

2020

Creating STEM Momentum: Culturally Relevant Leadership and Hispanic Girls in High School T- STEM Programs in the Southwest Border Region

Antoinette Howard

New Mexico State University, matador3@sbcglobal.net

Pamela Gray

New Mexico State University, pgray@nmsu.edu

Kristin Kew

New Mexico State University, kew@nmsu.edu

Follow this and additional works at: <https://scholarworks.sfasu.edu/slr>



Part of the [Educational Leadership Commons](#)

[Tell us](#) how this article helped you.

Recommended Citation

Howard, Antoinette; Gray, Pamela; and Kew, Kristin (2020) "Creating STEM Momentum: Culturally Relevant Leadership and Hispanic Girls in High School T- STEM Programs in the Southwest Border Region," *School Leadership Review*. Vol. 15 : Iss. 1 , Article 19.

Available at: <https://scholarworks.sfasu.edu/slr/vol15/iss1/19>

This Article is brought to you for free and open access by the Journals at SFA ScholarWorks. It has been accepted for inclusion in School Leadership Review by an authorized editor of SFA ScholarWorks. For more information, please contact cdsscholarworks@sfasu.edu.

Title: Creating STEM Momentum: Culturally Relevant Leadership and Hispanic Girls in High School T- STEM Programs in the Southwest Border Region

Abstract

This case study research identified culturally relevant leadership practices that influence the outreach, recruitment, and retention of Hispanic girls in Texas Science, Technology, Engineering, and Math (T-STEM) programs in a School District in the Southwest Border region. Educators have a social justice responsibility to challenge the inequitable social, cultural, and political constructs in their schools and districts and address the unique needs of students who represent underserved racial, ethnic, and cultural groups. Administrators in this study acknowledged the hegemonic structures and barriers they and their students face and share some of their strategies and ideologies for school improvement and equity. Suggestions are made on how to implement culturally responsive and sustaining leadership that can spark and sustain the interest of Hispanic girls to continue their pursuit of higher education and careers in STEM fields.

Introduction

Our nation's future hinges on our ability to prepare our next generation to be internationally competitive and innovators in science, technology, engineering, and math (STEM). The United States is facing an educational crisis in that students are not equipped or prepared to join a workforce that requires strong STEM skills (Arroyo, 2017; Blackburn, 2017; Diamond et al., 2020; Estrada et al., 2016). In Texas, more companies are joining forces to work with schools and communities to change this downhill trajectory. Programs linking local organizations, companies, and schools are challenged with co-creating a more equitable future with our diverse student population where disproportionate numbers of women and students of color are engaged and employed in highly competitive STEM fields (Armstrong et al., 2017; Card et al., 2017; Domann, 2017; García-Peñalvo, 2017; Guy et al., 2019).

The 21st Century has demonstrated a continued shortage of women in the fields of Science, Technology, Engineering, and Math (STEM) as well as numbers of girls participating in STEM programs and activities across the country and worldwide (García-Holgado, 2019; García-Peñalvo, 2019; Lindemann et al., 2016; O'Brien et al., 2020). This generated such campaigns as "Educate to Innovate" created by President Barrack Obama in an effort to expand STEM education and opportunities for underrepresented groups to include girls and women. As a part of the America Competes Act of 2007, billions of dollars in federal funding earmarked specifically for STEM and STEM education reform efforts included: 1) Race to the Top; 2) Investing in Innovation; 3) Educate to Innovate; and 4) STEM P-16 partnerships (Baxter, 2010). In the race for federal STEM funding, Texas was one of the few states that did not apply for these federal funds. One reason was that Texas had already developed an extensive STEM network of schools and centers that dated back to 2005.

Texas responded to the nation's call to increase the STEM talent pool when governor, Rick Perry, issued Executive Order RP 53 to create the Texas-STEM (T-STEM) initiative under the auspices of the Texas High School Project (THSP) (Office of the Governor, 2005). Initially, the T-STEM project was funded with 180 million dollars from a public private consortium consisting of contributors from the Texas Education Agency, federal funds, the Bill & Melinda Gates Foundation, the Michael & Susan Dell Foundation, the Communities Foundation of Texas, educators, and others (Texas Education Agency, 2005). As part of the initial requirements for receiving grant funding, each T-STEM Academy had to adhere to the T-STEM Blueprint which addressed seven areas of reform: 1) Mission-Driven Leadership; 2) T-STEM Culture; 3) Student Outreach, Recruitment and Retention; 4) Teacher Selection, Development and Retention; 5) Curriculum, Instruction and Assessment; 6) Strategic Alliances; and 7) Academy Advancement and Sustainability. In 2010, the T-STEM project consisted of 51 T-STEM Academies, 7 T-STEM Centers, and the T-STEM Network (Dee Chambliss, THSP Program Officer, personal communication, August 5, 2010).

