

The COVID-19 Pandemic's Impact on Black or African American Undergraduate STEM+C Students at a Hispanic Serving Institution

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The COVID-19 pandemic has created various challenges for all students, regardless of ethnicity. Research reveals how historically minoritized groups have struggled in their educational pursuits due to the pandemic. Black/African American students have encountered increased challenges in learning online, job insecurity, and negative impacts on their health or emotional state. While research indicates these negative influences have adversely affected students' overall engagement in postsecondary education, literature is scarce regarding how the COVID-19 pandemic has affected Black or African American students in postsecondary science, technology, engineering, mathematics, and computing (STEM+C) education. The purpose of this exploratory study is to understand the influences of COVID-19 on Black/African American STEM+C majors at a Hispanic serving institution.

Keywords: *Black/African American, COVID-19 pandemic, Hispanic serving institution, STEM+C education, undergraduate*

INTRODUCTION

The COVID-19 pandemic has had a large effect on all students in various capacities including learning, economic and job insecurity, and health/emotional issues. However, for historically minoritized students, the COVID-19 pandemic exasperated the issues they already faced. Black/African American and Hispanic Students were noted as negatively affected by the pandemic in various aspects of their lives. However, there is a lack of research focused on the effects of the COVID-19 pandemic on these populations in postsecondary science, technology, engineering, mathematics, and computing (STEM+C) education. As part of a larger mixed-methods study ($n = 203$), the research team developed a 47-item questionnaire, including an open-ended question about the impact of the COVID-19 pandemic, to survey students majoring in undergraduate STEM+C programs at a large southwestern university classified as a Hispanic serving institution (HSI). The survey was conducted in 2020 and again in 2022, which included two Likert scale questions measuring influences on enrollment and persistence. In total, there were 17 influences ranging from their self-confidence, and personal faith/spirituality, to participation in a faith-based school before college or in STEM (science, technology, engineering, and math) academic programs hosted at a faith-based institution. For this exploratory study, a convenience sample of undergraduate Black/African American students ($n = 12$) in STEM+C programs was identified from the overall sample of students impacted by COVID-19 ($n = 124$). Utilizing qualitative thematic analysis, data were analyzed to understand the responses of Black/African American survey participants. The overarching research question undergirding this study is: How has the COVID-19 pandemic impacted undergraduate Black/African American students in their STEM+C educational and career endeavors?

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Our findings inform faculty and program administrators how the COVID-19 pandemic has impacted Black/African American students' persistence in undergraduate STEM+C education and their overall career trajectories. Despite the pandemic, we share recommendations on how to best support these students in their pursuit of higher education.

LITERATURE REVIEW

Inequalities and Lack of Equitable Access to Education

Students of color are underrepresented in STEM +C fields in postsecondary education resulting in lower representation in the workforce. The lack of representation, driven by systemic inequalities, can be traced back to the origins of our nation. This educational debt rooted in the foundation of the education system of the United States continues to bear fruit to this day (Ladson-Billings, 2021). The lack of progress in educational equality for students of color in the United States is well documented in the literature (Ashford-Hanserd et al., 2020). While institutions of higher education are working to address these disparities, the introduction of new factors, such as COVID, may have negative impacts on these gains.

The Role of Minority Serving Institutions in Equitable Access

The creation of Minority serving institutions (MSI) has origins dating back to the mid-17th century with the creation of the first 'Indian College' whose intent was not so much to educate individuals but to indoctrinate Native Americans in colonial ways (Gasman et al., 2015). Historically Black colleges and universities (HBCUs) were introduced after the end of the Civil War by the Freedman's Bureau to begin redressing the systemic exclusion of education brought about by slavery. In the beginning, these colleges were predominantly "in name only" focusing more on "basic education" due to centuries of slavery (Gasman et al., 2015, p. 122). There are 101 HBCUs today, both public (52) and private (49); that confer associate, bachelor, master's, and doctorate degrees; and represented 13 percent of all bachelor's degrees awarded to Black students in 2019-2020 (National Center for Education Statistics, 2022).

