

1. **Title of the submission:** Experiences and Perceptions on Culturally Responsive STEM Doctoral Mentoring
2. **Name(s) of the author(s):** Anna Sanczyk, Niesha C. Douglas, Cathy D. Howell, and Lisa R. Merriweather
3. **Affiliation(s) of the author(s):** University of North Carolina at Charlotte, College of Education, Department of Educational Leadership
4. **Address(es) of the author(s):** 9201 University City Blvd. Charlotte, NC 28223
5. **E-mail address(es) of the author(s):** asanczyk@uncc.edu, niesha.douglas@gmail.com, chowell22@uncc.edu, lmerriwe@uncc.edu
6. **Paper:**

## Experiences and Perceptions on Culturally Responsive STEM Doctoral Mentoring

### **Abstract**

Research has established that effective cross-cultural mentoring relationships impact minority student success in higher education and further career; however, a scarcity of studies focus on culturally responsive practices in mentoring relationships in STEM programs. This paper describes experiences and perceptions on culturally responsive mentoring of faculty in STEM programs, and thus, has a significant contribution to the existing body of literature on mentoring in STEM education. The theoretical framework for this research study was grounded in the ideas posited by sociocultural theory and culturally responsive pedagogy, and the research question that guided this study is as follows: How do STEM doctoral faculty mentors engage in culturally responsive mentoring? A case study research design was used to aid in providing in-depth insights into the dynamic nature of the culturally responsive mentoring journey. The findings reveal three themes that relate to mentoring journeys that mentor and underrepresented minority mentees experience: academic journey, intentional journey, and subliminal journey. This study offers several implications for mentoring and leadership in cross-cultural educational contexts.

**Keywords:** *culturally responsive mentoring, underrepresented minority students, STEM*

## **Introduction**

The U.S. population has become increasingly more diverse; however, higher education institutions continue experiencing racial and ethnic disparities in graduation, educational inequalities, and opportunity gaps, especially in STEM programs. Unfortunately, the graduate student population in STEM fields does not reflect the increasing diversity of the U.S.; for example, African Americans received just 4.5 percent of doctorate degrees in STEM in 2011. Racially minoritized doctoral students, particularly, may feel isolated when embarking on an educational journey. Providing support services, such as mentoring, is crucial to advance racially minoritized student success (U.S. Department of Education, 2016). To be most effective, this mentoring should be culturally responsive. Brown-Nagin (2016) argues that even though higher education institutions strive for increasing diversity in their programs, they face a mentoring gap. Underrepresented racial minority and low-income students face unique challenges in higher education and have unequal access to mentors who can nurture their talents and support them professionally and emotionally throughout their educational journey. With this in mind, this research study makes a significant contribution to the existing body of literature on mentoring in STEM education as it explores experiences and perceptions of six faculty fellows on culturally responsive mentoring of graduate students in the STEM programs.

## **Theoretical Framework**

This study draws on sociocultural theory, originated by Vygotsky (1978). Vygotsky's theory highlights the construction of knowledge is based on social interaction. Sociocultural theory focuses on cultural, social, and historical aspects of learning and meaning making in social contexts. The sociocultural approach guides this research study because it reminds us of the social

nature of learning and development in the mentoring process. The sociocultural approach also informs the research process as it centers on shared understanding and joint construction of knowledge.

Another central theoretical influence in this study is culturally relevant pedagogy (CRP) introduced by Ladson-Billings (1995) and culturally responsive pedagogy (CRP) introduced by Gay (2002). CRP seeks to engage students in learning by connecting students' prior knowledge and cultural experiences, recognizing their various voices, and empowering them to reach their full potential. Ladson-Billings (1995) highlights the importance of teachers "empowering students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes" (p. 18). Gay (2002) adds that it is essential to build a cultural diversity knowledge base about students' heritage, use strategies that validate students' diverse cultures, be a caring, empathetic educator, and incorporate effective, cross-cultural communication skills when fostering culturally responsive environments. Thus, culturally responsive mentoring can be viewed as involving validating contributions of the racially minoritized students' cultural histories, identities, experiences, and worldviews and evaluation of one's own prejudices, biases, and attitudes.