Although the participation and success of females and males in STEM courses generally begins on equal footing in Grades K-6, there is a trend that females participate in STEM courses less as they progress through Grades 7-12 (Brown, Ernst, Clark, DeLuca, & Kelly, 2017). Research has shown that females and males earn similar grades in middle and high school STEM courses; however, females' self-efficacy in STEM academics is lower than males' (MacPhee,

Farro, & Canetto, 2013). It is important to note that there are barriers that discourage female participation, including their own negative perceptions of their abilities in STEM (Weber, 2012), implicit stereotypes of gender association with STEM fields (Lane, Goh, & Driver-Linn, 2012), and cultural biases and restrictions (Zuga, 1999). According to a study by Weber (2012), both males and females performed equally in STEM subjects, used STEM-based resources, and participated in after-school activities to an equal degree; however, males perceived that they had higher capabilities in STEM subjects than did females. All of these factors can have a direct effect on how few women choose to study a STEM discipline in college and go into the workforce in a STEM field and may have direct correlation on some of the challenges Hispanic girls may face when they choose to pursue programs in science, technology, engineering, and math (STEM). Unfortunately, gender stereotypes and false beliefs persist despite actual abilities. Teachers can play a pivotal role in shifting these perceptions, and there are a variety of tactics that can be employed to foster a positive and gender-neutral classroom environment (Brown, et al, 2017; O'Brien et al., 2020; Smith et al., 2018).

Administrators themselves are influenced by the dominant culture and are subject to the same kind of hidden curriculum about discipline and control that teachers and students experience (Gordon & Ronder, 2016). Like teachers, they not only experience but also reproduce, sometime unwittingly; conditions of hierarchy and oppression, in particular by fostering complaint thinking instead of critical reflection (DiBella et al., 2016). Consequently, administrators should be concerned with increasing the intellectual STEM capital of Hispanic girls, developing the P-20 STEM pipeline, and contributing to increased student achievement in math and science. This could serve as a framework for creating positive school climates that are safe and supportive and assist in developing a clear vision and mission that incorporates a culture of collective trust and responsibility with responsiveness and reflection in order provide continuous improvement while overcoming discriminatory practices experienced by marginalized students.

Culturally responsive leadership in STEM fields

As the nation's population transitions to a majority minority by 2050 (U.S. Census Bureau, 2004), it is imperative to consider the human capital development of minority students in STEM fields. As a group, minorities have traditionally been underrepresented in the science and engineering disciplines (National Science Board, 2007) with less than 10% of the science and engineering jobs held by minorities (National Science Foundation, 2008). In addition, even though women constitute over half of the post-secondary students, they represent only 25% of the science and engineering workforce (National Science Foundation, 2008). Furthermore, a disproportionate number of women and minorities opt out of science and engineering majors before completing their degrees (Ohland, Zhang, Thorndyke, & Anderson, 2004). This silent epidemic of underrepresentation of minorities and women in STEM fields (US Department of Education, 2003; Whalen & Shelley II, 2010) highlights the reality that American education is unequal and bleak for many (Blanchett & Mumford, 2005; Beachum & Obiakor, 2005). Some authors (Ford & Webb, 1995; Hilliard, 1992) even suggest that the underrepresentation of culturally diverse students in rigorous education relates to efforts to perpetuate school segregation and white hegemonic practices. As such, studying educational leadership practices in

implementing the goals of STEM schools is critical to understanding and improving equitable access for Hispanic girls (Lindemann et al., 2016; Lopez, 2020).

The purpose of this qualitative research study was to identify culturally responsive leadership competencies that positively influence the outreach, recruitment, and retention of Hispanic girls in Texas Science, Technology, Engineering, and Math (T-STEM) programs in a school district in the Southwest Border region. Recent analyses indicate that during the next five years, major American companies will need to add a total of nearly 1.6 million employees to their workforce: 945,000 who possess basic STEM literacy and 635,000 who demonstrate advanced STEM knowledge (Business Roundtable & Change the Equation, 2014). Other data suggest that at least 20 percent of U.S. jobs require a high level of knowledge in any one STEM field (Rothwell, 2013). Even outside of the traditional STEM job sector, there is a need for STEM competencies and skills. To further understand and unpack this significant issue as well as fill a gap in the literature, the main research question for this case study research was: How do culturally responsive leadership practices of administrators influence the outreach, recruitment, and retention of Hispanic girls in high school T-STEM programs in a school district in the Southwest Border region?

Significance of the Study

The increasing emphasis on culturally relevant, responsive, and competent leadership in schools is a necessity as the percentages of school children representing a diversity of racial, ethnic, and linguistic populations increase in the United States (Horsford, Grosland, & Gunn, 2011). Administrators should be motivated to take action and be responsible for realizing that “good” instructional behaviors may differ from one cultural group to another. They have to understand the interconnectedness of power relationships and cultural relationships in schools, and how power relationships marginalize some cultural groups (Gordon & Ronder, 2016). STEM learning fosters skills and growth mindsets among all students that lead to lifelong learning and opportunities for postsecondary and career success, while expanding access to rigorous STEM courses. There are challenges to innovation but there must be more targeted starting points upon which key stakeholder groups, including policymakers, researchers, educators, and industry leaders, as well as the broader public, can build.

According to the STEM Ed Coalition (2010), reform in STEM, intellectual capital development is critical to the nation’s ability to remain globally competitive. It is imperative to understand ways that culturally responsive leadership practices in T-STEM schools in the Southwest Border Region can influence and close some of the gaps between higher education requirements, standardized state assessments, and the demands of critical thinking skills requisite in STEM fields.

Children, families, teachers, and school leaders bring varied cultural assumptions, perspectives, experiences, and expectations to the school environment, and as a result, “subcultures” in schools often develop naturally around content areas, grade levels, and among educated and students who share specific values not fully held by the larger group (Brooks & Normore, 2010). Administrators can help students understand the relevance of STEM to their lives and to see the value in addressing issues that better their own lives and the lives of others. There is a need for continued research and the development of strengthened culturally responsive

leadership practices in the area of STEM that address the needs of diverse student populations in particular Hispanic girls that were less likely to aspire to pursuing STEM pathways in high due to gender stereotypes and biases (Schuster & Martiny, 2017).

