an educational experience to teach design

- **NOT to "get something done"**
  - **Pay big $$$ for research to get deliverables: tell sullen grad student what to do**
- **Hard to let them flail when sponsor expects deliverables!**

Academic Advising

Thank you, Alexander Graham Bell:

- **X5381 is Ann Garvin's office. She loves your phone calls.**
- **X5211 is the Registrar's office. They love your phone calls.**
- **Find an advising mentor. Call / talk to mentor often.**

- **Be there (Academic Advising Day, appointments, etc.)**
- **Read the catalog!**
- **Talk with seniors in your department**
  - **What worked, what didn't in their program of study**
- **Remember how clueless you were at age 18**
  - **Care about these people!**
- **Forget about what you were like when you were 18**
  - **Not everyone wants to be a professor!**

"Someone at WPI cared about me as a human being"

What I've Learned

- Find mentors
  - Teaching
  - Project advising
  - Academic advising
- Expect Success
  - Set high expectations
  - Communicate expectations clearly
- Show by your performance that you care
  - About students
  - About what you’re doing