

Fostering Dissemination Skills in STEM Doctoral Students: Tips for the Ph.D. Student and the General Impact on STEM Undergraduates

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INTRODUCTION

Context

- Graduate students are placed as undergraduate instructors
 - Benefits the universities & graduate students
 - Allows for lighter teaching loads of full time faculty members
 - Creates flexibility in faculty teaching schedules.
 - Offers graduate students the opportunity to be the instructor over a class
 - Hones desirable skill sets of future employers



INTRODUCTION

Where the Problem Arises

- Graduate Students are not provided with resources to prepare them to properly to oversee a course.
- Assigned a course with little to no training and expected to have the skills of an experienced professor
 - Skills will not appear instantly
 - Develop over time from experience
- Universities and the graduate students will not receive the full benefits



INTRODUCTION

Overcoming the problem

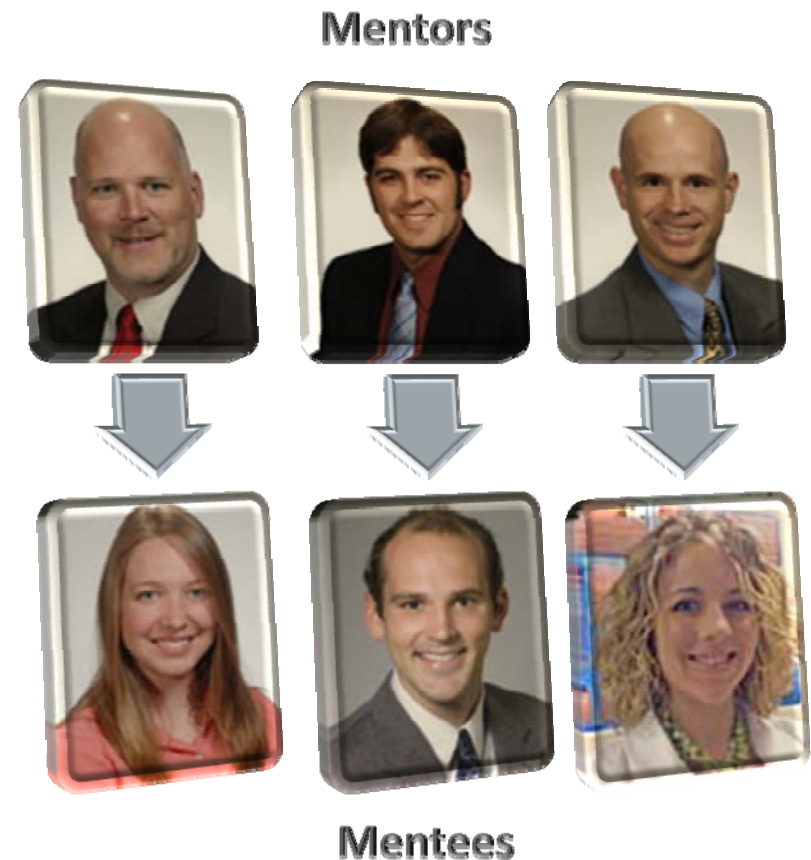
- Graduate student development can be accelerated ...
 - Through an understanding of successful lecturing practices
 - By participating in a mentorship program
- Develop a model achieving these goals





MODEL DEVELOPMENT

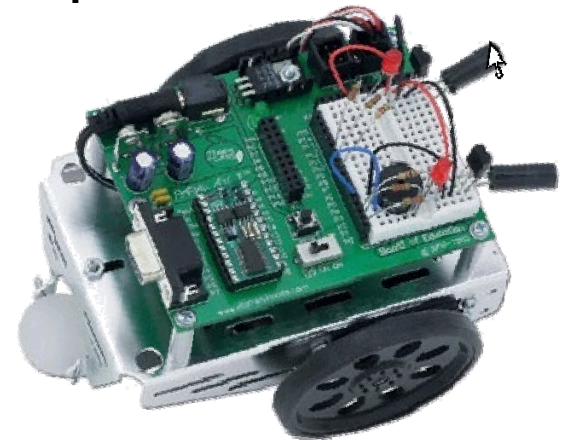
- **Quarter 1/Semester 1:** *The graduate student will...*
 - Pair with an experienced faculty mentor
 - Shadow mentor and observes classroom technique
 - Begin to teach some lessons while mentor provides feedback
 - Teach entire lessons by the end of the quarter
- **Quarter 2/Semester 2:** *The graduate student will...*
 - Be the sole instructor of a class
 - Maintain contact with mentor for advice in classroom