### **Literature Review**

Mentoring can be defined in various ways. For the purpose of this study, mentoring is understood as a journey that mentor and mentee take together and is defined as:

A process whereby one guides, leads, supports, teaches, and challenges other individuals to facilitate their personal, educational, and professional growth and development through mutual respect and trust. An understanding of cultural and gender differences is

critical to the success of the mentoring process. Mentoring is viewed not only as a relationship between two individuals, but as a process. Mentoring is the all-inclusive description of everything that is done to support the protégé's orientation and professional development. It includes creating the relationship, ensuring emotional safety, and providing the cultural norms needed for risk taking for the sake of learning and achieving the desired result of accelerated professional growth. (White-Harp & Cole, 2008, p. 8)

Research has established that effective cross-cultural mentoring relationships impact minority student success in higher education and further career (Davidson & Foster-Johnson, 2001; Estrada, Hernandez, & Schultz, 2018; Fedler, 2010). For example, Davidson and Foster-Johnson (2001) assert that formal mentoring relationships are crucial to advance success of graduate underrepresented minority (URM) students because mentoring can improve socialization and integration in the department, strengthen the professional and social networking, improve graduate student research skills, and prepare them for the future workforce. However, as far as STEM fields are concerned, Hund et al. (2018) assert that even though effective mentoring should be a principal goal of STEM faculty members, departments, and institutions, most scientists receive “little to no training and often lack essential skills for accomplishing this goal” (p. 9974). In addition to the complex situation of insufficient mentoring training for faculty in STEM programs, many URM students experience feelings of isolation and lack of access to mentors, which may result in lower persistence rates and satisfaction in the doctoral programs (Ellis, 2000; Givers, Zepeda, & Gwathmey, 2005). Therefore, despite empirically supported benefits of mentoring in graduate programs and a visible neglect of URM students in mentoring relationships, little research focuses on exploring culturally responsive mentoring relationships (Byars-Winston, 2015; Charleston,

Charleston, & Jackson, 2014). This study seeks to fill a void in the literature and illustrates the faculty's experiences and perceptions on mentoring reflecting principles of culturally responsive mentoring.

### **Methodology**

A qualitative research method is used to uncover and understand “how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences” (Merriam, 2016, p. 5). The preliminary findings presented are drawn from a larger ongoing study, an embedded case study that includes various voices, such as faculty, students, and department leaders. “A case study is an in-depth exploration from multiple perspectives of the complexity and uniqueness of a particular project, policy, institution, program or system in a real life” (Simons, 2009, p. 21). Accordingly, this research design allows for investigating complexity and nuances of mentoring relationships and provides a richer understanding of how participants view the importance and promotion of culturally responsive mentoring. The research question that guided this study is as follows: How do STEM doctoral faculty mentors engage in culturally responsive mentoring?

### **Data Collection**

Six faculty in STEM disciplines from a large, public Southeastern university were interviewed. Each was a participant (faculty fellow) in an NSF funded initiative focused on creating institutional change that supports the development and transition of underrepresented minorities (URM) students into STEM faculty positions. There were four males and two females, with the exception of one Asian all identified as White. They taught in a diverse range of departments: a department of statistics, a department of poultry science, a department of molecular

and structural biochemistry, and a department of chemistry. Data collection included individual, semi-structured interviews. The goal of an individual interview was to gain insights into individual life experiences and perspectives. Each interview lasted from 30 to 90 minutes, were audio recorded and transcribed.

### **Analysis**

A constant comparative method (Glaser & Strauss, 1967) was used to analyze data to discover the central themes across the interview transcripts. The preliminary findings reveal three themes that relate to mentoring journeys that mentors and URM mentees experience: an academic journey, an intentional journey, and a subliminal journey.

#### **Academic Journey**

The first theme that emerged from data analysis reveals that the faculty fellows view mentoring as academic support. During the interviews, they discussed the importance of supporting students academically in their educational journey, for instance, by providing needed guidance to complete the program, assisting with research, supporting them financially via funding opportunities, helping them to network with other students, providing appropriate resources, meeting with students on a regular basis to keep them on track, and offering personal support to improve matriculation in the program. Therefore, mentoring is seen as an academic journey that revolves around moving students through the graduate program.

#### **Intentional Journey**

The second theme that emerged from data analysis reveals that mentoring in graduate STEM programs lacks intentionality. The faculty fellows reported that they received limited training on mentoring, expressed that more training is needed in their departments, and had limited

support for mentoring. Therefore, data revealed that the faculty fellows were aware of the gaps in their knowledge and resources in offering effective mentoring in general and that recognition points to the importance of taking a more intentional journey that would forge a successful culturally responsive mentoring process.

### **Subliminal Journey**

The third theme that emerged from data analysis reveal that mentoring is approached with deficit views, implicit bias, and color blindness. Some faculty fellows view URM students as ill-prepared for the graduate work; others were defensive when asked to talk about diversity in the program; yet, some clearly stated they did not see color when discussing mentoring White versus URM students. These findings hint at lack of culturally responsive mentoring in the STEM graduate programs. The lack of intercultural understanding and unconscious, covert racism may be the cause. Basically, the data implies that the participants strive for understanding their students and help them reach their goals, but do not seem to evaluate their belief systems more critically; therefore, the faculty fellows takes a subliminal journey in their mentoring relationships that is deprived of deeply connecting with their diverse mentees and examining own dispositions.

