

ENGAGE Strategy Research Brief

Faculty-Student Interaction

"Two of the most significant factors affecting engineering student engagement, retention, and academic performance are the quality and extent of students' interactions with engineering faculty. Positive student learning outcomes are correlated with faculty discussion with students about the nature of engineering work and affirmation of students' ability to successfully perform such work."

Dr. Norman Fortenberry
Executive Director, American Society for Engineering Education

There is a clear link between faculty engagement or mentoring, student satisfaction and degree completion (3, 12). Engineering students regularly report that faculty mentors play a pivotal role in supporting students as they progress through the engineering curriculum (8). The concept of faculty-student interaction is based on the idea of a faculty's manner toward students – either open or closed, responsive or non-responsive which research suggests, has an impact on student achievement (13).

A 2007 MentorNet survey of 2,206 students in the STEM disciplines found that women and underrepresented minorities were significantly more likely than other students to report that mentoring was a critical component in the successful completion of their degree program (8). Only 20% of respondents considered it important to have a mentor of their own gender. However, those who reported this as important were more likely to be female. Undergraduate females were significantly more likely than males to consider all three mentoring roles (psychosocial, role modeling, academic/career) important but were also more likely (than males) to report a lack of mentoring in these areas (8). In particular, career and psychosocial mentoring helps women address perceived gender role barriers (4, 5, 11).

Faculty approachability and accessibility have a direct impact upon student perceptions of self-efficacy, which directly influence GPAs, academic confidence, and retention rates (3, 6, 7, 10, 11, 14). A study of nine schools of engineering found that positive faculty-student interactions were significantly related to satisfaction with an engineering major and the likelihood of employment in engineering ten years in the future (2).

The Project to Assess Climate in Engineering (PACE) study, based on survey and interview data from 21 engineering schools, recommended that faculty-student interactions be improved in a variety of capacities at 17 engineering schools, particularly in the first two years of study to improve retention (9).

Undergraduate students reported mentoring to be most helpful in the areas of study skill development and job attainment skills (8). Faculty mentors can also help students to make connections between current coursework and future engineering challenges, both academic and professional (1). This type of faculty interest in their students' progress is a fundamental component of mentoring (4). In fact, a student may, and ideally should, have multiple mentors, who play varied roles in mentoring that individual (1,11). The types of characteristics students look for in mentors are: a nonthreatening encouraging role model, a faculty member who freely offers advice, and one who respects students as individuals and assists them in overcoming difficult challenges (8). Positive interactions between faculty and students can have a profound impact on both students' academic performance and on their perceptions of self-efficacy and enhance the likelihood of students persisting in engineering.

ENGAGE will work with teams from 30 engineering schools to improve faculty-student interaction, during the 1st and 2nd year when students are most vulnerable to leave engineering as a strategy to improve undergraduate retention. Resources and materials to improve faculty-student interaction will be available on the ENGAGE website.

References

1. Amelink, C. (2009). *Overview: Mentoring and Women in Engineering*. SWE-AWE Applying Research to Practice Series, CASEE Overviews.
2. Amelink, C. and Creamer, E. (2010). Gender Differences in Elements of the Undergraduate Experience that Influence Satisfaction with the Engineering Major and the Intent to Pursue Engineering as a Career. *Journal of Engineering Education*. (99)1: 81-92.
3. American Society for Engineering Education. (2009). *Creating a Culture for Scholarly and Systematic Innovation in Engineering*.
4. Chen, H., Lattuca, L. & Hamilton, E. (2008). Conceptualizing Engagement: Contributions of Faculty to Student Engagement in Engineering. *Journal of Engineering Education*. (97)3.
5. Chesler, N. & Chesler, M. (2002). Gender-Informed Mentoring Strategies for Women Engineering Scholars: On Establishing a Caring Community. *Journal of Engineering Education*. (91)1.

6. Goodman, I.F. & Cunningham, M.L. (2002). *Final Report of the Women's Experiences In College Engineering (WECE) Project*.
7. Lotkowski, V.A., Robbins, S.B., and Noeth, R.J.(2004). The Role of Academic and Non-Academic Factors in Improving College Retention. ACT, Inc.
www.act.org/research/policymakers/pdf/college_retention.pdf
8. MentorNet. (2008). *Students' Perceptions of the Value and Need for Mentors as They Progress Through Academic Studies in Engineering and Science*. A report to the National Science Foundation.
www.mentornet.net/documents/about/results/evaluation/.../index.aspx
9. Metz, S.S., Brainard, S.G., and Litzler, E. (2010). *Extending Research Into Practice: Results From The Project To Assess Climate In Engineering (PACE)*. Proceedings of the American Society for Engineering Education 2010 Annual Conference, Session AC 2010-723.
10. Micomonaco, J. and Stricklen, J. (2010). Toward a Better Understanding of Academic and Social Integration: A Qualitative Study of Factors Related to Persistence in Engineering. Proceedings of the American Society for Engineering Education 2010 Annual Conference, Session AC 2010-1467.
11. National Academy of Engineering. (2009). *New Directions in Engineering Excellence: Keeping Students Engaged*.
12. Pfund, C., Pribbenow, C.M., Branchaw, J., Lauffer, S.M., Handelsman, J. (2006) The Merits of Training Mentors. *Science*. (311), 473-474.
13. Vogt, C.M. (2008). Faculty as a critical juncture in student retention and performance in engineering programs. *Journal of Engineering Education*. (97)1: 27-36.
14. Winters, K. Matusovich, H. and Streveler, R. (2010). How Student-Faculty Interactions Influence Student Motivations: A Longitudinal Study Using Self-Determination Theory. Proceedings of the American Society for Engineering Education 2010 Annual Conference, Session AC 2010-1107



This material is based upon work supported by the National Science Foundation (NSF) under Grant No. 083306. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of NSF.