METHODOLOGY

- 3 engineering graduate students
- 3 faculty mentors
- ENGR 120 – course 1 in the first year integrated engineering sequence
 - Lecture/Lab
 - Living with the Lab
 - Established Curriculum
 - Available Online





METHODOLOGY

- **Research Question:** What is the graduate student instructors' impact on the undergraduate students?
- **Instrument:** 21 question survey
 - 5 point Likert Scale
 - 5 Question Categories
 - AVOVA Statistical Analysis
- **Sample Set:** 3 ENGR 120 sections containing 69 undergraduate freshmen
 - 10 female
 - 36 male
 - 23 unknown



Questions

1. I am more comfortable with the graduate assistant because he/she is closer to my age.
2. The graduate assistant was more approachable than other faculty members.
3. I am more comfortable with the graduate assistant due to the student-status of the graduate assistant.
4. The instruction that I received from the graduate assistant was more effective than similar instruction from a faculty member.
5. I am more comfortable with my graduate assistant than the instructor due to gender.
6. It was evident that the graduate assistant had minimal college teaching experience.
7. I feel that the graduate assistant communicates effectively.
8. The graduate assistant improved in his or her ability to teach over the course of the quarter.
9. I would consider choosing a class taught by a graduate assistant in the future, even if one were also offered by a faculty member.
10. It is important that a graduate assistant dress professionally to gain the respect of the students.
11. I prefer a graduate assistant to teach my class instead of a faculty member.
12. I would be disappointed to have to take a class taught solely by a graduate assistant.
13. I feel the graduate assistant displayed mastery of the technical content delivered in this course.
14. The graduate assistant was a confident instructor.
15. The graduate assistant treated me with respect.
16. I am comfortable approaching the graduate assistant for help outside of class.
17. I have not felt discouraged about pursuing an engineering degree.
18. I will be an excellent engineer.
19. I have friends in engineering.
20. I can have a fulfilling career in engineering.
21. I feel like I belong in engineering.

Survey questions were categorized into five sections...

Perceived strengths of having graduate student instructors

Disparities in perceptions of graduate student instructors versus faculty instructors

