

A comparison of STEM students' expectations for engagement and faculty teaching practices



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Agenda

- Engaging teaching practices in first-year STEM
- BCSSE & FSSE
- Data and sample
- STEM student engagement expectations
- STEM faculty teaching practices
- Aligning expectations and practice

Engaging teaching practices

What are some challenges with using engaging teaching practices with first-year STEM students?

Does anyone have any great success stories about using engaging teaching practices with first-year STEM students?

NSSE

- National Survey of Student Engagement
 - Measures the time and energy that students invest in activities known to relate to student learning and development
 - More specifically, the survey explores aspects of academic challenge, learning with peers, experiences with faculty, campus environment, and high-impact practices
 - Since the launch of the survey, more than 1,600 bachelor's-granting colleges and universities in the United States and Canada have used NSSE
- NSSE has two companion surveys: FSSE and BCSSE

FSSE

- Faculty Survey of Student Engagement
 - Measures faculty (and other instructional staff) expectations and values for student engagement and their use of educational practices that are linked with high levels of learning and development
 - Covers parallel content to NSSE and additionally explores how faculty structure their time both in and out of the classroom
 - Faculty are instructed to select one course that they are teaching or have taught during the current school year about which they answer a variety of questions
 - Since its launch, more than 250,000 faculty members from over 800 institutions have participated in FSSE

BCSSE

- Beginning College Survey of Student Engagement
 - Explores entering college students' high-school academic and co-curricular experiences as well as their expectations for participating in educationally purposeful activities during the first college year
 - Covers content areas parallel with NSSE
 - Since its launch, more than 665,000 entering first-year students at 441 institutions across the United States and Canada have participated in BCSSE

Data & Sample

- Data for this session come from 68 institutions that participated in both FSSE and BCSSE during the 2013-2015 survey administrations
- FSSE
 - 1,028 STEM faculty teaching a lower-division course
- BCSSE
 - 12,711 incoming first-year students expecting to major in a STEM field
- STEM
 - Biological Sciences, Agriculture, & Natural Resources; Physical Sciences, Mathematics, & Computer Science; Engineering

Respondents

	First-Years (%)	Faculty (%)
Men	55	58
Women	45	38
Asian	8	7
Black or African American	8	5
Hispanic or Latino	7	3
White	65	74
Other or Multiracial	10	4
Biological Sciences, Agriculture, Natural Resources	44	30
Physical Sciences, Mathematics, Computer Science	22	62
Engineering	35	8

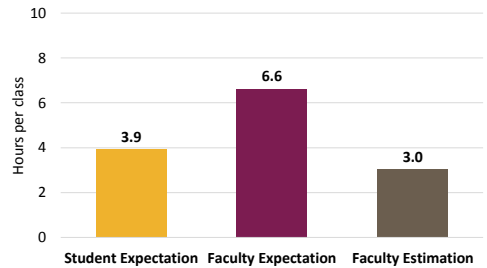
Time Spent Preparing for Class

How many hours do you think incoming first-year students *expect* to spend preparing for class in an average week?

How many hours do you think faculty *expect* lower-division students to spend preparing for class in an average week?

How many hours do you think faculty *actually* think lower-division students spend preparing for class in an average week?

Time Spent Preparing for Class

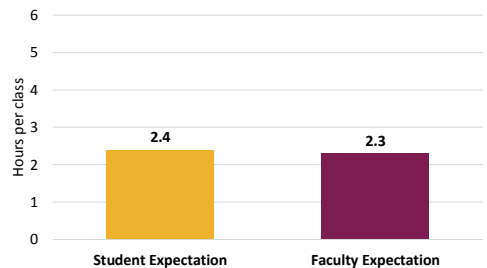


Time Spent Reading

How many hours do you think incoming first-year students *expect* to spend **reading** for class in an average week?

How many hours of **reading** do you think faculty *assign* lower-division students in an average week?

Time Spent Reading

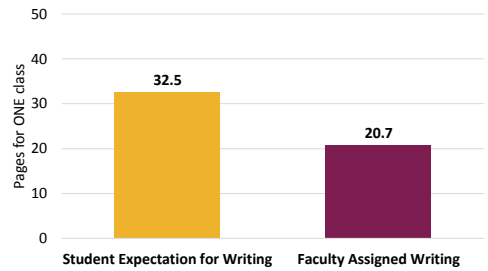


Writing: Pages

How many **pages of writing** do you think incoming first-year students *expect* to write for class in an average week?

How many **pages of writing** do you think faculty *assign* lower-division students in an average week?