Theoretical Framework

This study looked at how the culturally responsive leadership practices of administrators influence the outreach, recruitment, and retention of Hispanic girls in high school T-STEM programs in a school district in the Southwest Border region. The epistemologies, attitude, and assumptions of administrators concerning race and culture, and their implications for learning influence the outreach, recruitment, and retention of Hispanic girls to the high school T-STEM program was also considered. The foundation of and theoretical framework for this research is Critical Race Theory as the goal of our work as scholars is to challenge white hegemonic practices, particularly in educational leadership and administration, by offering counternarratives through critical research.

This research critically assesses the authenticity of school leaders and their relationships with Hispanic girls in T-STEM schools to identify culturally responsive leadership practices that uplift these underrepresented students. A goal of Critical Race Theory is to challenge existing epistemologies and transform the relationship among race, racism, and power and includes the following tenets: racism is ordinary and inherent in our society; our system of white over color ascendancy serve important purposes for the dominant group; races are categories that society invents, manipulates, or retires when convenient; the dominant society racializes different minority groups at different times in response to different and self-sustaining needs; and the notion of a unique voice of color (Delgado & Stefancic, 2017). The specific culturally responsive leadership practices that contribute to sustainable change in the outreach, recruitment, and retention of Hispanic girls to the high school T-STEM program and what district/campus policies and/or procedures promote or hinder the outreach, recruitment, and retention of Hispanic girls to the high school T-STEM programs.

Review of the literature

As a part of the America Competes Act of 2007, billions of dollars in federal funding earmarked specifically for STEM and STEM education reform efforts included: 1) Race to the Top; 2) Investing in Innovation; 3) Educate to Innovate; and 4) STEM P-16 partnerships (Baxter, 2010). The complexities of today's world require all people to be equipped with a new set of core knowledge and skills to solve difficult problems, gather and evaluate evidence, and make sense of information they receive from varied print and, increasingly, digital media. The learning and doing of STEM help develop these skills and prepare students for a workforce where success results not just from what one knows, but what one is able to do with that knowledge. Thus, a strong STEM education is becoming increasingly recognized as a key driver of opportunity, and data show the need for STEM knowledge and skills will grow and continue into the future. Those graduates who have practical and relevant STEM precepts embedded into their educational experiences will be in high demand in all job sectors.

It is estimated that in the next five years, major American companies will need to add nearly 1.6 million STEM-skilled employees (Business Roundtable & Change the Equation,

2014). Labor market data also show that the set of core cognitive knowledge, skills, and abilities that are associated with a STEM education are now in demand not only in traditional STEM occupations, but in nearly all job sectors and types of positions (Carnevale, Smith, & Melton, 2011; Rothwell, 2013). The nation has persistent inequities in access, participation, and success in STEM subjects that exist along racial, socioeconomic, gender, and geographic lines, as well as among students with disabilities. STEM education disparities threaten the nation's ability to close education and poverty gaps, meet the demands of a technology-driven economy, ensure national security, and maintain preeminence in scientific research and technological innovation.

In recognition of the widening skills and opportunity gaps in STEM, the Obama Administration has initiated several efforts to motivate action. In 2010, President Obama announced the launch of Change the Equation, a CEO-led effort to improve STEM education, as part of the Administration's larger Educate to Innovate campaign. In addition, under this Administration, the Committee on STEM Education (CoSTEM), comprised of several federal agencies—including all mission-science agencies and the Department—is facilitating a cohesive national strategy to increase the impact of federal investments in STEM teaching and learning. In 2013, CoSTEM put out a Five-Year Federal Science Technology, Engineering, and Mathematics Education Strategic Plan. In January 2016, Obama announced a bold Computer Science for All initiative; and the Elementary and Secondary Education Act (ESEA), as reauthorized under the Every Student Succeeds Act (ESSA) in December 2015, identifies all four STEM disciplines, including engineering and computer science, as fundamental components of a well-rounded education for all children. ESSA also includes provisions to promote local innovation and investments in what works to improve STEM teaching and learning.⁴ These are just a few examples of the focused attention being placed on STEM at the national level to generate change and improvement at the state and local levels.

Women's representation is low at all levels of the STEM career pipeline from interest and intent to majoring in a STEM field in college to having a career in a STEM field in adulthood. However, in recent years there has been little change with regard to the presence of women faculty in STEM fields in spite of the increase of women with terminal degrees in these disciplines (Xu, 2008). Research has shown that the greatest influences on and determinants of success in STEM disciplines for women students is access to same gender role models. Additionally, reports indicate that same gender and same race mentoring often involves stronger psychosocial support that may yield better career outcomes (Rankins, Rankins, & Inniss, 2014). There has to be continued outreach programs in order to provide girls with positive images of careers in STEM fields. Outreach materials to include posters, flyers, and brochures of female role models are limited. Some argue that widespread success in technical fields of enquiry is evidence that there is nothing wrong with the status quo. There is dispute that every person should have equal opportunity to learn and work in a discipline he or she chooses. As long as women remain underrepresented in STEM, a substantial number of intelligent women are pursuing other careers therefore making the chances significant changes and solutions to human problems to occur (Blickenstaff, 2005). The research indicates that reaching out to counselors is critical because they can provide a pipeline for female students to STEM programs so that instructors and administrators do not have to do all the recruiting directly. Instructors and administrators can provide counselors at their own schools and feeder schools with career

information and marketing materials that feature female role models on the job (Milgram, 2011). In addition to seeing these female role models, girls must also know that there can be a balance between work and life.