Hispanic serving institutions (HSIs) were introduced in 1965 through the Higher Education Act of 1965 (Pichon, 2016). While HBCUs and Tribal colleges were compensatory measures, HSIs addressed "a demographic increase and shift" (Gasman et al., 2015, p. 128) and can apply for this federal designation to qualify for federal funding based on enrollment demographics including race and socioeconomic status (Benitez & DeAro, 2004). According to Gasman et al., (2015) "Research has found that HSIs serve a vital role in providing access to college for diverse students" (p. 134). This may be in part due to HSI's tradition of serving non-traditional students (Benitez & DeAro, 2004) and the increased capacity to provide tailored services to the entire student body through Title III and Title V funding allocated to HSIs designated institutions (Gasman et al., 2015). As Benitez & DeAro (2004) noted

some HSIs showing promising results in improving student retention are deliberately aligning student support services with academic programs to provide effective support environments for students who juggle competing obligations of work, school, and family. (p. 40).

Systemic Barriers in K-16 STEM+C Education

Research has shown that there is no difference in bachelor's degree completion rates for students of color for those who enroll at an MSI and for those who do not "despite these schools serving a larger share of high-need and underprepared students" (Flores & Park, 2015, p. 247). Factors that influence STEM outcomes include socioeconomic status (London et al., 2021), exposure to the field (London et al., 2021), and sense of belonging in the field (Ireland, 2018; London et al., 2021; Pichon, 2016).

Lack of early exposure. According to London et al. (2021), "Early exposure to STEM experiences is key to ensuring young people are adequately prepared to pursue engineering career paths" (p. 1007). However, not all students enjoy the privilege of access. Not only does socioeconomic status influence the number of opportunities and educational resources but also one's

attitudes and self-efficacy regarding STEM (London et al., 2021). According to London et al. (2021), “Since the establishment of the common school (De Lissovoy et al., 2015) racism, classism, and sexism have served as systemic gatekeepers to the level of access and quality of education that individuals receive.” (p. 1008). Furthermore, once in college, higher incomes indicate higher graduation rates for Black students, while higher total financial aid received is negatively associated with rates (Musoba & Krichevskiy, 2014).

Limited sense of belonging. STEM identity development and a sense of belonging, however, support STEM success (Ireland et al., 2018; Pichon, 2016). Furthermore, individuals that support the identity development of students (socializing agents, mentors, and role models) also help foster a sense of belonging (Ireland et al., 2018). Pichon stated (2016) “students believed it [is] important for faculty to take an interest in their personal development, empathize with their situation, and take interest in their matters” (p. 145). Unfortunately, not all interactions and environments are positive and affirming.

Racism, bias, and discrimination. According to London et al. (2021) “youth are often impacted by racism, bias, and discrimination, which often serves as barriers to STEM aspiration and participation” (p. 1009). Once in postsecondary education, these barriers influence outcomes. Specifically, research has found Black women in STEM encounter microaggressions, exclusion, gendered stereotypes, alienation and discrimination, and feelings of isolation (Ireland et al., 2018). More broadly, research has shown other issues that negatively impacted students’ sense of belonging in STEM courses include not feeling comfortable sharing thoughts in class, not feeling comfortable asking questions or contributing to discussion; difficulty meeting students in class, rarely talking to students in class; and not feeling comfortable asking faculty for help outside of class (Pichon, 2015).

Negative Impacts of COVID-19 on K-16 STEM+C Education

COVID-19 emerged in the United States in January 2020 (Zhai et al., 2021). By the end of March 2020, most campuses across the United States had begun responding to what would become a pandemic (Crawford et al., 2020). This shift caused many unforeseen disruptions to education, including temporary closures and transfers to online classes (Thacker et al., 2022). During this time, students experienced a myriad of challenges that affected their resilience, engagement, and sense of belonging (Camfield et al., 2021). Notable changes included leaving their competitive campuses to be close to family; social isolation from peers; and increased expenses related to their education (Cromley & Kunze, 2021; Desroachers et al., 2020). The research found that emergency remote instruction resulted in a loss of confidence, self-regulation, and meta-cognitive elements; decreased help-seeking behaviors, limited access to the instructor and loss of opportunity to learn in preferred modality; and lost campus community and autonomy (Camfield et al., 2021; Desroachers et al., 2020). Other research found many students were able to keep a positive outlook despite learning during a pandemic and with disruptions to their lives (Desroachers et al., 2020). Most participants believed that COVID-19 did not influence their career pathways and were only moderately concerned about the influence of COVID-19 on their future careers (Desroachers et al., 2020). Additionally, knowledge about careers, natural inclination, science-related classes, parents, and college teachers were crucial factors in supporting participants’ career goals (Pena et al., 2009; Raque-Bogdan et al., 2013).

