

Academic Engagement of Undergraduate Students Majoring in STEM

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Abstract

Research on the educational outcomes of students in Science, Technology, Engineering, and Math (STEM) continues to be needed given the persistent underrepresentation of women and minorities in STEM fields. Prior research has determined that academic engagement is a predictor of student academic success and persistence within higher education. However, little research has been conducted on underrepresented students' academic engagement within STEM. Using the results of surveys administered at ten large, public, research universities, the authors examine the relationships between academic engagement, gender, race/ethnicity, and students' major, with specific attention given to underrepresented students in STEM. The findings suggest that women and students of color in STEM fields have similar levels of academic engagement and, for some measures, have higher levels of academic engagement than that of majority students in STEM fields. The findings provide a basis for understanding academic engagement patterns of underrepresented students in STEM, while also informing programmatic interventions that seek to serve women and students of color in STEM.

Purpose of the Study

- ❖ Underrepresentation and retention rates of women and students of color remains prevalent in STEM fields.
- ❖ Academic engagement is one of many factors that impact post-secondary persistence of students.
- ❖ Investigate levels of academic engagement of undergraduate students by type of major (STEM vs. non-STEM)
- ❖ Investigate differences in engagement by gender and race/ethnicity
- ❖ Create a baseline from which to study how engagement might change over time.

Research Questions

- ❖ How are students engaged academically at their university?
- ❖ How does academic engagement differ by type of major? By gender? By race/ethnicity?



This material is based on work supported by NSF under Grant No. 0856309. Any opinions, findings, and conclusions or recommendations are those of the authors and do not necessarily reflect the views of NSF.

Data & Methodology

The data stems from two iterations of an online survey of undergraduate students from ten large, public, research universities administered in 2010 & 2011. The survey asked questions about students' socio-demographic background, pre-college experiences, college experiences, majors, and post-college plans. Questions pertaining to students' academic engagement are used for the basis of analysis.

Students were classified into STEM and Non-STEM majors. STEM majors included:

- ❖ Science & Engineering
- ❖ Agricultural & Biological Sciences
- ❖ Health & Psychology

Descriptive statistics and cross-tabulations were used to answer research questions. Statistically significant findings are reported ($p < 0.05$).

The Academic Engagement measures included the following:

- ❖ How often do you work with other students on school work outside of class?
- ❖ How often do you discuss your ideas from your readings or classes with students outside of class?
- ❖ How often do you discuss ideas from your readings or classes with students within your major?
- ❖ How often do you discuss ideas from your readings or classes with faculty outside of class?
- ❖ How often do you work harder than you thought you could to meet an instructor's expectations?
- ❖ How often are you involved in projects that allow you to express your creativity (e.g. research)?
- ❖ Academic Engagement Index (derived from measures above)

Profile of Participants (n=4,561)

Variables	N	%
Gender		
Male	1,854	40.60%
Female	2,669	58.50%
Prefer not to Answer	38	0.80%
Race and Ethnicity		
White, not Hispanic	3,320	72.80%
Asian or Pacific Islander	561	12.30%
Hispanic or Latino/a	197	4.30%
Black, not Hispanic	176	3.90%
Other Race/Ethnicity	154	3.40%
Prefer not to Answer	130	2.90%
Native American or Alaskan Native	23	0.50%
Major Category		
STEM	4,066	89.10%
Non-STEM	495	10.90%

Source: Project STEP-UP Survey, 2011. Authors' Calculations.

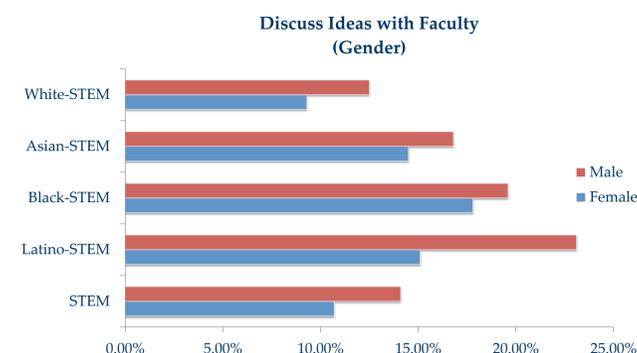
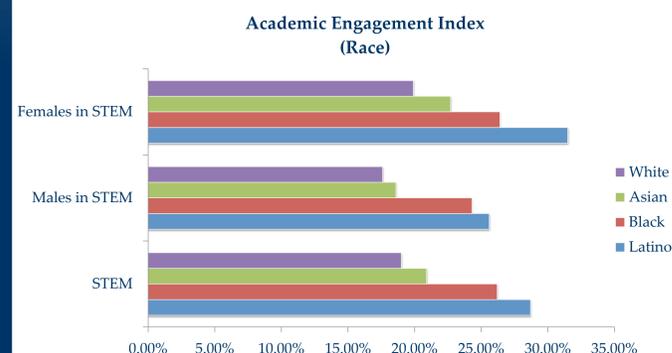
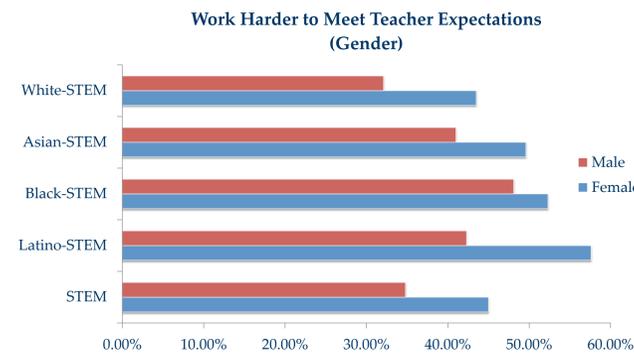
Results

Overall

- ❖ More students in STEM report working with other students outside class at least twice a week or more, as compared to students in non-STEM majors.
- ❖ A higher percentage of students in STEM majors reported discussing ideas with students in their major at least twice a week or more, as compared to students in non-STEM majors

Intersection of Race and Gender

- ❖ A higher percentage of Black males in STEM reported working with other students outside of class twice a week or more, as compared to Latino, Asian, and white males in STEM.
- ❖ A higher percentage of Latinas overall reported working with other students outside of class twice a week or more, as compared to Black, Asian, and white females overall.
- ❖ A higher percentage of Black females reported discussing ideas with students within their major once a month or less, as compared to Asian, Latina, and white females.



Conclusions & Implications

Positives

- ❖ Both women and underrepresented students of color in STEM have high levels of academic engagement

Negatives

- ❖ Women show less engagement with faculty, especially in STEM
- ❖ Women and underrepresented students of color in STEM report having to work harder to meet teacher expectations

Implications

- ❖ Higher levels of academic engagement may be an unintended consequence of women and students of color having to work harder to meet teacher expectations
- ❖ Highlights need to examine motivations for students' academic engagement
- ❖ Informs programs, services, or field-specific interventions to increase engagement levels for underrepresented students
- ❖ Reinforces the need for culturally conscious student programs and training of professors in STEM fields

Limitations

- ❖ Small sample size of racial and ethnic minority students limited the analysis
- ❖ The number of responses varied across each campus
- ❖ The survey was long, and despite being offered an incentive, some students did not complete the survey
- ❖ Generalizations of findings limited due to uniqueness of universities featured in study

Future Research

- ❖ Examine relationship between academic engagement and persistence within STEM fields
- ❖ Investigate differences of academic engagement by class status (e.g., freshman)
- ❖ Examine students' social and academic engagement as a combined measure of total engagement
- ❖ Perform longitudinal analysis to explore changes in academic engagement over time