Methods

As policy implementers, school and district leaders must not only be capable of administering federal, state, district, and school-based politics and procedures but also must be equipped to discern and analyze the educational ideologies, philosophical assumptions, and political perspectives that both underlie and frame such policies and practices (Aleman, 2010). Knowledge-based economy is important in order to stay globally competitive (Johnsen, 2004). With the increase of minority populations in the country, the continued disparity of inequitable access to knowledge capital negatively affects the future of our economic prosperity.

In order to identify culturally responsive leadership practices that positively influence the outreach, recruitment, and retention of Hispanic girls in Texas Science, Technology, Engineering, and Math (T-STEM) programs in a school district in the Southwest Border region, a qualitative case study approach was employed (Baxter & Jack, 2008; Creswell, 2013; Miles & Huberman, 1994; Stake, 1995). The case study method allowed researchers to view the comprehensive and multi-layered characteristics of real-life events such as group behavior, managerial processes and school performance (Creswell, 2013; Yin, 2014). Data collection through semi-structured interviews (Ravitch & Carl, 2016) allowed the researchers to respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic. The participants were four administrators working in the T-STEM designated high schools in the district, chosen through semi-purposive sampling. These administrators volunteered and responded to an email invite sent through the district listserve. The interviews conducted with these school leaders were essential in gathering data about the behavior, perceptions and feelings of individuals regarding their educational environment while determining if culturally responsive leadership practices contribute or influence Hispanic girls in these T-STEM programs. In addition to utilizing a digital recorder during the interview process, we utilized observational notes taken during the interview in order to be reflexive. Marshall & Rossman's (2011) method of triangulation of sources was used and reflexive journaling was practiced in order to document the progress of the learning through this research study. Regular entries throughout the research process were made in order to record decisions and reasons for them, logistics of the study, and track any reflections (Yin, 2014).

Findings

The findings of this research support beliefs of critical educational change and research in the area of educational administration for creating positive school climates that are safe and supportive and assist in developing a clear vision and mission that incorporates a culture of collective trust and responsibility with responsiveness and reflection. In order provide continuous improvement while overcoming discriminatory practices experienced by marginalized students, this research looked at how culturally responsive leadership practices of administrators influence the outreach, recruitment, and retention of Hispanic girls in high school T-STEM programs in a school district in the Southwest Border region. Principals shared their thoughts on culturally

responsive leadership, equitable representation of under-represented groups in STEM initiatives and coursework as well as their social justice based personal and school missions.

There were three main themes that emerged from this research: 1. Promoting inclusive school environments, 2. Self-determination and community empowerment, and 3. Developing and sustaining culturally responsive teachers. The first theme of promoting inclusive, anti-oppressive context demonstrated a need to practice an anti-oppressive stance and explicitly include a commitment to advocating for the inclusion of traditionally marginalized students. This theme aligns with Khalifa's (2019) work in that leaders must be critically self-aware or knowledgeable about racism and other histories of oppression. The second theme of self-determination and community co-empowerment showed that leadership in schools should happen in close collaboration with communities, and it should co-empower children and families through a shared leadership style where everyone was a part of the larger whole. The third theme of developing and sustaining culturally responsive teachers and curricula showed the beliefs of the principals in fighting systemic racism and how the structure can and should be re-worked to develop culturally responsive teachers, administrators, and community. This is in line with Khalifa's (2016) work on the importance to school and community climate and being an active anti-racist.

To one of the principals, culturally responsive leadership was “doing what was best for all of their students, regardless of their background, their ethnicity, their race, and just making sure that we understand that a student is just as important as that student next to them.” To the other principals, it was about representation of all students in school activities and courses,

“I'm very conscious of making sure that everybody's represented, particularly Hispanic females. I did most of my elementary in Mexico. So, I really didn't learn how to speak English until I was like 11. So, I'm very conscious of how I felt. I'm very conscious of being seen as an outsider. So that's always made me very conscious of making sure that everybody's represented right.” Success and equity were translated in terms of accomplishing espoused goals and providing pathways to leadership opportunities for students.”

“I think when it comes to student success, I think the biggest thing is for students to be able to accomplish the goals and what they're set out to do. I'm a big proponent of not putting students in a box, but opening the frontiers and allowing them to choose, whether it is that they want to go to a post-secondary or join the military, that they're not limited by somebody else's advice or somebody else's choices.”

“I do truly believe, especially in our STEM Academy, that it should be student-led. It should be run by students. We get to facilitate it, we get to open doors, but really the active participants should be our students.”

Principals wanted to provide opportunities and a strong sense of responsibility for all of their students to be active participants in the process and adults needed to be open-minded and listen to student ideas.

“We are a student led campus. We listen to the needs of our students and when they say we want an aerospace program, we want a computer science program, we make it happen for them. And because of the community, I would say that a lot of the parents are pushing their sons and daughters to, to open up and to take those classes. So, we get their support.”

