

DePauw University

## Scholarly and Creative Work from DePauw University

---

Annual Student Research Poster Session

Student Work

---

10-2-2019

### Exploring Student Experiences in Science & Math to Address Underrepresentation in STEM

Brittany Davis  
*DePauw University*

Hira Ahmad  
*DePauw University*

Berenice Contreras  
*DePauw University*

Krista Kaleel  
*DePauw University*

Sydney Majka  
*DePauw University*

Follow this and additional works at: <https://scholarship.depauw.edu/srfposters>



Part of the [Higher Education Commons](#), and the [Science and Mathematics Education Commons](#)

---

#### Recommended Citation

Davis, Brittany, Hira Ahmad, Berenice Contreras, Krista Kaleel and Sydney Majka. "Exploring Student Experiences in Science & Math to Address Underrepresentation in STEM." Poster presented at the DePauw University Science Research Fellows Poster Session, Greencastle, IN, October 2019.

This Poster is brought to you for free and open access by the Student Work at Scholarly and Creative Work from DePauw University. It has been accepted for inclusion in Annual Student Research Poster Session by an authorized administrator of Scholarly and Creative Work from DePauw University.



## Abstract

According to a 2018 publication by *Higher Education Today*, millions of dollars have been invested in recent years to promote diversity in science. Yet still, domestic students of color and first generation students are persisting in STEM at a lower rate than that of their similarly interested white or non-first-generation counterparts (Witham, Malcom-Piqueux, Dowd, & Bensimon, 2015). This state of underrepresentation is mirrored at our own university. To learn more about students' experiences, we conducted a survey to gather insight on the experiences of first generation students, international students, and domestic students of color in science and math classes at DePauw. Our initial findings have shown that classroom climate, teaching styles, and peer relationships all affect the degree to which students negatively or positively evaluate their classroom experiences, and ultimately their decision to persist with or leave STEM departments.

## Introduction

While STEM fields and careers are in high demand in today's society and there is increasing opportunity for people of a variety of backgrounds to become involved in STEM, there has still been a lingering tradition of underrepresentation of certain groups within these fields. To address this representation gap, studies were conducted in order to determine causes for these disparities. Chesler (1997) conducted focus groups with undergraduate students of color, and Malone & Barabino (2009) conducted focus groups and interviews with graduate students of color in STEM research labs at a large research university. Common trends from their findings were that faculty involved in students' STEM experiences held problematic practices, that ultimately impacted their experiences in science and math courses at their respective institutions. Among these issues, other themes ranging from neglect to isolation from peers were also present.

With the aforementioned statistics, and the recurring data trends from studies like that of Chesler, Malone & Barabino as precedents to our study, we have developed and administered an interview survey that has been sent to students of all backgrounds, campus-wide. In doing so, our aim with our particular study is to be able to provide a statistical comparison of student experiences in science & math at DePauw University by using a series of common questions and scenarios in order to address underrepresentation in STEM.

## Method

Participants were 387 students from a midwestern university and were recruited through email announcements sent by the university registrar. The survey took about 20 minutes to complete and included 10 statements requiring a rating by the participant on a scale from strongly agree to strongly disagree. Examples of questions include:

- I felt comfortable attending faculty office hours
  - I feel confident taking a science and math course after taking a STEM course at DePauw.
- An additional 4 open ended questions sought to understand students personal experiences in STEM classrooms. Examples of open ended questions include:
- Please share any personal examples of feeling either welcomed, alienated, or both in a DePauw STEM course
  - Please give examples or suggestions for how a professor has or could create a comfortable environment for all students present

## Results

Student researchers individually coded responses collected from open ended questions and then collectively categorized the responses based on recurring themes. A sample T-test was used to compare results.

### Positive

**Office hours:** This seemed to be a make or break paradigm for students. Positive experiences in office hours greatly enhanced student's overall positive regard for the course. The professor was very understanding, if you were struggling she would give you extra resources and was open for conversation. It was nice to have curriculum support

**Professor Aid:** International students specifically reported that faculty members were more likely to reach out to them with resources and that they felt more comfortable in office hours than domestic students did.

