



National Center for Women &
Information Technology
6 November 2007

Mentoring for Engineering Academia

An overview of the details

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Introduction

In previous session discussed the motivation, goals and rewards of mentoring.

Here consider

- what is mentoring?
- who mentors whom?
- key mentoring issues
- some mechanics of individual and institutional mentoring

Mentor



The *Oxford English Dictionary* defines *mentor* as “allusively, one who fulfils the office which the supposed Mentor fulfilled towards Telemachus. Hence, as common noun: An experienced and trusted adviser.”

Telemachus and Mentor by Pablo E. Fabisch

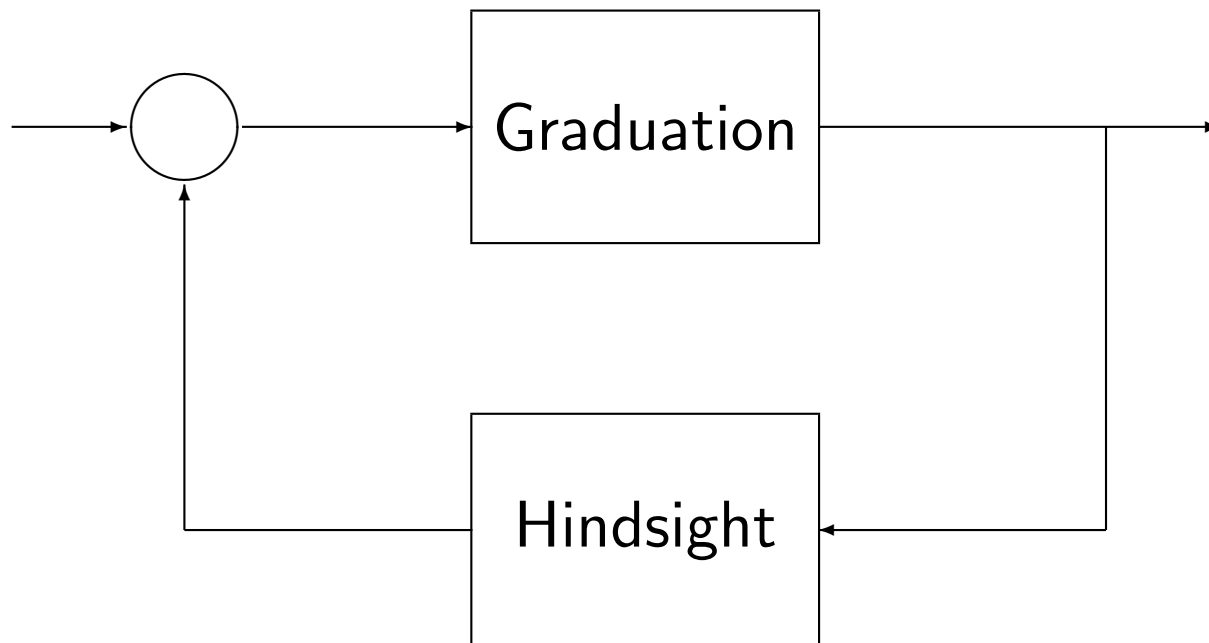
from *Les Adventures de Telemaque*

Mentoring is not one-way!

Mentors mentored by mentees \Rightarrow *feedback*

Feedback— a basic principle of engineering

and a useful model or metaphor for mentoring



benefit from protégés' hindsight

\Rightarrow **collective wisdom**

Who mentors whom?

Obvious:

- Faculty mentor students (undergraduate and graduate)
- Senior faculty mentor junior faculty
- Academic leaders mentor faculty

Less obvious:

- vice-versa on all the above (feedback)
- mentor on mentoring, e.g.

- Faculty mentor graduate students or junior faculty on mentoring
- Academic leaders use influence and carrots to promote effective mentoring of junior faculty and students

Each flavor of mentoring has different goals, issues, and mechanics

Collective Wisdom on “Best Practices” for mentoring students

Culled from former students and conversations with successful colleagues

Environment Work to create a comfortable, friendly, cooperative, and productive environment with the best possible resources for all students. Success begets success and attracts top quality students.

Cooperation Discourage aggressive competition among students, encourage cooperative efforts and openness. Sadly many people need education in basic politeness and diplomacy skills.

Counter argument The real world is cutthroat and hard, students should not be coddled.

Counter-counter argument Students can be prepared for the tough bits, academia should optimize learning.

Recruitment Actively recruit a diverse group. It improves the quality of life for all involved, enhances group morale, and it improves research ideas. A diverse group of students can actively assist in recruiting new generations.