Temporary school closures and online classes. COVID-19 caused many unforeseen disruptions to education, including temporary closures and transferring to online classes during the spring of 2020 which impacted women and students of color (Thacker et al., 2022). Learning environments, such as laboratories, libraries, maker spaces, tutoring services, and physical spaces that support students were closed. Women and students of color need to have collaborative environments to create STEM identities and succeed in STEM fields (Thacker et al., 2022). However, the impact of the disruptions may be acutely felt by marginalized communities. Factors in the home environment and being away from learning in the school environment play a role in distancing students from being successful in school (Cromley & Kunze, 2021). According to Cromley and Kunze (2021),

Self-variables declined more for females once separated from supportive friends. The dramatically higher burdens due to COVID-19 might move focus away from understanding and to simply finishing. For first-generation students, decreased social comparison at home lowers performance-avoidance, and aims for future achievement and economic mobility increase. Lastly, during these challenges, students either become committed to learning or their school achievement significantly decreases. (p. 5)

Closed physical spaces. Specific to students pursuing STEM+C degrees, learning environments, such as laboratories, libraries, maker spaces, tutoring services, and physical spaces that support students were closed. Women and students of color need to have collaborative environments to create STEM identities and succeed in STEM fields (Thacker et al., 2022).

Decreased school attendance. COVID-19 has led to a decrease in the number of students continuing school and pursuing the science, technology, engineering, and mathematics (STEM) workforce due to disruptions as a result of the pandemic (Forakis et al., 2020). Short-term choices were made by students to delay coursework. However, this could result in graduating later than expected (Forakis et al., 2020). According to Forakis and colleagues (2020, p. 3340), “These results represent only a short-term perspective on the onset of COVID-19, but this data will be useful for future work as it demonstrates the lack of an immediate effect on STEM students’ career intentions.”

Slow internet connections. The switch to online instruction was not desirable for most participants in the study (Desroachers et al., 2020). A barrier was slow internet connections. Lastly, one of the main barriers to achieving participants’ career goals was education costs. However, the challenge may have been proposed before the pandemic (Desroachers et al., 2020).

Isolated home environments. During COVID, historically underrepresented students experienced various disadvantages in their learning: difficulties leaving a competitive campus for a close family, students going from being social to isolated, no connections with peers, and isolated activities that can make studying more expensive (Cromley & Kunze, 2021). Factors in the home environment and being away from learning in the school environment play a role in distancing students from being successful in school (Cromley & Kunze, 2021). According to Cromley and Kunze (2021),

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Emergency Remote Instruction Disruptions (ERIDs). The Emergency Remote Instruction Disruptions (ERIDs) of Resilience for students found the following: lost strength, lost confidence, lost self-regulation, and lost meta-cognitive elements (Camfield et al., 2021). For ERIDs of Engagement for students: decreased help-seeking behaviors, lost access to the instructor, and loss of opportunity to learn in preferred modality (Camfield et al., 2021). For ERIDs of Sense of Belonging: lost campus community and lost autonomy (Camfield et al., 2021)

Positive Impacts of COVID-19 on K-16 STEM+C Education

Positive or no influence. Many underrepresented students were able to keep a positive outlook despite learning during a pandemic and with disruptions to their lives (Desroachers et al., 2020). Additionally, knowledge about careers, natural inclination, science-related classes, parents, and college teachers were crucial factors in supporting participants’ career goals (Perna et al., 2009; Raque et al., 2013). Most participants believed that COVID-19 did not influence their career pathways and were only moderately concerned about the influence of COVID-19 on their future careers.