Writing: Pages



Collaborative Learning

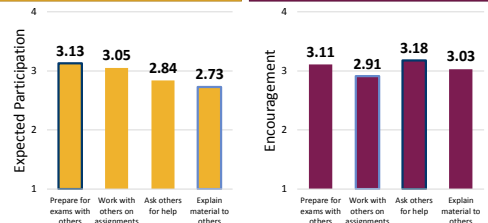
How much collaborative learning do incoming first-year students *expect* to do?

How much do lower-division faculty *encourage* collaborative learning?

1. Asking other students for help understanding course material
2. Explaining course material to other students
3. Preparing for exams by discussing or working through course material with other students
4. Work with other students on course projects or assignments

Collaborative Learning

4=Very often 2=Sometimes 4=Very much 2=Some
3=Often 1=Never 3=Quite a bit 1=Very little



Student Faculty Interaction

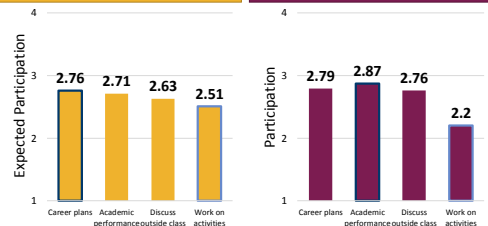
How much student-faculty interaction do incoming first-year students *expect* to do?

How much student-faculty interaction do lower-division faculty *participate* in?

1. Talking about student career plans
2. Working on activities other than coursework (committees, student groups, etc.)
3. Discussing course topics, ideas, or concepts outside of class
4. Discussing their academic performance

Student Faculty Interaction

4=Very often 2=Sometimes 4=Very often 2=Sometimes
3=Often 1=Never 3=Often 1=Never



Discussions with Diverse Others

How often do incoming first-year students *expect* to have discussions with diverse people?

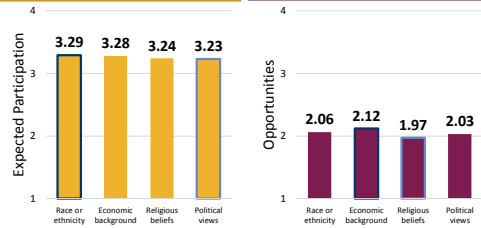
How much *opportunity* do students have to engage in discussions with diverse others?

1. People of a race or ethnicity other than the student's
2. People from an economic background other than the student's
3. People with religious beliefs other than the student's
4. People with political views other than the student's

Discussions with Diverse Others

4=Very often
3=Often
2=Sometimes
1=Never

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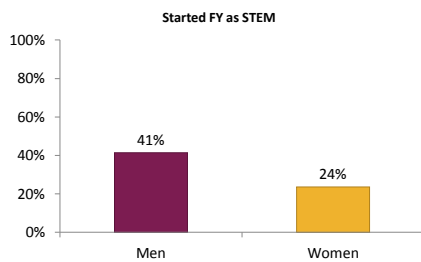
Overall Findings Overview

- Fairly parallel expectations and practice:
 - Time spent on reading
 - Collaborative Learning
 - Student Faculty Interaction
- Non-parallel expectations and practice:
 - Student expectations for time spent preparing for class are lower than faculty expectations, but on par with faculty perceptions of first-year engagement
 - Students expect to write more than faculty assign!
 - Student expectations for discussions with diverse others are much higher than faculty-provided opportunities

STEM Attrition

- Overall, about 28% list a STEM field as their major at some point during their undergraduate career (NCES, 2014)
- However, females and students of color switch out of a STEM major at higher rates compared to their peers (NCES, 2014).
- How might student expectations help us to learn more about the students who do not persist.

Differences by Gender



Differences by Gender

How do you think students' *expectations* for these activities might vary by gender?

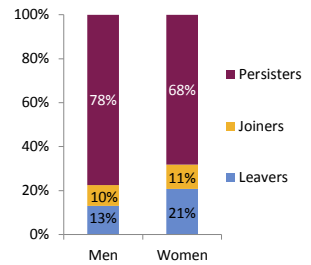
- Time spent preparing for class
- Time spent reading
- Pages of assigned writing
- Collaborative learning
- Student-faculty interaction
- Discussions with diverse others

Differences by Gender

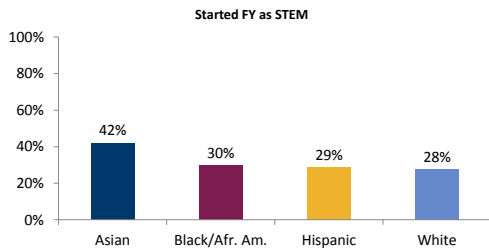
- Men and women students expect to spend about the same amount of time preparing for class
- However, women students generally expect to do more:
 - About an hour more of reading
 - About ten more pages of writing
 - More collaborative learning ($d = .2$)
 - More student-faculty interaction ($d = .3$)
 - More discussions with diverse others ($d = .2$)

Differences by Gender

However, these same women are more likely to choose a non-STEM major by the end of their first year.



