

Broadening Participation in Engineering: Minorities Share Lived Experiences at Minority Serving Institutions

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Abstract

This paper describes the lived experience of minority students within the context of engineering, with the aim of presenting a more comprehensive picture of the challenges and barriers faced along the K-12, baccalaureate, and graduate education pathway. A qualitative methodology driven by Colaizzi descriptive phenomenology research framework was applied. In addition, purposive sampling technique was used to enlist twenty-nine students from Black, Latinx and Native American institutions to participate in this study. Participants volunteered to voice their lived experiences and clusters of themes emerged thereafter. Emergent from the lived experiences was a host of factors indicating vulnerabilities, resilience, success, and frustration, while seeking to and pursuing their studies in an engineering environment favoring and dominated by the status quo. Five ingredients proved pivotal to their enrollment, retention, and academic success in engineering, namely: (i) positive attitude, (ii) early exposure and access to opportunities, (iii) family, (iii) peer support, (iv) institutional support, (v) beneficial partnerships, and (vi) engineering community. Apart from a positive attitude, the other four factors pointed to a 'dependence syndrome' on support systems. The positive attitude showed itself in various ways such as resilience, determination, innovation, and self-motivation to persist in engineering. Emerging from the shared experiences are recommendations from experts to (i) cultivate early intervention at institutions, (ii) address leakage in the pipeline (iii) rebrand STEM skills in the classroom, (iv) make better connection to the real world, environments, (v) provide accessibility to opportunities, and (vi) create more industry-education partnerships.

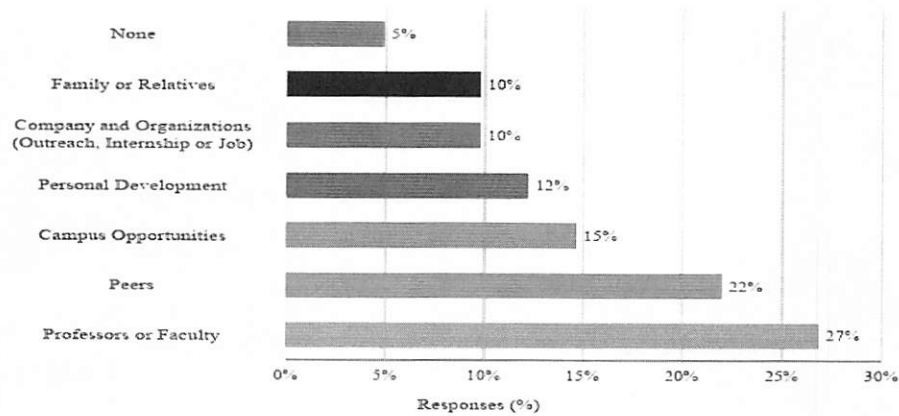


Figure 1. Contributes or Support Systems along the Education Pathway that Assisted in Overcoming Barriers

References

1. D. R. Simmons and S. M. Lord, "Removing invisible barriers and changing mindsets to improve and diversify pathways in engineering," *Adv. Eng. Educ.*, vol. 7, no. 2, pp. 1–22, 2019.
2. M. Ong, N. Jaumot-Pascual, and L. T. Ko, "Research literature on women of color in undergraduate engineering education: A systematic thematic synthesis," *J. Eng. Educ.*, vol. 109, no. 3, pp. 581–615, 2020, doi: 10.1002/jee.20345.
3. Y.-L. Chen, K. Murthi, W. Martin, R. Vidiksis, A. Riccio, and K. Patten, "Experiences of Students, Teachers, and Parents Participating in an Inclusive, School-Based Informal Engineering Education Program," *J. Autism Dev. Disord.*, vol. 52, no. 8, pp. 3574–3585, 2022, doi: 10.1007/s10803-021-05230-2.
4. J. S. London, W. C. Lee, C. Phillips, A. S. Van Epps, and B. A. Watford, "A systematic mapping of scholarship on broadening participation of African Americans in engineering and computer science," *J. Women Minor. Sci. Eng.*, vol. 26, no. 3, pp. 199–243, 2020, doi: 10.1615/JWomenMinorScienEng.2020027889.
5. B. A. Burt, B. D. Stone, R. Motshubi, and L. D. Baber, "STEM validation among underrepresented students: Leveraging insights from a STEM diversity program to broaden participation.," *J. Divers. High. Educ.*, 2020, doi: 10.1037/dhe0000300.