Perceived affects of graduate student

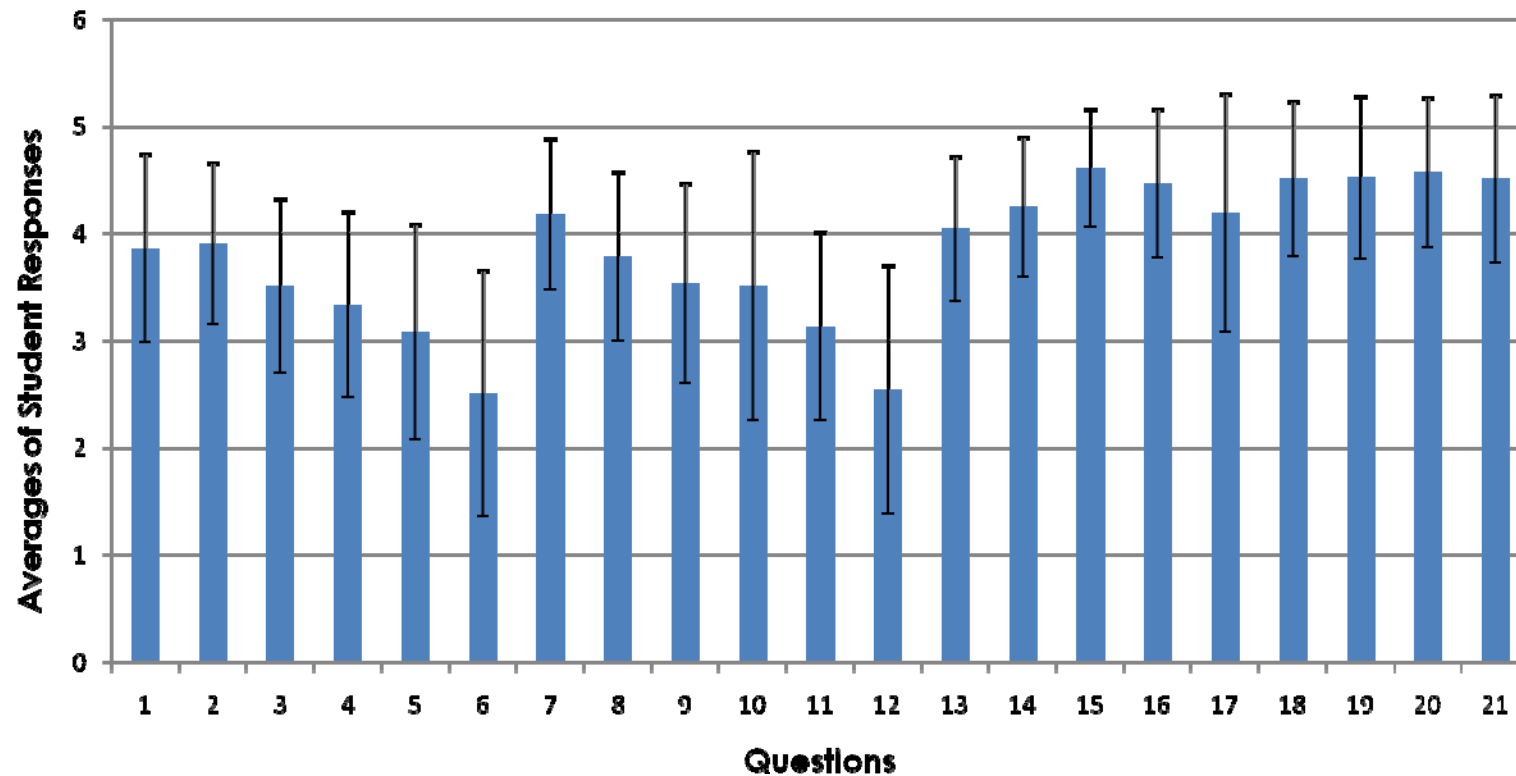
Graduate students' communication and teaching skills

Undergraduates personal experience in the curriculum



RESULTS

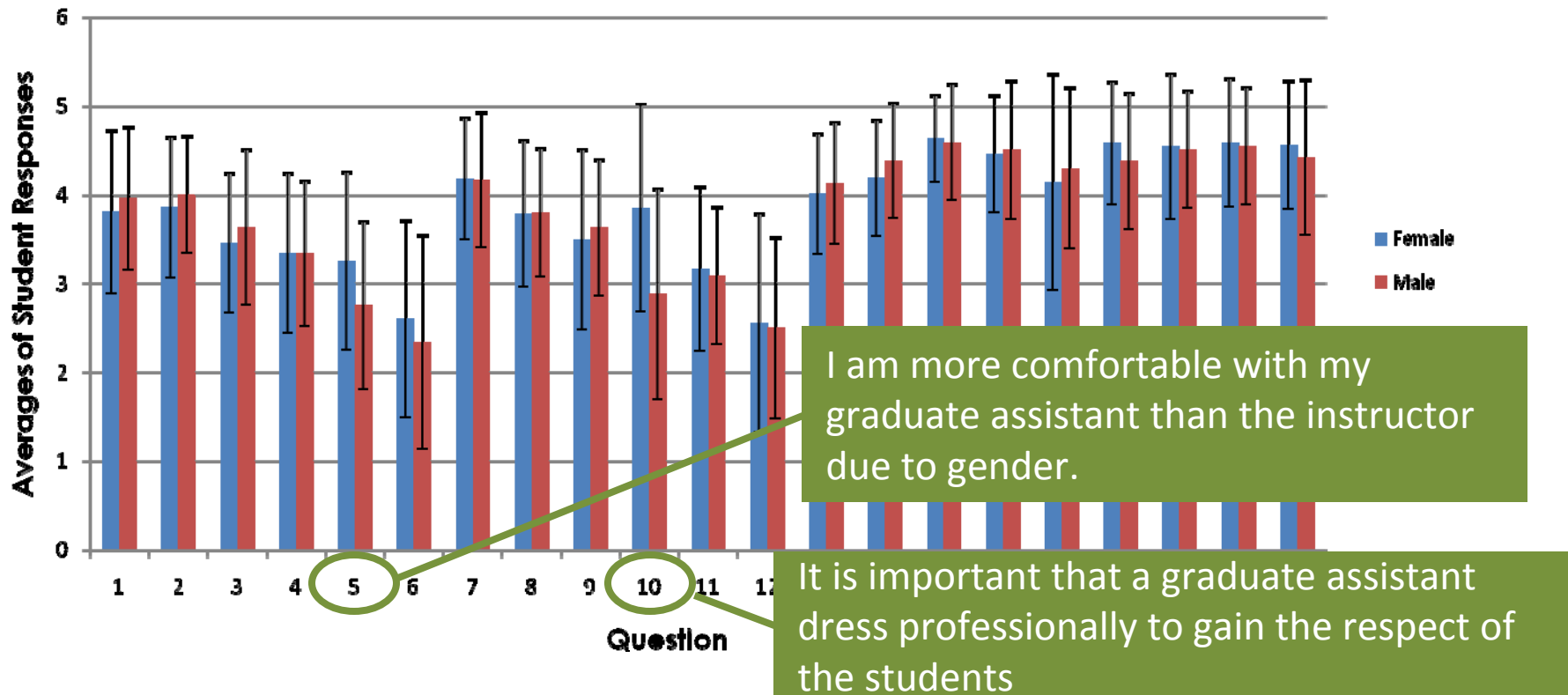
Combined Graduate Student Averages per Individual Question with Standard Deviation Error Bars