**Collaborative classroom:** Students of color specifically reported feeling more comfortable in classrooms that lacked diversity when professors ensured all students worked together.

**Academic growth:** A significant difference between international and domestic students was found when assessing confidence in STEM courses after taking STEM courses at the University. Specifically, international students felt significantly more confident than domestic students afterwards and felt more successful.

### Negatives

**Professor Interactions:** Students reported feeling as though professors put less effort in building relationship with students that belonged to minority groups, whether that be students of color or female students in male dominated fields. Some students stated that the lack of professor student interaction contributed to their low grade outcome.

**Course Structure:** Faculty often fail to recognize that students come from a variety of educational backgrounds and that some students may not be as well prepared. Some students felt behind in their STEM courses due to the level of knowledge professors assumed students had.

## Discussion

The past research found:

- Student academic performance for domestic students of color improved when students were allowed to teach each other at their own level of intelligence (Pentecost, 2002).
- Classmate support and connections contributed to academic success (Palmer, 2011)
- Students felt meeting with welcoming professors and teachers assistants was very meaningful to them in and contributed to a positive classroom experience (Slaten, Elison, Lee, Yough, & Scalise, 2016)

The following solutions are consistent with the past literature and our results:

Problems	Solutions
Not all students have the same baseline knowledge in STEM fields	Offer more beginner level courses, and perhaps courses that are designed specifically for non STEM majors
Not feeling welcomed by professors in the classroom or office hours	Professors can learn student names, work to be non-judgemental of student questions, and facilitate kindness in the classroom
Cliques and not knowing one another can strain peer relationships in the classroom	Icebreakers and small group activities can help peers become more comfortable with one another

Responses collected were fairly representative of the student population except for African-American students. Out of the 5.5% African-American students, only 2.4% responded to the survey. This serves as a limitation as the population was not fairly representative.

“A lot of the time I felt alienated because I struggled to keep up with the pace and felt dumb”  
-student describing their STEM class

“The only thing that makes me feel alienated in a science or math class is the lack of diversity. At times it can be intimidating to be the only student of color because it makes you stand out from the rest of the group”  
- Student describing STEM at DePauw

“I would consider adding a course in science and math reserved for non stem majors. This would allow students to explore other fields without the intimidation of feeling inferior to other students”  
-Student describing stem courses

## Acknowledgements

We would like to thank our faculty sponsor, Dr. Pam Proptom, and the Asher Fund for supporting this project.

## References

- Addressing STEM Culture and Climate to Increase Diversity in STEM Disciplines. (2018, May 15). Retrieved from <https://www.higheredtoday.org/2018/04/23/addressing-stem-culture-climate-increase-diversity-stem-disciplines/>
- Lewis, A., Chesler, M., & Forman, T. (2000). The Impact of "Colorblind" Ideologies on Students of Color: Intergroup Relations at a Predominantly White University. *The Journal of Negro Education*, 69(1/2), 74-91. Retrieved from <http://www.jstor.org/stable/2696266>
- Malone, Kareen & Barabino, Gilda. (2009). Narrations of Race in STEM Research Settings: Identity Formation and Its Discontents. *Science Education*. 93. 485 - 510. 10.1002/sec.20307.
- Palmer, T. R. (2011). A qualitative investigation of factors promoting the retention and persistence of students of color in STEM. *Journal of Negro Education*, 80(4), 491-504.
- Pentecost, N.(2002). What successful black south african students consider as factors of their success: *Educational Studies in Mathematics*, 50(1), 103-113.
- Slaten, C. D., Elison, Z. M., Lee, J., Yough, M., & Scalise, D. (2016). Belonging on campus: A qualitative study of asian international students. *The Counseling Psychologist*, 44(3), 383-410.