“Student success to me is when you are excelling at things that you didn't think that you could do. Student success is when you challenge yourself to, to do something that you're not trained to do, to take on those challenges. The counter to that, to me, failure and I always tell my kids this is when you blame everyone else for your shortcomings. It's okay to fail a class. It's okay not to pay a bill. It's okay to, to fall every now and then cause you've got to get back up. But when we start blaming other people for things that you didn't achieve, that's when you failed. And so that's, that's my definition of student success. You take on the responsibility and you own it.”

One Latina principal acknowledged the challenges faced by her Hispanic students and took an asset-based stance on school administration and culturally responsive and culturally sustaining leadership,

“Yes, there are definitely barriers for Hispanic girls. Like I said, I encounter them daily as a Hispanic woman. The greatest barrier is fear, many in the Hispanic culture don't want their daughters to leave home to go away to college or even go to college because the family feels they shouldn't leave the home unless they are getting married. We have so many gifted and talented girls in our school that excel academically and athletically but when they are given scholarships if it isn't at UTEP many times their family doesn't want or allow them to go. Now don't get me wrong there is nothing wrong with UTEP but sometimes our kids need to be exposed to other things outside of this city. It only better equips them to deal with some of the challenges in the world. Grant you it is getting better but there is a constant battle that occurs and sometimes these girls miss out on opportunities because of this fear.”

This principal described student success as the student achieving the goals students have set for themselves with regard to their academics, social, and future life. She indicated that as an assistant principal she is sometimes confined to the traditional indicators of student success which usually is measured by state mandated tests however, in working with students in the T-STEM program, she has found that success can be measured in many ways such as improving their presentation skills, learning to work as a team to solve problems, thinking of ways to improve something that may be challenging, and learning to think outside the box. She felt that all students could achieve a level of success regardless of their ability or disability, racial identity, or neighborhood that they lived in. With regard to ensuring success for Hispanic girls in the T-STEM program, she shared:

“For the girls in the T-STEM program, we have a mentor program. Each freshman girl is assigned a mentor since we are only in our second year they are assigned to a sophomore.

The mentors are charged with the responsibility of checking in weekly with their mentee. They celebrate birthdays, tutor, and encourage them to participate in activities. So far, the program seems to be really instilling confidence in the girls. The teachers we have in the program are also an integral part of the success of the students. Being in a STEM Academy, they are aware of the state and national data with regard to girls. We are a data driven district so there is a constant effort to put supports in place so that students can be successful. We do have challenges, but we continue to work toward ensuring that girls in the program are successful.”

To her, culturally responsive leadership meant that as a leader you “acknowledge, respect, and celebrate the different variables that students bring to school. It may be their culture, values, traditions, etc. You find various ways to model the importance of diversity and encourage and empower your teachers to do the same as they work with students through instruction.”

Analysis

The rich cultural diversity of students and families represented in today’s U. S. public school system requires school leaders who possess the knowledge, skills, and disposition to work for and with diverse communities (Theoharris, 2009). Schools have been described as spaces of cultural conflict where different values, beliefs, and norms create discord and as spaces of cultural cohesion where educators and students create understanding and sustain harmony (Beachum & McCray, 2011; Horsford, 2010). In an effort to gather a better understanding of the themes and how to identify culturally relevant leadership practices that influence the outreach, recruitment, and retention of Hispanic girls in T-STEM programs in the Southwest Border Region, two theoretical frameworks were utilized. Critical race theory through the lens of culturally responsive school leadership provided insights into the intersectionality between the two theories allowing for a multidimensional view of oppressions and recognized that race alone cannot account for disempowerment. It recognizes the complex ways that intersectionality provides the opportunity to examine race, sex, class, national origin, sexual orientation and how their combination can influence various settings or systems of power. The cultural and racial identities of students and those who serve them have long continued to represent not only a demographic divide (Milner, 2007), but growing degrees of cultural mismatch, which occurs when student’s experiences incompatibility between their school and home cultures.

Culturally responsive school leaders are responsible for promoting a school climate inclusive of minoritized students, particularly those marginalized within most school contexts. Such leaders also maintain a presence in, and relationships with, community members they serve. They lead professional developments to ensure their teachers and staff, and the curriculum, are *continuously* responsive to minoritized students. A number of studies have been conducted on culturally responsive teaching/pedagogy (Gay, 2010; Ghong, Saah, Larke, & Webb-Johnson, 2007; Weaver, 2009) in an effort to understand strategies teachers use to help their culturally diverse students learn without devaluing students’ cultural beliefs. This is paramount to developing culturally responsive school leaders and curricula. School leaders, in turn, are responsible for ensuring that their teachers are culturally responsive, and that the vision

of the school imbues cultural responsiveness (Khalifa, 2011; Murtadha-Watts & Stoughton, 2004; Riehl, 2000). Educational administrators at the school and district level and building principals in particular are key to establishing and fostering the culture and climate of their schools, their epistemologies, attitudes, and assumptions concerning race, culture, and their implications for learning, must be an important part of the discourse concerning culturally relevant and antiracist education.

Culturally responsive leadership influences the school context and addresses the cultural needs of the students, parents, and teachers. Culturally relevant leadership fosters an environment where students and teachers can learn in a manner that best fits them, and it emphasizes several propositions that ask educators to think about and practice their work a bit differently than is typically the case (Fraise & Brooks, 2015). Culturally responsive leadership influences the school context and addresses the cultural needs of the students, parents, and teachers. The participants acknowledged the importance of understanding the school community and being open to building relationships for the betterment of the school. Two of the participants, both principals felt it was paramount to open the school doors to the community allowing parents and professionals to come in and share in the learning experiences of students as a way to foster better opportunities for all. Both principals saw themselves as not only school leaders but community leaders. This kind of advocacy empowers students academically and socially by strengthening opportunities for families and communities (Khalifa, 2019).