Differences by Race



Differences by Race

How do you think students' *expectations* for these activities might vary by racial/ethnic identification?

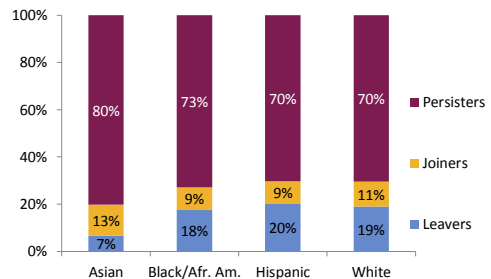
Asian; Black or African American; Hispanic or Latino; White

- Time spent preparing for class
- Time spent reading
- Pages of assigned writing
- Collaborative learning
- Student-faculty interaction
- Discussions with diverse others

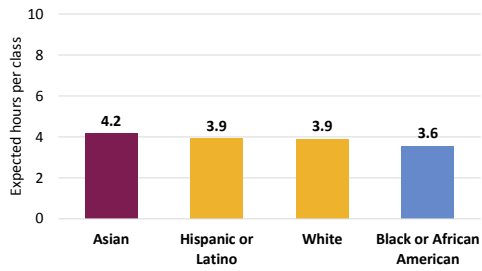
Differences by Race

- Black or African American students expect to spend the least amount of time preparing for class
- Asian and White students expect to spend the least amount of time reading and write the fewest number of pages
- Black or African American and Hispanic or Latino students expect to do the most collaborative learning and student-faculty interaction
- Students consistently expect high levels of discussions with diverse others

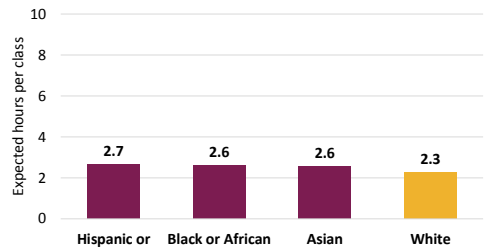
Differences by Race



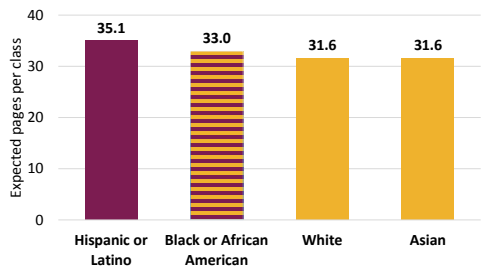
Differences by Race: Time Spent Preparing



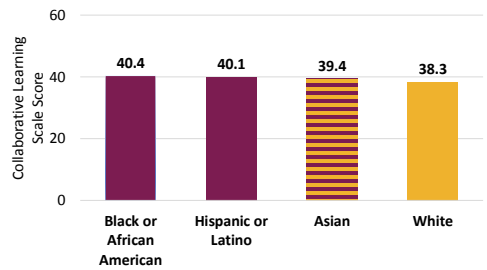
Differences by Race: Time Spent Reading



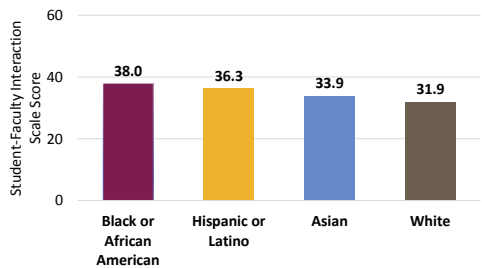
Differences by Race: Written Pages



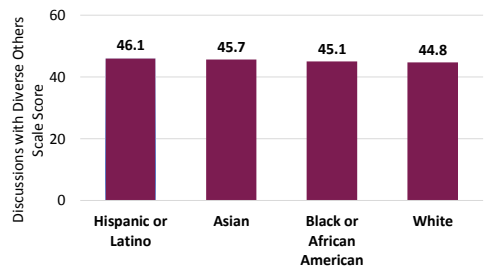
Differences by Race: Collaborative Learning



Differences by Race: Student Faculty Interaction



Differences by Race: Discussions with Diverse Others



Discussion

**What about any of these findings is most reassuring?
Distressing?**

**What can we do to maintain high levels of parallel
expectations and practice?**

**What can we do to create increased parallelism between
expectations and practice?**

**What challenges will we face in trying to align first-year
expectations and faculty practice?**

Additional thoughts or questions?

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