RESULTS

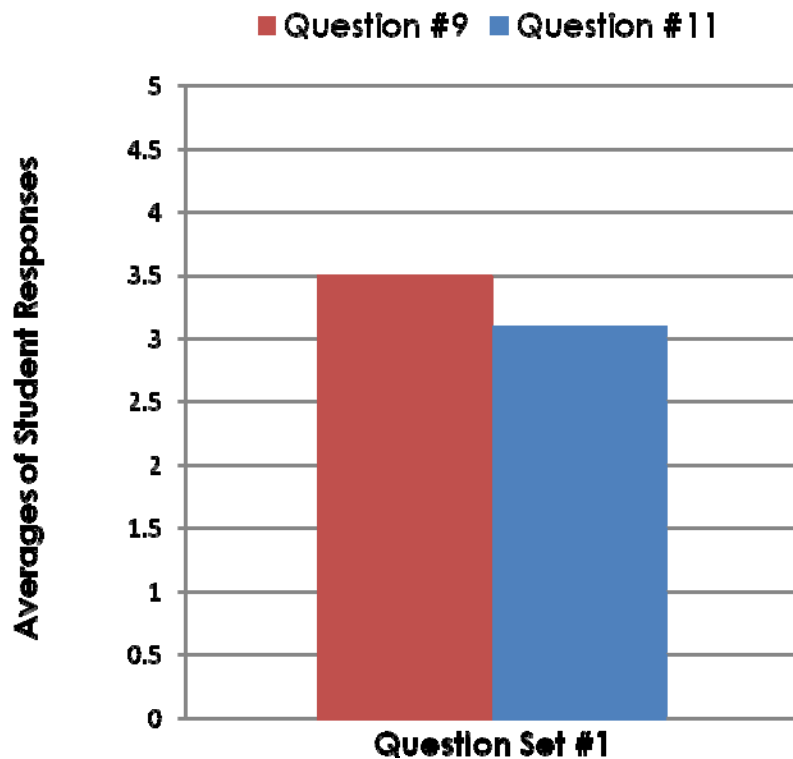
Averages of Survey Questions in Reference to Graduate Student Gender with Standard Deviation Error Bars