Confidence Many students start with little, but can become outstanding when properly encouraged and appreciated.

Particularly true in underrepresented groups.

Related: The “imposter syndrome”

<http://www.impostorsyndrome.com/>

Credibility The better we are at what we do, the better mentors we will be.

Integrity Words alone won't do it (just read the newspapers). Many students do not take it seriously. Mentors must. Too much cynicism in professors regarding ethics can cause real damage.

Communication skills Brilliant research is of little use if not understood. Correct English with good style is critically important. Practice writing and speaking skills constantly.

Chores and citizenship Engage students in professional responsibilities: reviewing, proposal writing, presentations, recruiting, mentoring.

Professional Visibility Send students to conferences to attend and give talks. Rehearse them extensively. Introduce them to colleagues. Get them plugged in. Encourage them to participate in and help with local workshops and conferences. After graduation recommend them for program committees, technical committees, reviewing chores.

Credit Give it generously to students. It helps them and makes mentor look good.

Attitude Building and maintaining a high quality and diverse group takes conscious commitment, effort, and action. This is particularly true when initially bringing diversity to a monolithic group.

Sharks Although many institutions have programs for diminishing sexual harrassment, it still exists. Be sensitive to potentially embarrassing or dangerous situations and do not accept inappropriate behavior from colleagues towards your students. Take very seriously complaints of inappropriate behavior.

Followup Mentoring does not stop with a degree, students evolve into colleagues.

Visits from alums provide wonderful examples, information, and inspiration.

Former students often lack mentors at new institutions.

Attributes of a good mentor

For graduate students the research supervisor usually plays the role of primary mentor, but multiple mentors can help

- positive role model
- trustworthy
- good personal and communication skills
- encouraging
- technically strong with a good scholarly reputation
- highly accessible

Signs of a good mentor:

- Former students of the adviser should have found good positions after graduation.
- Papers coauthored by the adviser with students should often have students as lead authors.

How *be* a good mentor?

The most obvious contribution of a PhD research supervisor is guiding students to learn how to do, evaluate, and present research. In addition, typically a mentor

- provides academic advice, both for meeting program requirements and for building a strong background in related areas, such as statistics, mathematics, physics, and biology;
- provides a sounding board for career planning and opinions on possible career tracks;
- provides an opportunity and critiques for technical talks in preparation for oral exams, thesis defenses, job interviews, conference presentations;

- provides an informed source for comparing job offers which can help students reach a sound decision;
- keeps students posted on current literature, meetings, and news;
- helps hone student's writing skills, both for technical articles and for outreach articles that expand the audience for the technical field;
- provides advice and help on preparing and submitting articles for scholarly publication and, on the other side, for reviewing work by others;
- provides connections into professional networks of colleagues, introduces students to colloquium speakers and other visitors, suggests collaboration opportunities.

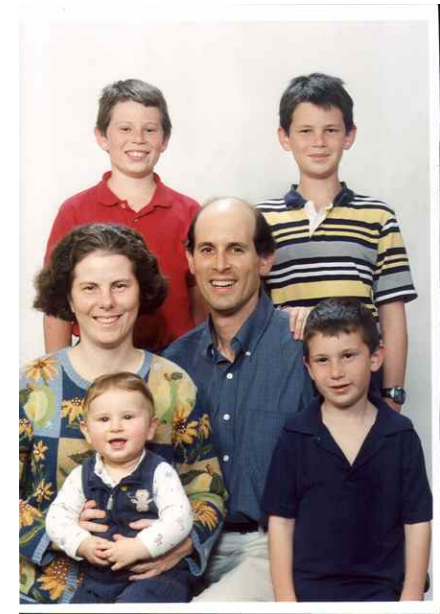
Mentoring junior faculty

Note: Often mentoring a graduate student transforms into mentoring a junior faculty if they move into academia.

Finding a mentor: many schools have formal programs, but need at least one — preferably tenured. [How help?](#)

- Advice on key academic responsibilities of teaching and advising, negotiating balance and getting good evaluations.
- Help finding resources
- Navigating the departmental maze, who actually does what. TA and RA approvals and appointments, ethics and honor codes.
- Proposal writing, examples and editorial help.

