Sense of Belonging in Active Learning STEM courses

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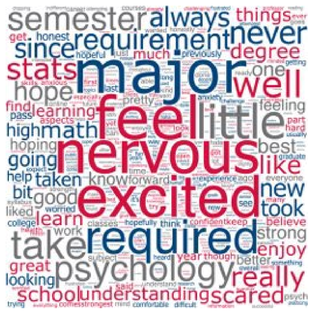
1) How can we help all students be successful, regardless of their background?



Many students feel intimidated and unprepared for Science, Technology Engineering and Math (STEM) courses even though they are interested in health professions. In an open enrollment university, students come from varied backgrounds, and some may have limited prior exposure to STEM fields. Many students report feeling nervous and excited for introductory STEM courses

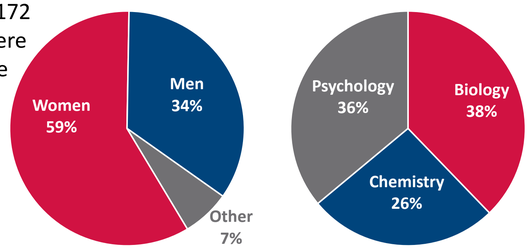
2) Why is ***Sense of Belonging*** important?

One factor that may influence student success is ***Sense of Belonging***. Sense of belonging predicts whether students will continue in STEM fields after an introductory STEM course. It fosters connection, inclusiveness, and helps students feel seen and understood. It reduces the fear of isolation to promote growth in student's academic and personal lives by creating a supportive environment that enables individuals to thrive. Students who feel a high sense of belonging are more likely to continue taking STEM classes.

Edwards, J. D., Torres, H. L., & Frey, R. F. (2023). The effect of social belonging on persistence to general chemistry 2. *Journal of Chemical Education, 100*(11), 4190-4199. https://doi.org/10.1021/acs.jchemed.2c01048

3) Who participated in our study?

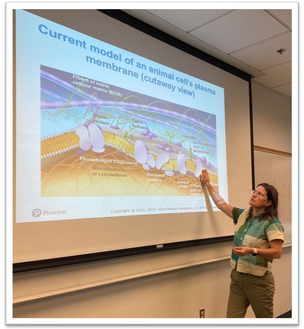
The participants in this study were 172 students who were enrolled in active learning STEM courses.

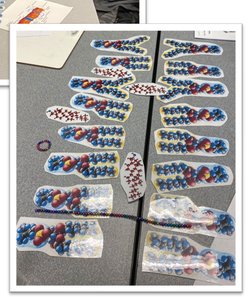


4) What is ***Active Learning***?

Active learning involves two-way interactions between instructors and students. Instructors spend less time lecturing (one-way teaching) and students spend most of their time in class completing activities designed to enhance learning. Biology, chemistry, statistics and neuroscience courses were taught by faculty trained in active learning teaching approaches.

Faculty spend less time in class lecturing in class (below).





In these photos, students are learning the structure of cell membrane. Students work in groups building models and solving problems (above & right).

Neuroscience students in psychology study the brain by labeling 3-D brain models and dissecting sheep brains in class. (above)

5) Does an ***Active Learning*** approach foster sense of belonging?

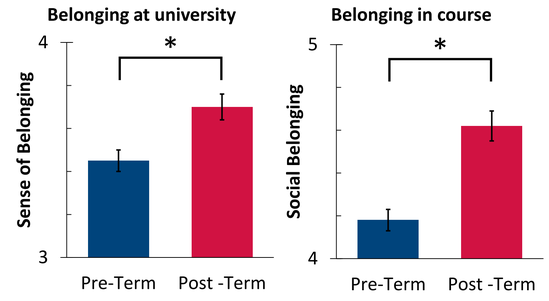
Pre-term survey → Active Learning class → Post-term survey

Sense of belonging was measured using two Likert-type scales:

1. **Sense of Belonging at the University** (Cronbach's α = .89)
Ten, 5-point questions measuring the general sense of belonging at the university
For example, "How welcoming have you found MSU Denver to be?"

2. Sense of Belonging in the Classroom (Cronbach's α = .84)
Six 6-point statements measuring the general sense of connectedness in a particular to STEM course
For example, "Setting aside my performances in class, I feel like I belong in this course."

6) ***Active Learning*** fosters ***Sense of Belonging***



Active Learning → Sense of Belonging → Student Success

Sense of belonging increased over the course of the semester for both **at the University and in the Classroom .** Error bars represent the standard error of the mean (*p < .05). This analysis is part of an ongoing study on the effects of active learning practices on other factors related to student success, such as self-efficacy and mindset.

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