Knowledge-based economy is important in order to stay globally competitive. However, access to this knowledge capital historically denied to minority students in particular girls continues to flourish (Johnsen, 2004). With the increase of minority populations in the country the continued disparity of inequitable access to knowledge capital, negatively affects the future of our economic prosperity.

Concluding thoughts

This research revealed that school leaders in our context are aware of the importance of students being valued and feeling safe in the school learning community. This type of school environment makes students feel safe enough to be themselves and concentrate on learning in a culturally safe environment. There are so many diverse groups of students on a high school campus that for some students it may be hard to find a group or place to belong. Leaders combine knowledge with communication skills and openness to school personnel and families. They are visionaries who imagine a better world and work to change others' beliefs and values tenaciously applying a combination of democratic and principal- initiated change (Gordon & Ronder, 2016). Schools reside in communities, in fact, many reside in the heart of a neighborhood. The study revealed that principals and assistant principals see themselves as part of these communities and therefore, community leaders, similar to Theoharis' (2010) study that found that responsive school leaders used specific strategies to disrupt injustice, including changing school structures, professionalizing teachers, connecting with the community and families, and improving achievement of diverse groups.

To promote culturally responsive schools there has to be relationship building, persistence and persuasiveness, modeling, school-wide presence and communication, fostering responsiveness among others, and showing care for others. The participants shared that campus walkthroughs, conversations in the school and community with students, teachers, parents, and other community members, review of curriculum materials, lessons plans, student work, achievement data, and office referral data were vital to determining the pulse of the campus and ensuring success for Hispanic girls in the T-STEM program.

Culturally responsive leadership requires the principal or assistant principal to make an effort to understand the teachers they work with, both on a cultural and a personal level. Culturally relevant pedagogy assumes that knowledge is co-constructed by leaders, educators, students, and community members and educators as they learn together in context. This has implications for the ways that culture shapes instruction and curricula, both formally and informally. navigate curriculum and instruction that addresses the diversity and required skills to enter the workforce. There continues to be debates concerning high stakes accountability in schools, school choice policy, race-conscious assignment plans, special education placements, the education of undocumented students, and funding for English learner programs these are but a few examples of the educational issues that have important implications for administrators and their ability to serve these diverse student populations in the school community. This research continues to fill a gap in the area of educational leadership and cultural responsiveness in diverse community settings that can be shared to encourage both further growth in the literature in the area and the creation of culturally responsive frameworks that better represent those most impacted by inequities in our school systems. This work contributes to a major social justice issue in the field of education and the future representation of Hispanic women in the STEM work and research.

References

- Ahram, R., Fergus, E., & Noguera, P. (2011). Addressing racial/ethnic disproportionality in special education: Case students of suburban school districts. *Teachers College Record*, 113(10), 2233-2266.
- Aleman, E. (2010). The politics of equity, adequacy, and educational leadership in a (post) racial America. In S. Douglass Horsford (Ed.), *New perspectives in educational leadership: Exploring social, political, and community contexts and meaning* (pp. 127-152). New York: Long.
- Armstrong, M. A., & Jovanovic, J. (2017). The intersectional matrix: Rethinking institutional change for URM women in STEM. *Journal of Diversity in Higher Education*, 10(3), 216.
- Arroyo, J. L. (2017). *Latina women in stem: a critical analysis of Ph. D. students' experiences* (Doctoral dissertation).
- Augustine, N. R. (2005, October). Testimony to Committee on Science, U.S. House of Representatives, 109th Congress re: *Rising above the gathering storm: Energizing and employing America for a brighter economic future*. Retrieved May 5, 2017 from http://www7.nationalacademies.org/ocga/testimony/gathering_storm_energizing_and_employing_america2.asp
- Augustine, N. R. (2007). *Is America falling off the flat earth?* Washington, D.C.: The National Academies Press.

- Basile, V., & Murray, K. (2015). Uncovering the need for diversity among k-12 stem educators. *Teacher Education and Practice*, 28(2/3), 255-267.
- Baxter, M. (2010, June). *Exploring STEM policy: Feedback from the field*. Paper presented at the Texas High School Project's T-STEM Leadership Conference, Dallas, TX.
- Beachum, F. D., & Obiakor, F. E. (2005). Educational leadership in urban schools. In F. E. Obiakor & f. D. Beachum (eds.), *Urban education for the 21st century: Research, issues, and perspectives* (pp. 83-99). Springfield, IL: Charles C Thomas.
- Berkowicz, J. & Meyers, A. (2016). What is educational leadership? *Education Week Blog*.
- Blackburn, H. (2017). The status of women in STEM in higher education: A review of the literature 2007–2017. *Science & Technology Libraries*.
- Blanchett, W., Mumford, V., & Beachum, F. D. (2005). Urban school failure and disproportionality in a post-Brown era: coincidence or conspiracy. *Remedial and Special Education*, 26(2), 70-81.
- Blickenstaff, J. C. (2005). Women and science careers: leaky pipeline or gender filter? *Gender and Education*, 369-386.
- Brand, B., & Kasarda, M. (2014). The influence of social interactions on female students retention in two engineering programs. *Insights on Learning Disabilities*, 11(1), 33-45.
- Brooks, J.S. & Normore, A. H. (2010). Educational leadership and globalization: Literacy for a

