



**CAREER
DEVELOPMENT
MONTH**

Webinar Series

Promote Diversity in STEM Careers

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About Me

- Assistant Professor in Counseling DePaul University
- School Counseling Faculty Adviser
- Research Interest: Examining the career development and mental health of historically marginalized students to improve Science, Technology, Engineering, Mathematics, and Healthcare (STEM-H) career and persistence outcomes
- Professional Experience: High School Counselor, College Career Adviser, Private Practice



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Webinar Objectives

- After viewing this webinar you should be able to:
- Explain disparities in STEM education and career outcomes.
- Discuss how to support underrepresented high school students who are interested in pursuing STEM careers.
- Identify barriers to supporting students who are from underrepresented backgrounds.

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Case Study

Emma is a Black 10th grade student who recently transferred to a new high school. Emma's family have moved many times throughout her life due to her father being in the military. Emma has always scored well on tests, including math placement and standardized tests. However her grades have not always been the highest due to the many transitions. Emma has mentioned that she would like to go to college and be a computer engineer because she loves math and working with computers. However, she lacks confidence that she can obtain this career path due to the grades on her academic transcripts.

How could you support Emma as her school counselor?

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STEM Overview

- Science, Technology, Engineering, and Mathematics (STEM) careers make up approximately 6% of the U.S. workforce (U.S. Bureau of Labor Statistics [BLS], 2020).
- STEM careers include careers in computer science, engineering, managerial and teaching occupations, manufacturing, technical sales, agriculture, etc. (BLS, 2020).
- The need for STEM workers is predicted to increase by 8% before 2030.
 - While non-STEM occupations are projected to grow by 3% before 2030 (BLS, 2020).
 - Every year there are millions of shortages in the STEM workforce (Xue & Larson, 2015)

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Critical Issues in STEM

- Students who major in STEM during college are likely to earn higher salaries upon completion when compare to their peers majoring in non-STEM areas (Cataldi et al., 2014; Vilorio, 2014)
- Almost 50% of undergraduate students who begin in a STEM major do not complete their STEM bachelor's degree (Chen, 2014). Reasons for not completing degrees in STEM include
 - Lack of access to higher level STEM coursework
 - Financial barriers
 - Motivation and confidence issues
 - Academic concerns and institutional barriers
 - Social factors (e.g., lack of support/representation, stereotype threat)

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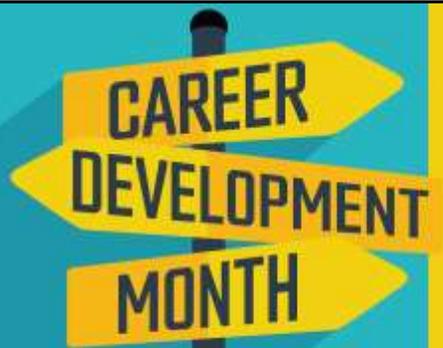
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The Need for Diversity in STEM

- Black, Latinx, and Native American workers are underrepresented in STEM occupations when compared to White and Asian workers (Funk & Parker, 2018; Mau, 2016).
- Women now make up over half of the overall workforce, they are underrepresented in certain STEM sectors such as computer jobs and engineering (Funk & Parker, 2018).



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Diversity Issues in STEM Education

- In college, significantly more men than women declare STEM majors and significantly more Asian and White students declare STEM majors (Mau, 2016).
 - In 2015-2016, more bachelor's degrees were awarded to females (58%) than males (42%); and yet, females only made up 36% of bachelor's degrees in STEM fields (NCES, 2019).
 - In 2015-2016, the percentages of Latinx (15%), Black (12%), and Native American (14%) students who received degrees in STEM was disproportionately lower than White students (NCES, 2019).

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Why do we want to promote diversity in STEM?