### **Discussion**

This study explored faculty fellows' experiences and perceptions on mentoring doctoral STEM students. Culturally responsive mentoring as a journey happens in social contexts and involves affirming URM students' backgrounds and views and analyzing one's own dispositions in order to help URM students thrive in the graduate program. The preliminary findings suggest that culturally responsive mentoring is not a journey regularly traveled by the faculty fellows who participated in this study.



This study offers several implications for mentoring and leadership in cross-cultural educational contexts. Even though the sample size is small in this study, the findings indicate there is a desperate need for creating formal mentoring trainings in graduate STEM programs. Such training should engage faculty in analyzing own cultural heritage and how it can impact their work with URM students. Thus, such training should offer a safe space for challenging own belief systems, where faculty can become more cognizant of their biases, privilege, and dispositions. Secondly, this study provides meaningful information about understanding mentoring in general. The findings show that academic advising and mentoring is often used interchangeably and creating formal training workshops that discuss the benefits and practical strategies of mentoring would be helpful in making that distinction. This study sheds light on mentoring in STEM doctoral programs and calls for better understanding of experiences and perceptions on culturally responsive mentoring.

#### Acknowledgements

This material is based upon work supported by the National Science Foundation under Grant Nos. 1820536 182058 and 1820582. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

## References

- Brown-Nagin, T. (2016, May 10). The mentoring gap. *Harvard Law Review*. Retrieved from <https://harvardlawreview.org/2016/05/the-mentoring-gap/>
- Butz, A., Spencer, K., Thayer-Hart, N., Cabrera, I., & Byars-Winston, A. (2018). Mentors' motivation to address race/ethnicity in research mentoring relationships. *Journal of Diversity in Higher Education*. <https://doi.org/10.1037/dhe0000096>
- Byars-Winston, A. (2014). Toward a framework for multicultural STEM-Focused career interventions. (science, technology, engineering, and mathematics). *Career Development Quarterly*, 62(4), 340–357. <https://doi.org/10.1002/j.2161-0045.2014.00087.x>
- Charleston, L. J., Charleston, S. A., & Jackson, J. F. (2014). Using culturally responsive practices to broaden participation in the educational pipeline: Addressing the unfinished business of Brown in the Field of computing sciences. *The Journal of Negro Education*, 83(3), 400–419. <https://doi.org/10.7709/jnegroeducation.83.3.0400>
- Davidson, M., & Foster-Johnson, L. (2001). Mentoring in the preparation of graduate researchers of color. *Review of Educational Research*, 71(4), 549–574. <https://doi.org/10.3102/00346543071004549>
- Ellis, E. (2000). Race, gender, and the graduate student experience: Recent research. *Diversity Digest*, Fall, Retrieved from <http://www.diversityweb.org/Digest/F00/graduate.html>.
- Estrada, M., Hernandez, P., Schultz, P., & Estrada, M. (2018). A longitudinal study of how quality mentorship and research experience integrate underrepresented minorities into STEM careers. *CBE Life Sciences Education*, 17(1), 13. <https://doi.org/10.1187/cbe.17-04-0066>

- Felder, P. (2010). On doctoral student development: Exploring faculty mentoring in the shaping of African American doctoral student success. *Qualitative Report, 15*(3), 455-474. Retrieved from <https://nsuworks.nova.edu/tqr/vol15/iss3/1>
- Gay, G. (2002). Preparing for culturally responsive teaching. *Journal of Teacher Education, 53*(2), 106–116. doi: 10.1177/0022487102053002003
- Girves, J. E., Zepeda, Y., & Gwathmey, J. K. (2005). Mentoring in a post-affirmative world. *Journal of Social Issues, 61*(3), 449-480.
- Glaser, B. G., & Strauss, A. L. (1967). *The discovery of grounded theory: Strategies for qualitative research*. Chicago, IL: Aldine.
- Hund, A., Churchill, A., Faist, A., Havrilla, C., Love Stowell, S., McCreery, H., & Scordato, E. (2018). Transforming mentorship in STEM by training scientists to be better leaders. *Ecology and Evolution, 8*(20), 9962–9974. Retrieved from <https://doi.org/10.1002/ece3.4527>
- Ladson-Billings, G. (1995, September 06). But that's just good teaching! The case for culturally relevant pedagogy. *Theory into Practice, 34*(3), 159-65.
- Simons, H. (2009). *Case study research in practice*. London: Sage.
- U.S. Department of Education. (2016). Advancing diversity and inclusion in higher education. *Office of Planning, Evaluation and Policy Development and Office of the Under Secretary, Washington, D.C.* Retrieved from <https://www2.ed.gov/rschstat/research/pubs/advancing-diversity-inclusion.pdf>

Wright-Harp, W., Cole, P., & Wright-Harp, W. (2008). A mentoring model for enhancing success in graduate education. *Contemporary Issues in Communication Science and Disorders*, 35(1), 4–16. Retrieved from <http://search.proquest.com/docview/85715949/>

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.