- global perspective. *Educational Policy*, 24(1), 52-82.
- Brown, R., Ernst, J., Clark, A., DeLuca, B., & Kelly, D. (2017). Engaging females in stem. *Technology and Engineering Teacher*, November, 29-31.
- Buschor, C. B., Berweger, S., Frei, A. K., & Kappler, C. (2014). Majoring in STEM-What Accounts for women's career decision making? A mixed methods study. *The Journal of Educational Research*, 167-176.
- Business Roundtable & Change the Equation. (2014). Business Roundtable/Change the Equation Survey on U.S. Workforce Skills: Summary of findings. Washington, DC: Authors. Retrieved from [http://changetheequation.org/sites/default/files/2014%20BRT-CTEq%20Skills%20Survey%20 Slides.pdf](http://changetheequation.org/sites/default/files/2014%20BRT-CTEq%20Skills%20Survey%20Slides.pdf).
- Bystydzienski, J. M., Eisenhart, M., & Bruning, M. (2015). High School Is Not Too Late: Developing girls' interest and engagement in Engineering careers. *The Career Development Quarterly*, 88-95.
- Cantor, N., Mack, K., McDermott, P., & Taylor, O. L. (2014). If Not Now, When? The promise of STEM intersectionality in the twenty-first century. *AAC&U*, 29-31.
- Card, D., & Payne, A. A. (2017). High school choices and the gender gap in STEM. *Economic Inquiry*.
- Carnevale, A., Smith, N., & Melton, M. (2011). *STEM*. Washington, DC: Georgetown University Center on Education and the Workforce. Retrieved from <http://cew.georgetown.edu/stem>.

Chang, J. (2014). Young women avoid STEM careers due to negative images, stereotypes. *Control Engineering*, 34.

Council on Competitiveness. (2005). *Innovate America: National innovation initiative summit and report*. Washington, DC: Council on Competitiveness.

Council of Graduate Schools. (2007). *Graduate Education: the backbone of American Competitiveness and Innovation*. Retrieved April 30, 2017 from http://www.cgsnet.org/portals/0/pdf/GR_GradEdAmComp_0407.pdf

Creswell, J. W. (2013). *Qualitative inquiry & research design: Choosing among five approaches* (3rd ed.). Thousand Oaks, CA: Sage.

DeJarnette, N. K. (2012). America's Children: Providing early exposure to STEM (Science, Technology, Engineering and Math) initiatives. *Education*, 77-84.

Diamond, A. H., & Kislev, E. (2020). Perceptions of science and their effects on anticipated discrimination in STEM for minority high-school students. *Cambridge Journal of Education*, 1-18.

Di Bella, L., & Crisp, R. J. (2016). Women's adaptation to STEM domains promotes resilience and a lesser reliance on heuristic thinking. *Group Processes & Intergroup Relations*, 19(2), 184-201.

Domann, M. (2020). Los Angeles County Public Works' STEM Outreach Program and Female

Students' Decision to Pursue a Degree in STEM (Doctoral dissertation, California State University, Northridge). Last accessed on October 1, 2020 at:

<http://scholarworks.csun.edu/bitstream/handle/10211.3/217239/Domann-Mackenzie-thesis-2020.pdf?sequence=1>

Estrada, M., Burnett, M., Campbell, A. G., Campbell, P. B., Denetclaw, W. F., Gutiérrez, C. G.,

... & Okpodu, C. M. (2016). Improving underrepresented minority student persistence in STEM. *CBE—Life Sciences Education*, 15(3), es5. Last accessed on October 1, 2020 at:

<https://www.lifescied.org/doi/pdf/10.1187/cbe.16-01-0038>

Ford, D. Y., & Webb, K. (1995). Desegregating gifted education: A need unmet. *Journal of Negro Education*, 64, 52-56.

Fouad, N. A., & Santana, M. C. (2017). SCCT and underrepresented population in STEM fields: Moving the needle. *Journal of Career Assessment*, 27, 24-39.

Fraise, N. J., & Brooks, J. S. (2015). Toward a theory of culturally relevant leadership for school-community culture. *International Journal of Multicultural Education*, 17(1), 6-21.

García-Holgado, A., Díaz, A. C., & García-Peñalvo, F. J. (2019, October). Engaging women into

STEM in Latin America: W-STEM project. In Proceedings of the Seventh International Conference on Technological Ecosystems for Enhancing Multiculturality (pp. 232-239).

Last accessed on October 1, 2020 at:

<https://gredos.usal.es/bitstream/handle/10366/140307/W-STEM-postprint.pdf?sequence=1&isAllowed=y>

García-Peñalvo, F. J. (2019). Women and STEM disciplines in Latin America: The W-STEM

European Project. Last accessed on October, 1, 2020 at:

<https://repositorio.grial.eu/bitstream/grial/1706/1/editorial.pdf>

García-Peñalvo, F. J. (2019). Innovative Teaching Approaches to attract, engage, and maintain

women in STEM: W-STEM project. Last accessed on October 1, 2020 at:

<https://repositorio.grial.eu/bitstream/grial/1787/1/w-stem.pdf>

the Community, 47(4), 354-365.

Glickman, C. D., Gordon, S. P., & Ross-Gordon, J. M. (2014). *Supervision and instructional leadership: A developmental approach* (9th ed.). Boston, MA: Allyn & Bacon.

