

ANITA BORG INSTITUTE FOR WOMEN AND TECHNOLOGY

Mentoring in Academia: Research and Resources

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Mentoring Students

- Mentoring is a key determinant of retention of women and other minorities in computer science and engineering [1, 2].

Undergraduates

- At the undergraduate level, the mentoring relationship should primarily focus on exposing the student to the various career possibilities that come with computer science and engineering and giving them support in making early career decisions [3].
- Another key role of mentors at the undergraduate level is attracting students to the field and reaching out to freshmen, and keeping the students excited and engaged about computer science and engineering through original teaching and outreach activities, such as technology demonstrations, service learning, and multi-disciplinary research assignments [4], [5].
- Peer mentoring is also important at the undergraduate level for recruiting new majors in their freshman year and at the high school level [2, 6].

Graduates

- Research shows that graduate students who are mentored by faculty increase their academic self confidence [7].
- At the graduate and post-doctoral level, the focus of mentoring is on finishing a degree on track with the time expectations of the advisor, support in publishing and building a resume for their post-graduate employment, and helping the student secure a wanted position [3, 8].
- Mentors help graduate students choosing and building a research area and agenda and develop adequate research skills [9, 10]. Research shows that students who are mentored publish at a higher frequency than those who are not [11]. Mentoring on publishing how to such as where to publish given one's research area (conferences, journals), and the review process, are important to future research career progression [9].
- Adequately mentoring graduate students is also beneficial to tenure-track faculty – part of the evaluation process for tenure involves looking at the success of graduate students under a faculty's direction [12].
- Part of a mentor's role is to promote his or her students in job talks, award nominations, committees, and creating professional connections for the student [9]
- Peer support and peer mentoring is also an important component of mentoring and should be encouraged at the graduate and undergraduate levels, such as women's groups or other minority groups [1], as well as matching younger students with more experienced students [2].
- Faculty who mentor graduate students who are from a different gender or ethnic identity need to educate themselves in terms of cultural and racial perspectives to be more effective mentors; fir example, many mentoring programs fail to acknowledge the specific needs of students of color [13].



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Mentoring Junior Faculty

- At the junior faculty level, mentoring focuses on navigating the tenure track and beyond. This is especially important to the retention of women and minorities, since in Engineering, less than 3% of full professors are women, and in Computer Science, about 10% of full professors are women [14], suggesting a strong glass-ceiling effect in academia [15].
- At the beginning of the new faculty's career, a mentor should advocate on their behalf to get the best possible starting conditions in terms of salary, research equipment and funding, and teaching load [16].
- The mentor helps the new faculty understand departmental structures and processes and articulates the requirements and expectations for progress toward tenure, including the official and non-official requirements [3, 16]. Mentors and protégées should schedule frequent feedback sessions to track progression toward tenure [16].
- The mentor also has a crucial role in protecting the new faculty's research time in order to make tenure, such as by protecting women and minority faculty from being asked to be on too many departmental and school committees or teaching too many classes [3, 16].
- Mentors should also guide new faculty in becoming better teachers, for example by introducing them to the last person who taught the class they are assigned to or encouraging them to consult the most successful teachers in the department [16].
- Mentors can encourage quality students to work with the new faculty member and provide visibility of the junior faculty to their peers.
- Across levels, mentors need to be aware of the additional barriers and mentoring needs faced by those who belong to more than one minority groups. These groups need additional mentoring opportunities [17] because they experience multiple sources of marginalization [18]. In one study, African American women faculty reported significant benefits from mentoring such as career counseling, feedback on research papers, letters of recommendation, and networking opportunities, as well as significant encouragement toward publication [19].
- At the junior faculty level, another key mentoring need is encouragement and advice on balancing work and family responsibilities [20], and acknowledging the competing demands of the "tenure clock" and child rearing [10].

Mentoring Senior Faculty

- Even tenured faculty need mentoring from trusted colleagues on the road to greater recognition and full professorship. The need for mentoring at this career stage is help with award nominations, opportunities for serving on prestigious committees [10], and recognition such as being named a member of the NAE.

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Additional Research and Resources

Online Resources

American Association for the Advancement of Science (AAAS) *Science's NextWave*
(<http://www.nextwave.org>).

American Association for the Advancement of Science (AAAS). *Standing our Ground: A Guidebook for STEM Educators in the Post-Michigan Era*. 2004,
http://www.aaas.org/publications/books_reports/standingourground/PDFs/Standing_Our_Ground.pdf

Computing Research Association (CRA). The Ph.D. Job Hunt - Helping Students Find the Right Positions - By Edward D. Lazowska <http://www.cra.org/CRN/articles/may02/lazowska.html>

CRA-W: Committee on the Status of Women in Computing Research
<http://cra.org/Activities/craw/index.php>

CRA-W Distributed Mentoring Project: <http://cra.org/Activities/craw/dmp/index.php>

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Committee on Science, Engineering, and Public Policy's (COSEPUP)
<http://www7.nationalacademies.org/cosepup/> .

Richard Ladner. *Mentoring Undergraduate Researchers*.
http://www.cs.washington.edu/homes/ladner/MentoringUG_files/frame.htm

National Research Council: *Career Planning Center for Beginning Scientists and Engineers* (CPC) (<http://www2.nas.edu/cpc>)

National Academy Press: Adviser, Teacher, Role Model, Friend: On being a mentor to students in science and engineering. <http://www.nap.edu/readingroom/books/mentor>

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http://www.ieee.org/organizations/society/sp/Mentoring_for_Engineering_Academia.pdf

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<http://paesmem.stanford.edu/html/proceedings.html>

School of Computer Science, Carnegie Mellon University, Women@SCS Initiative:
<http://women.cs.cmu.edu/http://women.cs.cmu.edu/>

University of Washington ADVANCE Mentoring Resources:
<http://www.engr.washington.edu/advance/mentoring/index.html#leadership>

University of Washington Access Computing. Working Together: Faculty and Students with Disabilities. <http://www.washington.edu/doit/Brochures/Academics/teachers.html>

Mentor Net: The E-Mentoring Network for Diversity in Engineering and Science:
www.mentornet.net

Further Reading

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