Classroom interaction and engagement. Students of color felt a greater sense of belonging to their coursework when engaged with in-person interaction in synchronous courses and more cognitive engagement in asynchronous courses (Thacker et al., 2022). The central findings found

that: “providing opportunities for classroom interaction can support feelings of social belonging and engagement, students’ feelings of competency can serve as the basis for belongingness in STEM and individually completed coursework (exams and quizzes) have tradeoffs” (pp. 19-20).

Empathy and responsiveness. According to Camfield et al. (2021), “By creating systems of empathetic responsiveness, universities can move beyond the culture of emergency ‘911’ responses to students who are failing one or more classes to provide pre-emptive care. This form of empathetic responsiveness is fostered through a collection of information about student experiences and reflection on those experiences” (p. 16).

Our literature review provided insight into the overall impacts of COVID-19 on K–12 education and some aspects of undergraduate STEM+C. However, literature is scarce on the impact of COVID-19 on Black/African American STEM+C majors. This exploratory study seeks to address it by conducting survey research at a minority serving institution.

METHODS

Data Sources

As part of a larger mixed-methods study ($n = 203$), we developed a 47-item questionnaire to survey undergraduate students ($n = 203$) majoring in STEM+C programs at a large southwestern research university, which is classified as a Hispanic Serving Institution. This instrument (Ashford-Hanserd et al., 2020) captured participants’ demographics and measured 17 dimensions participants reported that influenced their decisions to enroll and persist within their major program (Table 1). Students rated the 17 dimensions in two Likert scale questions, one Likert scale measured the influence on enrollment and another influence on persistence, using a Likert-type scale from 1-5 with “1” being strongly made me not want to apply/remain enrolled and “5” being strongly made me want to apply/remain enrolled, respective to the prompt. The survey also collected demographic data including date of birth, gender, race/ethnicity, citizen status, parent’s highest degree obtained, languages spoken, hometown zip code, program of study, current grade level, post-graduation aspirations, courses completed in middle school, courses completed in high school, participation in additional academic programming, the decision to enroll in their major, and the main reason they remained in enrolled in the major. The survey was conducted in 2020 and again in 2022.

Table 1

Dimensions of Influence Explored in Study

17 Dimensions of Influence
Self-Confidence in Subject
Money/Cost to be in Program
Family and/or Peer Pressure
Preparedness for the Program
Potential for Learning Experiences
Stereotypes about Gender in the Field
An Identified Role Model/Mentor
Presence of Job Opportunities
Stereotypes about Race/Ethnicity in the Field
Sense of Belonging in the Program
Personal Intelligence
Geographic Location of the Program
Personal Motivation
Program's Commitment to Diversity
Personal Faith/Spirituality
Participation in STEM Academic Programs Hosted at Faith-based Institution
Participation in a Faith-based School Before College

Participants

For this exploratory study, a convenience sample of 12 undergraduate students who identified themselves as Black or African American was identified from the overall sample of students impacted by COVID-19 ($n = 124$) as depicted in Table 2. Only 10 participants completed the COVID-19-related questions found in these surveys.

Table 2
Participant Demographics ($n = 124$)

	Count	%
<i>Gender</i>		
Female	80	62.5%
Male	47	36.7%
Self-Identified (Non-Binary)	1	.78%
<i>Race/Ethnicity</i>		
White	47	36.7%
Asian	9	7.0%
Hispanic or Latino	56	43.7%
Black	12	9.4%
<i>Languages Spoken</i>		
English Only	66	51.6%
Bilingual	46	35.9%
Trilingual	9	7.0%
<i>Grade Level</i>		
Junior	51	39.8%
Senior	67	52.3%
Recent Graduate	3	2.3%
<i>Major</i>		
Biological Sciences	70	54.7%
Chemistry	19	14.8%
Computer Science	25	19.5%
Engineering, Physics, or Applied Mathematics	11	8.6%

Data Collection

We emailed all undergraduate computer science, majors, in 2020 and 2022 a link to the survey and invited Black students to participate. The survey in 2020 included an open-ended question, In what ways has the COVID-19 pandemic impacted your decisions about pursuing a degree in STEM? In 2022, a second survey was sent out that included a Likert-scale question categorizing the previous open-ended responses into 15 factors or potential influences of the COVID-19 pandemic.