- To increase diversity of thought in order to develop innovative solutions to tomorrow's problems
- Diverse teams tend to outperform homogenous teams
- Diversity increases the likelihood of scientific success



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The Importance of Career Development

- Belser and colleagues (2017) found that first-year undergraduate students who declared a STEM major and participated in a STEM-focused career planning course were 17.8 times more likely to stay in a STEM major for a second year.
- Belser et al. (2018) also predicted retention of students in a STEM career planning course using the Career Thoughts Inventory. As students' negative career thoughts decreased, their odds of second-year retention increased. *The less distorted thinking students had surrounding their future career in STEM, the more likely they were to stay in a STEM major*

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The Importance of Career Development (cont'd)

- Cabell and Gnilka (2021) found that undergraduate engineering students in a STEM career planning course, increased in their Career Search Efficacy (CSES) over the course of the semester.
 - Participating in career counseling was associated with increased CSES.
- Cabell (2021) found that CSES scores were a significant positive predictor of undergraduate engineering students' increased odds of persisting in their major for the following semester.
 - Students self-categorized how likely they were to enroll in an engineering major for the following semester on a scale ranging from 1 (not likely at all) to 5 (extremely likely).

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The Importance of Mental Health

- 70% of teens say stress is a major problem for them.
- In 2018, the American College Health Association (ACHA) reported that most undergraduate students experience symptoms of stress and stress is a major impediment to academic performance.
- Increased stress, shown to decrease career decidedness and negatively impact academic outcomes (Britt et al., 2016; Bullock-Yowell et al., 2011)
- Cabell and Gnilka (2021) found that for engineering undergraduate students, increased perceived stress was associated with lower career-related self-efficacy.

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Barriers School Counselors Face

- Cabell et al. (2021), interviewed 9 high school counselors on how they support underrepresented students in STEM and the barriers they face. Here's some of the barriers they cited:
 - COVID-19: *"All I did from March through May was call, email, and bother parents and seniors about graduation and making sure they were alive. That completely impacted my role for minority students pursuing STEM. . . . We were down to basic needs."*
 - School Barriers: *"A student could do everything they need to graduate high school but not necessarily be ready for the university."*
 - *"I would probably even go as far as to say, knowing that all of our STEM teachers and faculty are anti-racist and I don't know that all of them are. And the reason why I think that that's important is because it's possible that they receive opportunities for students, and are they aggressively sending or communicating those opportunities out to students of color?"*

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Barriers School Counselors Face (cont'd)

- Administration: *"I don't know if any of my Black students are coming into ninth grade with that previous exposure. . . . I know that some of them are not. And so, I think that is a huge barrier. Not having them already exposed to a lot of what the STEM fields can offer."*
- *"Another barrier is just time. Even with my caseload this year, I have 350 students."*
- Students' Self-Efficacy: *"I'm not a math person or I'm not good at math." "I think a lot of my students, when they're looking at these careers, sometimes they don't see themselves in those careers and so that steers them away. . . . They just don't feel it's a possibility."*
- Language: *"Working with Latinx and some undocumented or DACA students, the students of color, and even first-generation students . . . our role is very influential. In certain situations, especially for my kiddos whose parents don't speak English, we are the adult, we are the person that's helping them make those important decisions."*
- *"We can sometimes talk about opportunities, but if it's not getting into the hands of the families and if they're not understanding what the opportunity is, they may not be as willing to allow their kid to attend maybe a 6-week program or a college program."*

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Recommendations for School Counselors

School counselors can:

- Encourage students to take advanced-level math and science courses (Falco, 2017)
- Provide classroom instruction on the benefits of pursuing STEM education
- Improve self-efficacy through providing mentoring and small group counseling opportunities
- Connect students with (in-person and virtual) internship opportunities (Cabell et al., 2021)
- Discuss STEM apprenticeships with high school students
- Connect students with STEM-related college opportunities (e.g., Historically Black Colleges and Universities)
- Conduct reviews of higher-level STEM coursework for gender and racial equity
- Collaborate with administration to develop STEM programming

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Revisiting Emma's Case

- Capitalize on her math test scores in order to help place her in higher level math classes.
- Share computer related electives with Emma, if they are offered at the high school (or even local colleges)
- Empower Emma to realize that she is more than her grades
- Connect Emma with social media campaigns/organizations that increase her access to representation (e.g., National Society of Black Engineers, #BlackinSTEM, #BlackGirlsInSTEM)
- Encourage Emma to look into STEM opportunities at local colleges (e.g., STEM summer programs)
- Share STEM opportunities with Emma's parents.

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