RESULTS

Category: Graduate Student Instructor versus Full Time Faculty

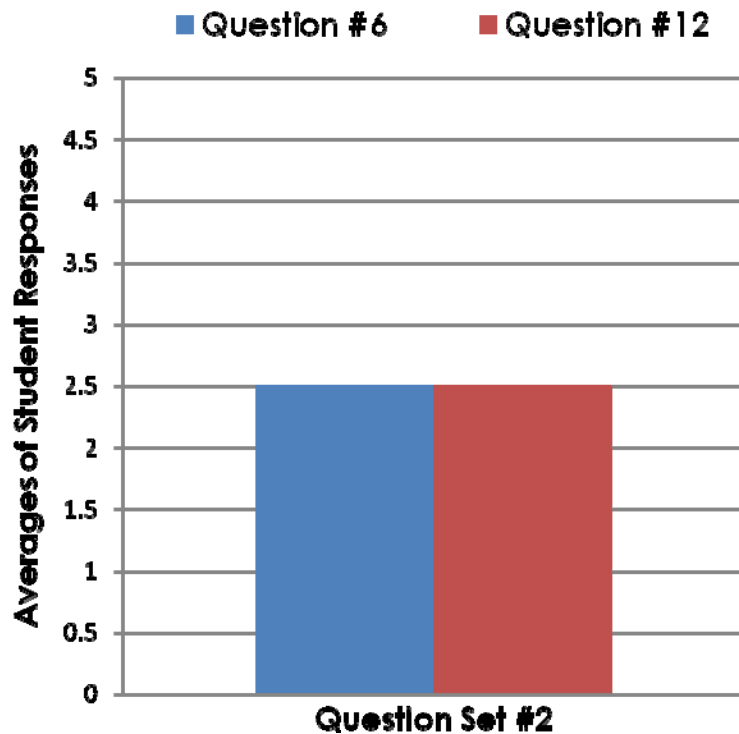


#9 I prefer a graduate assistant to teach my class instead of a faculty member.

#11 I prefer a graduate assistant to teach my class instead of a faculty member.



RESULTS

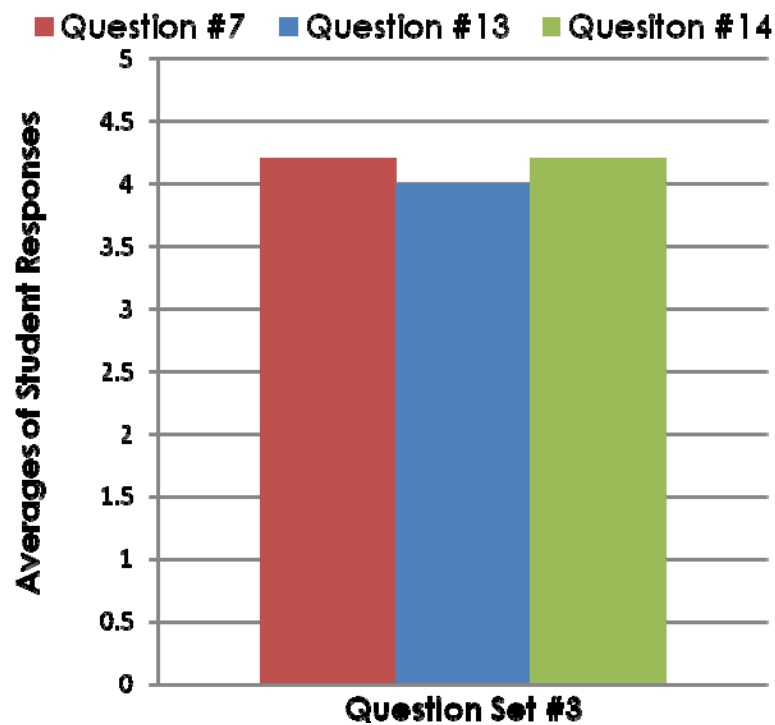


Category: Graduate students' communication and teaching skills (#6) & graduate student instructors versus faculty instructors (#12)

- #6 It was evident that the graduate assistant had minimal college teaching experience.
- #12 I would be disappointed to have to take a class taught solely by a graduate assistant.