Data Analysis

We analyzed the survey data utilizing qualitative thematic analysis. The overarching research question undergirding this study is: “How has the COVID-19 pandemic impacted undergraduate Black/African American students in their STEM+C educational and career endeavors?”

To identify, analyze, and summarize the emergent themes, the researchers followed a six-step thematic analysis process (Braun & Clarke, 2006). First, the open-ended questions will be read for familiarity. Second, a list of codes was developed and manually entered into a Microsoft Excel document. Third, an inductive process was employed to code each response by manually organizing participants’ quotes under each associated code in the Excel document and then performing open

coding by adding new codes as needed while reading the open-ended answers (Braun & Clarke, 2006). Fourth, the list of codes was reviewed and refined. Fifth, high-level themes were identified, and the codes and the associated quotes were manually regrouped under these themes. Finally, the final report of emergent themes with the associated participants' quotes was produced. The second survey included a Likert-scale question with factors that were developed by the first emergent themes. So, the second survey's results were integrated into the findings. The coding results were verified by another researcher who reviewed the emergent themes and related quotes.

Data Trustworthiness

This survey is part of a larger mixed-method study supported by the National Science Foundation. We will employ data triangulation methods (Brantlinger et al., 2005) by completing follow-up interviews with these students soon. One limitation of this study is that it was only conducted at one Hispanic Serving Institution located in Texas. Consequently, there is a much smaller sample size than would be optimal. The research team considers these two surveys as initial or preliminary and therefore, these results are preliminary results that will be bolstered once we expand our research to other institutions. However, the researchers practiced inter-rater reliability by reviewing each other's data analysis results and coming to a consensus on our results.

RESULTS AND DISCUSSION

A subset of the participants completed our survey during the Fall of 2020 survey while under COVID-19 restrictions. Impacted participants ($n = 124$) responded to an open-ended prompt about how the global pandemic has impacted their pursuits toward their STEM degree. Reported impacts were evenly distributed across negative (37.4%), neutral (35.8%), and positive (26.8%) outcomes. Students that reported they were negatively impacted reported concerns such as difficulties gaining experience, financial complications, disturbed routines, higher anxiety, and delayed graduation. Students that reported then were positively impacted reported outcomes such as increased curiosity, reinforced career choice, and enhanced motivation.

In the exploratory study, our results underscore two major findings; Black or African American STEM+C students noted negative changes in their educational and career endeavors. Within their educational changes, participants first suggested their learning became harder as everything went online. They specifically shared how worried they were about online learning and even questioned their potential. Additionally, their academic progress was put into question. Some students even noted wanting to withdraw from school. Many students felt as though their routines were disturbed. Going fully online for the pandemic also made it harder for students to make connections with others and this took away from the entire academic experience that Black or African American STEM+C expect. Our literature review defends how emergency remote learning challenged students' confidence and a sense of belonging (Camfield et al., 2021; Cromley & Kunze, 2021; Desrochers et al., 2020; Thacker, 2022). For STEM+C students a sense of belonging is essential to be successful in the field (Ireland, 2018; London et al., 2021; Pichon, 2016). The lack of a community compounded by the COVID-19 pandemic only intensifies the difficulties Black or African American STEM+C students face in their educational pursuits.

These Black and African American participants also noted a negative change in their career endeavors which impacted their economic status. They noted that the pandemic put a delay their career plans and many lost career opportunities. This finding is supported by Forakis and colleagues (2020) who noted that the pandemic has led to a decrease in the number of students continuing school and pursuing the STEM+C workforce. Hence, the COVID-19 pandemic caused significant financial impacts on their lives. As this survey continues to be expanded to different institutions, it is assumed that these findings will be substantiated with additional data. These preliminary results, however, are fortified by the support from our literature review.

CONCLUSION AND RECOMMENDATIONS

Black or African American students face various systemic barriers when choosing to pursue an education in the STEM+C field. When the COVID-19 pandemic occurred, research focused on the

effects on all students and racially minoritized students. This study focused on the effects of the COVID-19 pandemic on Black or African American students who were in the STEM field. The preliminary results highlighted that Black or African American students in the STEM+C field faced negative changes in their educational and career endeavors during the pandemic. It was noted that students felt that going online made learning harder, that they lacked a sense of belonging, and that the pandemic affected their educational progress/career plans. Concerning these findings and considering what Black or African American students in the STEM+C field need, the following is a list of recommendations about how to best support these students as we continue forward through the pandemic.