- Demystifying the tenure process, planning ahead. Maximizing visibility, balancing committees and service with research and teaching, professional positions.
- University connections, inside and outside your department
- Help keep things in perspective, transcending the daily crises. Mistakes happen, get past it (grant and paper rejections are not personal).
- Academic leadership — advantages and disadvantages
- Balancing family and work
(see *Proceedings PAESMEM/Stanford Workshop* and *BIRS Workshop*)



Mentoring colleagues

Encourage discussion of mentoring issues at faculty lunches and meetings, e.g.,

- what skills should PhD students learn in addition to the obvious research skills? How can mentors help them?
- what inside knowledge of the way an institution work can best assist junior faculty learn to navigate the system?
- how can a department ensure that students and junior faculty connect with appropriate mentors?
- how can mentors become sensitive to the needs of protégés who do not share their background/gender/ethnicity?

Two key points regarding colleagues and academic administration:

★ Individuals should encourage fair and open searches, open discussion of common myths and hidden prejudices and their potential damage.

Search committees for faculty determine the future, searches for Chairs/Directors/Deans have a profound influence.

★ There are not enough faculty of type X to mentor students/faculty of type X for most values of X (women, African American, Native American, deaf, blind, . . .)

⇒ Faculty need to make an effort to mentor people of different gender, background, ethnic group, culture

A bunch of bullets: key issues in mentoring

Important skills to develop/practice/discuss

- for students: How to
 - present a poster or a paper at a conference
 - publish a peer-reviewed journal article (writing, submitting, responding to reviews, revising)
 - publish a chapter in an edited volume
- for junior faculty: the above and
 - when and how to say “no”
 - the patent process
 - intellectual property rights

- scientific ethics
- use of human subjects in research
- the institutional review process
- best practices in teaching
- how to set up and manage a laboratory
- how to write a budget
- grant-writing procedures
- science policy
- how to develop international research collaborations.

Institutions with active mentoring programs for students support the programs by

- appointing a departmental mentoring committee to develop and implement a departmental mentoring plan with a particular emphasis on providing students with career information and

opportunities to develop workforce skills

- providing mentor training for faculty
- providing mentee training for students,
- providing online mentoring resources or links to resources for faculty and students, and
- assessing and providing incentives for high quality faculty mentoring.
- academic preparation & support programs, particularly during the early course-taking years.
- ensuring that graduate students are on track towards the PhD,

including nurturing during their preparation for qualifying and comprehensive exams

- early detection of switchers and leavers in the department
- early social and intellectual integration into the department
- faculty mentoring that focuses on research productivity, career counseling, and workforce preparation
- attention to financial aid and debt burden
- attention to family/work balance.

Institutions with active mentoring programs for junior faculty support the programs by helping with

- preparing for the 3-year review
- teaching and TA Management for the large classes
- balancing service with teaching and research
- time management
- graduate student development and advising
- grantsmanship strategies

Methods for a mentor to encourage development of these skills.

- for students

- planned orientations coupled with frequent communications and annual reviews of required milestones with faculty mentors
 - planned peer mentoring
 - shared office space with a more experienced graduate student
 - write abstracts and participate in poster and paper presentations at professional society meetings.
 - author or co-author peer-reviewed journal articles and book chapters.
 - review journal articles or book chapters.
- for junior faculty
 - regular chats to track progress and status
 - some schools have monthly lunches with Chair or Dean and junior faculty

- make sure institutional priorities for tenure clearly spelled out

How can individuals and organizations foster good mentoring?

Promote events that spread the word and stimulate discussion:

- Encourage discussions (e.g., lunch, faculty meetings, retreats) of mentoring issues, benefits, techniques, resources
- PAESMEM: <http://www.ehr.nsf.gov/EHR/HRD/paesmem.asp>
- Talks by successful mentors
- Workshops — Promote discussion, generate ideas, network e.g., 2004 PAESMEM/Stanford School of Engineering Mentoring Workshop <http://paesmem.stanford.edu/> and 2007 BIRS Mentoring Workshop <http://birs07.stanford.edu/>





- Support/sponsor/encourage student groups for mentoring, e.g., WEE at Stanford (founded by student participants following 2004 PAESMEM/Stanford workshop)



Mentoring resources

See lists in *Proceedings* of the PAESMEM/Stanford and Banff International Research Station workshops on mentoring for engineering academia for extensive web sites, books, and articles:
<http://paesmem.stanford.edu/> <http://birs07.stanford.edu/>

New resource: NCWIT Mentoring-in-a-Box: Women Faculty in Computing
<http://www.ncwit.org/practices.box.faculty.html>

NSF ADVANCE Centers: a wealth of programs and materials
portal: <http://research.cs.vt.edu/advance/index.htm>

This has been a rapid list of the why, what, and how of mentoring.

Most academics do some as an ordinary part of the job, but additional attention can pay rich dividends to improving individual research groups, departments, schools, and fields.

Questions??