RESULTS

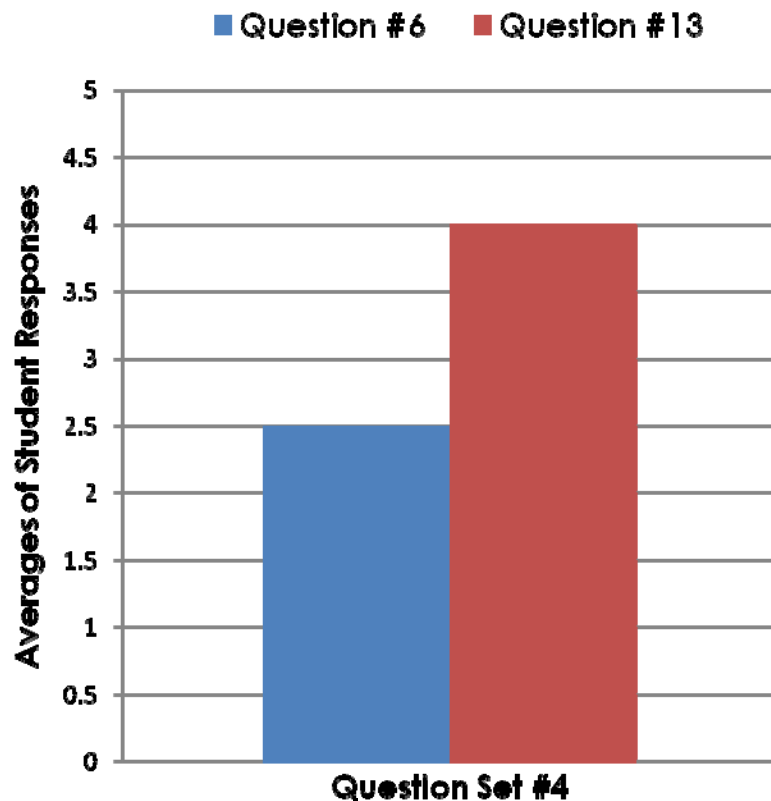


Category: Graduate students' communication and teaching skills

- #7 I feel that the graduate assistant communicates effectively.
- #13 I feel the graduate assistant displayed mastery of the technical content delivered in this course.
- #14 The graduate assistant was a confident instructor.



RESULTS



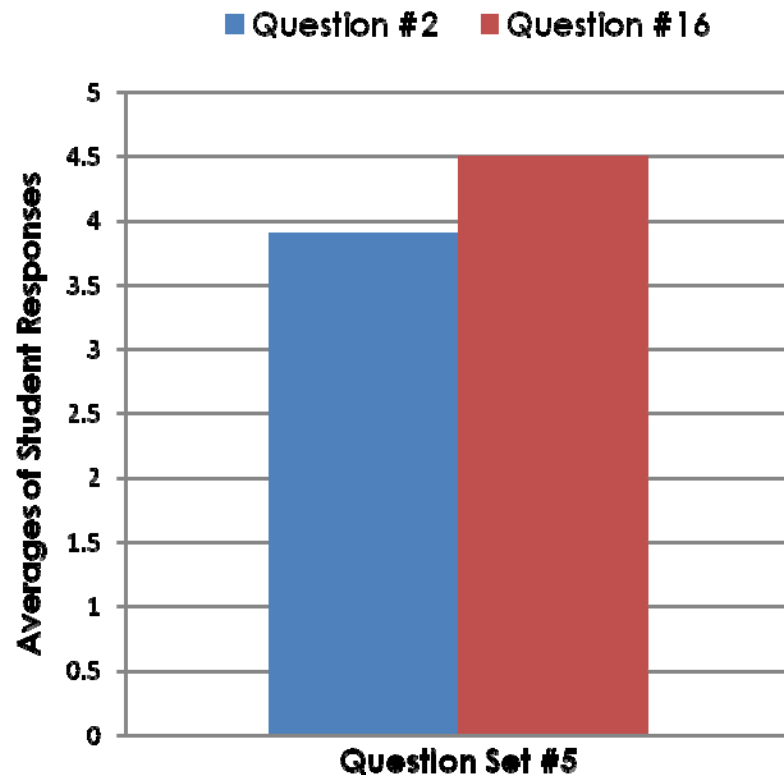
Category: Graduate students' communication and teaching skills

#6 It was evident that the graduate assistant had minimal college teaching experience.

#13 I feel the graduate assistant displayed mastery of the technical content delivered in this course.