RECOMMENDATIONS FOR K–16 STEM+C EDUCATION

Although some institutions have switched back to in-person teaching, there are still some schools continuing online courses. Hence, we recommend that online formats be developed for all students to have engagement outside of classroom time. Through virtual meetings and commitments, it is possible to build a community that is racially minoritized, for example, Black or African American, STEM+C students need to be successful in the field. It is also important to develop these opportunities as unforeseen circumstances may occur in the future and this would help us be best prepared.

Allow for any virtual meetings and engagements to be culturally responsive and relevant. Keeping the need for equity and diversity in mind when developing programs is important to create a space that is welcoming and appreciative of all students. With support systems being crucial for racially minoritized population's success in the STEM+C field, providing virtual engagements that are inclusive this is ensuring their support systems outside of the classroom are present and reliable.

Since the COVID-19 pandemic delayed some students' progress, it is the responsibility of the institution to find ways to keep students on track to graduate on time. It might be necessary to provide more classes to accommodate the student's needs. In addition to this, a recovery fund must be considered to aid students in being able to financially afford courses and complete their degrees promptly. As of now, the United States Congress passed the Coronavirus Aid, Relief, and Economic Security Act, or CARES Act, to provide a higher education emergency relief fund (U.S. Department of Education, 2022). However, this fund requires students to apply for economic relief and its requirements are extremely strict. Therefore, it is recommended that each institution develop a fund that is more flexible and that is specifically dedicated to racially minoritized populations as they are at a higher risk of dropping out of school due to economic issues. Culturally, Black or African

American males tend to provide for their families, and hence, any national economic insecurity would require them to further support their families and forego their educational pursuits. For example, even if a student retained their job during the pandemic, they might have had to take on another job to offset the loss of another family member's job. This extra job may have caused them to have to step back from their education. Although the CARES Act exists, this student would not

have been able to apply for it because they did not lose their job themselves. The complexity of financial situations in racialized minoritized communities should be called to our attention and require us to consider how to best support these students in their success during national economic insecurity.

Provide students with additional support as they transition into the workforce. The COVID-19 pandemic created a lot of job insecurity and loss of opportunities. It is vital to provide racially marginalized students, such as Black or African American, STEM+C students the support required to obtain employment after graduation. One recommendation would be to create a STEM+C job fair that is specifically geared toward racially minoritized students. By focusing on this population and connecting them directly with recruiters, a network is being created to ensure job security.

REFERENCES

Ashford-Hanserd, S. Daniel, K. L., Garcia, D. M., & Idema, J. L. (2020). Factors that influence the persistence of biology majors at a Hispanic-serving institution. *Journal of Research in Technical Careers*, 4(1), 47-60.

