Recommended Readings

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Active and Peer Learning

Dasgupta, N., McManus Scircle, M., & Hunsinger, M. (2015). *Female peers in small work groups enhance women's motivation, verbal participation, and career aspirations in engineering*. Retrieved from www.pnas.org/content/early/2015/04/03/1422822112

This article found that groups that are majority women (3/4) were more effective at promoting participation than equal representation or minority representation. Important when considering composition of teams for group projects.

Rath, K. A., Peterfreund, A. R., Xenos, S. P., Bayliss, F., & Carnal, N. (2007). Supplemental instruction in introductory biology I: Enhancing the performance and retention of underrepresented minority students. *CBE–Life Sciences Education*, *6*(3), 203–216.

Supplemental instruction (as well as facilitated study groups) are more effective than tutoring in many contexts because these approaches normalize and integrate the help in a pro-active, targeted manner. SI or FSG programs do not mean one should eliminate tutoring; however, SI and FSG can buffer many students within gateway courses as well as faculty time. A worthy investment.

Haak, D. C., HilleRisLambers, J., Pitre, E., & Freeman, S. (2011). Increased structure and active learning reduce the achievement gap in introductory biology. *Science*, *332*(6034), 1213–1216.

The way a course is organized, including regular homework assignments and chances in-class to work through problems with feedback, can make a difference in performance and understanding. A number of articles (Eddy & Hogan, 2014) have examined course structure and active learning with similar results. Reading these carefully can help with syllabus design and rethinking the use of class time.

Advising/Difficult Conversations

Cohen, G. L., Steele, C. M., & Ross, L. D. (1999). The mentor's dilemma: Providing critical feedback across the racial divide. *Personality and Social Psychology Bulletin*, 25, 1302-1318.

This article recommends that professors combine high standards with an explicit communication of belief in the student to achieve a higher standard when giving critical feedback. This can help to buffer ambiguity regarding the intent of critical feedback particularly when involving a cross-race interaction.

Crosby, J.R., & Monin, B. (2007). Failure to warn: The effect of race on warnings of potential academic difficulty. *Journal of Experimental Social Psychology*, *43*, 663-670.

Although the study is based on a simulated advising situation, the implications of the findings are relevant to advisors. This helps to explain why White advisors may avoid

giving critical feedback (failing to warn) to advisees of color for fear of looking racist even when that feedback could have been helpful.

Rattan, A., Good, C., & Dweck, C. S. (2012). "It's ok—not everyone can be good at math": Instructors with an entity theory comfort (and demotivate) students. *Journal of Experimental Social Psychology*, *48*(3), 731–737.

Documents what researchers call "comfort feedback" or the false reassurance that certain students (such as women in math) do not need to worry about poor skill development or performance. Advocates for growth mindset and the encouragement of skill development.

Packard, B. W., Tuladhar, C., & Lee, J. (2013). Advising in the classroom: How community college STEM faculty support transfer-bound students. *Journal of College Science Teaching*, *42*(4), 54-60.

This article focuses on the ways in which faculty embed advising messages within their class time (at only 30 minutes over the entire semester) suggesting this approach reaches a wider array of students than does meeting with students individually in meetings. Strategy can be extended beyond transfer students.

Mentoring—Peer and Faculty/Professional

Dasgupta, N. (2011). Ingroup experts and peers as social vaccines who inoculate the self-concept: The stereotype inoculation model. *Psychological Inquiry*, *22(4)*, 231–246.

Suggests that peers can provide positive buffering to identity and belongingness even in situations where the field itself (and professionals within them) are less diverse.

Carlone, H. B., & Johnson, A. (2007). Understanding the science experiences of successful women of color: Science identity as an analytic lens. *Journal of Research in Science Teaching*, *44*(8), 1197–1218.

Promotes the concept of "recognition" by experts (e.g., faculty and staff) as a key predictor of persistence for underrepresented students, beyond the student's interest, competency, or performance.

Schwartz, J. (2012). Faculty as undergraduate research mentors for students of color: Taking into account the costs. *Science Education*, *96*, 527–542.