RESULTS



Category: Perceived strengths of having graduate student instructors (#2) & Graduate students' communication and teaching skills (#16)

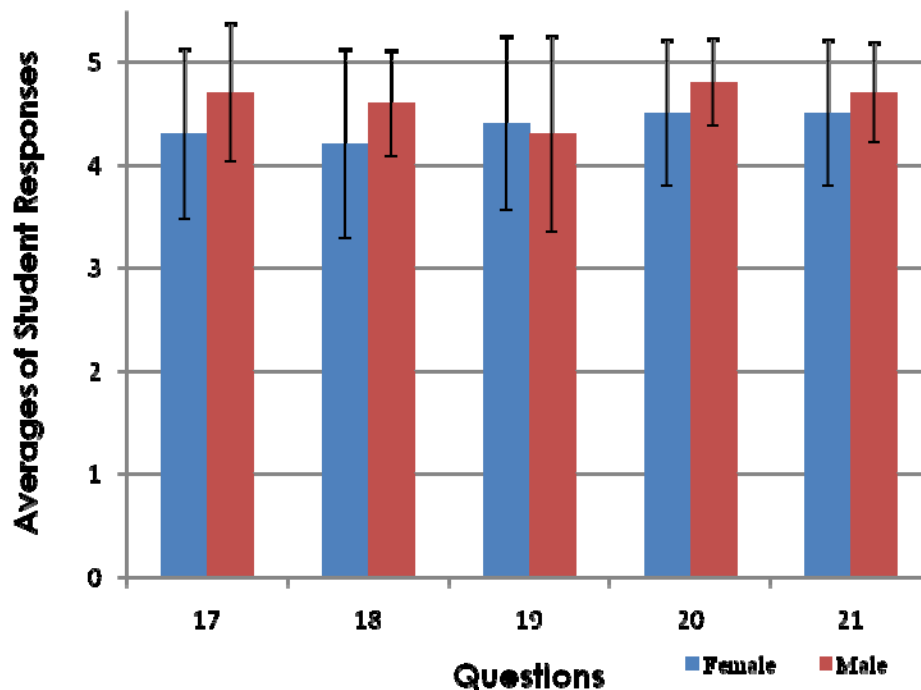
#2 The graduate assistant was more approachable than other faculty members.

#16 I am comfortable approaching the graduate assistant for help outside of class.



RESULTS

Averages of Questions 17-21 In Reference to Student Gender with Standard Deviation Error Bars



Category:

Undergraduates personal experience in the curriculum

- #17 I have not felt discouraged about pursuing an engineering degree.
- #18 I will be an excellent engineer.
- #19 I have friends in engineering.
- #20 I can have a fulfilling career in engineering.
- #21 I feel like I belong in engineering.



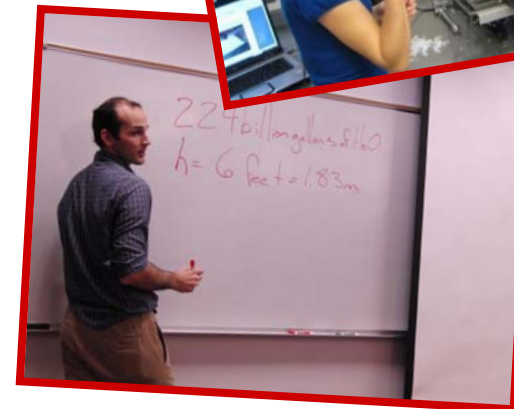
CONCLUSION

Overall results of the Survey indicated...

- Validation the positive influences of the graduate instructors on the first-year college students

Future Research

- Compare undergraduates' gender responses with those having grad student instructors versus faculty instructors (#17-#21)
- Compare successes of graduate students who do not participate in mentorship model versus those who do





CONCLUSION

Tips For Graduate students instructors

1. Focus on the students' learning of the material as opposed to the graduate student's performance as an instructor.
2. Teach the curriculum alongside a professor and use their feedback
3. Exhibit confidence to gain respect.
4. Become comfortable with content knowledge through lecture preparation, practice, and proven lesson plans.
5. Dress professionally.
6. Be comfortable with making mistakes.
7. Keep it fun.



Questions

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- Check it out!
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