- Ashford-Hanserd, S., Springer, S. B., Hayton, M., & Williams, K. E. (2020). Shadows of *Plessy v. Ferguson*: The dichotomy of progress toward educational equity since 1954. *The Journal of Negro Education*, 89(4), 410-422.
- Benitez, M., & DeAro, J. (2004). Realizing student success at Hispanic-serving institutions. *New Directions for Community Colleges*, 12, 35-48.
- Brantlinger, E., Jimenez, R., Klingner, J., Pugach, M., & Richardson, V. (2005). Qualitative studies in special education. *Exceptional Children*, 71(2), 195-207. <https://doi.org/10.1177/001440290507100205>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. <https://doi.org/10.1191/1478088706qp0630a>
- Camfield, E., Schiller, N., Land, K. (2021). Nipped in the bud: COVID-19 reveals the malleability of STEM student self-efficacy. *Life Sciences Education*, 20 (25), 1-18. <http://doi.org/10.1187/cbe.20-09-0206>
- Crawford, J., Butler-Henderson, K., Rudolph, J., Malkawi, B., Glowatz, M., Burton, R., Magni, P. A., & Lam, S. (2020). COVID-19: 20 Countries' higher education intra-period digital pedagogy responses. *Journal of Applied Learning & Teaching*, 3(1), 9-28. <http://journals.sfu.ca/jalt/index.php/jalt/index>
- Cromley & Kunze (2021). Motivational Resilience during COVID-19 across at-Risk undergraduates. *Journal of Microbiology & Biology Education*, 22 (1), 1-6. <https://doi.org/10.1128/jmbe.v22i1.2271>
- De Lissovoy, N., Means, A. J., & Saltman, K. J. (2015). *Toward a new common school movement*. Routledge.
- Desrochers, M., Naybor, D., & Kelting, D. (2020). Perceived impact of COVID-19 and other factors on STEM students' career development. *Journal of Research in STEM Education*, 6 (2), 138-156. <https://doi.org/10.51355/jstem.2020.91>
- Flores, S. M., & Park, T. J. (2015). The effects of enrolling in a minority-serving institution for Black and Hispanic students in Texas. *Research in Higher Education*, 56, 247-276. <https://doi.org/10.1007/s11162-014-9342-y>
- Forakis, J., March, J., & Erdmann, M. (2020). The impact of COVID-19 on the academic plans and career intentions of future STEM professionals. *Journal of Chemical Education*, 97 (9), 3336-3340. <https://doi.org/10.1021/acs.jchemed.0c00646>
- Gasman, M., Nguyen, T., & Conrad, C. F. (2015). Lives intertwined: A primer on the history and emergence of minority serving institutions. *Journal of Diversity in Higher Education*, 8(2), 120-138. <https://doi.org/10.1037/a0038386>
- Ireland, D. T., Freeman, K. E., Winston-Proctor, C. E., DeLaine, K. D., McDonald Lowe, S., & Woodson, K. M. (2018). Hidden figures: A synthesis of research examining intersectional experiences of Black women and girls in STEM education. *Review of Research in Education*, 42, 226-254. <https://doi.org/10.3102/0091732X18759072>
- Ladson-Billings, G. (2021). *Critical race theory in education: A scholar's journey*. Teachers College Press.
- London, J. S., Lee, W. C., & Hawkins Ash, C. D. (2021). Potential engineers: A systemic literature review exploring Black children's access to and experiences with STEM. *Journal of Engineering Education*, 110, 1003-1026. <https://doi.org/10.1002/jee.20426>
- Musoba, G. D., & Krichevskiy, D. (2014). Early coursework and college experience predictors of persistence at a Hispanic-serving institution. *Journal of Hispanic Higher Education*, 13(1), 48-62. <https://doi.org/10.1177/1538192713513463>
- National Center for Educational Statistics. (2022, June). *Historically Black colleges and universities*. <https://nces.ed.gov/fastfacts/display.asp?id=667>
- Perna, L., Lundy-Wagner, V., Drezner, N. D., Gasman, M., Yoon, S., Bose, E., & Gary, S. (2009). The contribution of HBCUs to the preparation of African American women for STEM careers: A case study. *Research in Higher Education*, 50, 1-23.

- Pichon, H. W. (2016). Descubriendo mi lugar: Understanding sense of belonging and community of Black STEM-H students enrolled at a Hispanic serving institution. *Journal Multicultural Education*, 10(2), 126-151. www.emeraldinsight.com/2053-535X.htm
- Raque-Bogdan, T. L., Klingaman, E. A., Martin, H. M., & Lucas, M. S. (2013). Career-related parent support and career barriers: An investigation of contextual variables. *The Career Development Quarterly*, 61(4), 339-353.
- Thacker, I., Seyranian, V., Madva, A., Duong, N., & Beardsley, P. (2022). Social connectedness in physical isolation: Online teaching practices that support under-represented undergraduate students' feelings of belonging and engagement in STEM. *Education Sciences*, 12(61), 1-22. <https://doi.org/10.3390/educsci12020061>
- U.S. Department of Education. (2022, August). *CARES Act: Higher Education Emergency Relief Fund*. <https://www2.ed.gov/about/offices/list/opec/caresact.html>
- Zhai, Z. M., Long, Y. S., Tang, M., Liu, Z., & Lai, Y. C. (2021). Optimal inference of the start of COVID-19. *Physical Review Research*, 3, 1-12. <https://doi.org/10.1103/PhysRevResearch.3.013155>

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