Documents the costs incurred by faculty who became research mentors for students of color. A good piece to raise policy questions at the institutional level for supporting faculty mentoring of students in equitable and effective ways.

Kasprisin, C. A., Boyle Single, P., Single, R. M., & Muller, C. B. (2003). Building a better bridge: Testing e-training to improve e-mentoring programs for diversity in higher education. *Mentoring & Tutoring: Partnerships in Learning*, *11*(1), 67–78.

This article explains why training mentors is so important for a mentoring program. MentorNet has tested each module and does not run a program longer than it has modules for to promote mentee/mentor interaction.

Packard, B. W., Marciano, V., Payne, J. M., Bledzki, L. A., & Woodard, C. T. (2014). Negotiating peer mentoring roles in undergraduate research lab settings. *Mentoring & Tutoring: Partnerships in Learning, 22*(5), 433–445.

If peer mentors are not validated and trained by their faculty, they may be perceived as less credible and have a less positive experience.

Wilson, Z., Holmes, L., deGravelles, K., Sylvain, M., Batiste, L., Johnson, M., . . . Warner, I. (2012). Hierarchical mentoring: A transformative strategy for improving diversity and retention in undergraduate STEM disciplines. *Journal of Science Education & Technology*, *21*(1), 148–156.

Explains the LA-STEM program and how the peer mentoring operates effectively. In the LA-STEM program, they have a pathway to recruit underperforming students after their first year of courses.

Stolle-McAllister, K., Sto Domingo, M. R., & Carrillo, A. (2011).The Meyerhoff way: How the Meyerhoff scholarship program helps Black students succeed in the sciences. *Journal of Science Education and Technology*, *20*(1), 5–16.

Documents key element of the Meyerhoff scholars program and how the scholars fared better than a comparison group of college students.

Climate and Intersectionality

Cheryan, S., Plaut, V. C., Davies, P. G., & Steele, C. M. (2009). Ambient belonging: How stereotypical cues impact gender participation in computer science. *Journal of Personality and Social Psychology*, *97*(6), 1045–1060.

Highlights how the environment including posters and role models provide messages of who belongs.

Griffin, K. A., Cunningham, E. L., & George Mwangi, C. A. (2016). Defining diversity: Ethnic differences in Black students' perceptions of racial climate. *Journal of Diversity in Higher Education, 9*(1), 34-49.

Identified differences in perceptions of racial climate and diversity, stereotypes and marginalization as associated by second generation and first generation immigrants.

Harackiewicz, J. M., Canning, E. A., Tibbetts, Y., Giffen, C. J., Blair, S.S., Rouse, D. I., & Hyde, J. S. (2014). Closing the social class achievement gap for first-generation college students in undergraduate biology. *Journal of Educational Psychology*, 106(2), 375–389.

This article documents that values affirmation research is not only relevant for students of color in educational settings generally, but also for first-generation college students in science. This suggests that first-generation college students may perceive a limited sense of belongingness that can impede their performance on exams. Having students write about things they are good at or value can help to mitigate negative performance; similar results have been suggested by introducing growth mindset beliefs in class.

Johnson, D. R. (2012). Campus racial climate perceptions and overall sense of belonging among racially diverse women in STEM majors. *Journal of College Student Development, 53*(2), 336-346.

This paper drew upon nearly 2000 women pursuing STEM fields who were enrolled in the 2004 National Study of Living-Learning Programs. Their sense of belongingness was related to overall campus racial climate as well as the residential hall climate.

Ro, H. K., & Loya, K. I. (2015). The effect of gender and race intersectionality on student learning outcomes in engineering. *Review of Higher Education, 38*(3), 359-396.

Using a dataset with over 5,000 student participants, the researchers disaggregate the data illustrating differences across gender and race, and at the intersection of gender and race.

Wilson, R. E., & Kitteson, J. (2013). Science as a classed and gendered endeavor: Persistence of two white female first-generation college students within an undergraduate science context. *Journal of Research in Science Teaching, 50*(7), 802-825.

Explains how the intersection of class and gender play out as students pursue their STEM goals.