Gordon, S.P., & Ronder, E. A. (2016). Perceptions of Culturally responsive leadership inside and outside of a principal preparation program. *International Journal of Educational Reform*, 25, 125-153.

Goals 2000: Educate America Act, Public Law 103-227, 103rd Congress (1994).

Guy, B., & Boards, A. (2019). A seat at the table: Exploring the experiences of underrepresented minority women in STEM graduate programs. *Journal of Prevention & Intervention in*

- Hansuhek, E. A. (2005). *Economic outcomes and school quality*. Paris, France: The International Institute for Educational Planning. <http://www.unesco.org/iiep>
- Hargreaves, A. (2003). *Teaching in the knowledge society: Education in the age of insecurity*. New York, New York: Teachers College Press.
- Hilliard III, A. G. (1992). The pitfalls and promises of special education practice. *Exceptional Children*, 49(4), 168-172.
- Horsford, S. D., Grosland, T., & Gunn, K.M. (2011). Pedagogy of the personal and professional: toward a framework for culturally relevant leadership. *Journal of School Leadership*, 21, 582-606.
- Hoske, M. T. (2014). Fail on your way to a satisfying engineering career. *Control Engineering*, 8.
- Johnsen, S. K. (2004). *Identifying gifted students: A practical guide*. Waco, TX: Prufrock Press.
- Johnson, C. C. & Fargo, J. D. (2010). Urban school reform through transformative professional development: Impact on teacher change and student learning of science. *Urban Education*, 45(1), 4-29.
- Lindemann, D., Britton, D., & Zundl, E. (2016). "I don't know why they make it so hard here": Institutional factors and undergraduate women's STEM participation. *International Journal of Gender, Science and Technology*, 8(2), 221-241.

- Lopez, A. A. (2019). *Entrelazar: The Lived Experiences of Latinas Who Attained an Undergraduate Degree in Engineering at a Hispanic-Serving Institution in the Southwest Border Region—a Phenomenological Qualitative Study* (Doctoral dissertation, New Mexico State University).
- Mansfield, K. C. (2014). Creating smooth spaces in striated places: Toward a global theory for examining social justice leadership in schools. In I. Bogotch & C.M. Shields (Eds.) *International Handbook of Educational Leadership and Social (In) Justice* (p. 37-50). Dordrecht, The Netherlands: Springer.
- Marshall, C., & Rossman, G. B. (2011). *Designing qualitative research*. Thousand Oaks, CA: Sage.
- Merriam, S. (2009). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.
- Merriam, S.B. (1998). *Qualitative research and case study applications in education: revised and expanded from case study research in education*. San Francisco, CA: Jossey-Bass.
- Merriam, S.B. & Tisdell, E.J. (2016). *Qualitative research: A guide to design and implementation*. San Francisco, CA: Jossey-Bass.

- Milgram, D. (2011). How to Recruit Women and Girls to the Science, Technology, Engineering, and Math (STEM) Classroom. *Technology and Engineering Teacher*, 4-11.
- Mills, C., & Keddie, A. (2012). Fixing student deficit in context of diversity: Another cautionary tale for pre-service teacher education. *International Journal of Pedagogies & Learning*, 7(1), 9-19.
- Mau, W.C. J., & Li, J. (2018). Factors influencing stem career aspirations of underrepresented high school students. *The Career Development Quarterly*, 66, 246-258.
- Micari, M., & Drane, D. (2007). Promoting success: possible factors behind achievement of under-represented students in a peer led small group STEM workshop program. *Journal of Women and Minorities in Science and Engineering*, 13, 295-315.
- National Science Board. (2007, October 30). *Memorandum from the chairman of the National Science Board re: A national action plan for addressing the critical needs of the U.S. science, technology, engineering, and mathematics education system*. Retrieved June 19, 2017 from the National Science Board Web site:
http://www.nsf.gov/nsb/documents/2007/stem_action.pdf
- National Science Board. (2010), *Science & Engineering Indicators 2010*. Arlington, VA:
National Science Foundation.
- National Science Foundation. (2008). *NSF Science and Engineering Indicators 2008*. Arlington, VA: National Science Foundation.
- O'Brien, L. T., Garcia, D. M., Blodorn, A., Adams, G., Hammer, E., & Gravelin, C. (2020). An

educational intervention to improve women's academic STEM outcomes: Divergent effects on well-represented vs. underrepresented minority women. *Cultural Diversity and Ethnic Minority Psychology*, 26(2), 163.

O'Brien, L. T., Garcia, D. M., Adams, G., Villalobos, J. G., Hammer, E., & Gilbert, P. (2015).

The threat of sexism in a STEM educational setting: The moderating impacts of ethnicity and legitimacy beliefs on test performance. *Social Psychology of Education*, 18(4), 667-684.

Office of the Governor. (2005). *Texas science, technology, engineering, and math (STEM) initiative*. Retrieved April 11, 2017 from http://governor.state.tx.us/priorities/education/public/learning_learning_environment/texas_science_technology_engineering_and_math_t_stem_initiative/

Office of Innovation and Improvement. (2016). STEM 2026: A vision for innovation in stem education. Retrieved from <https://innovation.ed.gov/what-we-do/stem/>.

Ohland, M. W., Zhang, G., Thorndyke, B., & Anderson, T. J. (2004). *Grade-point average, changes of major, and majors selected by student leaving engineering*. 34th ASEE/IEEE Frontiers in Education Conference. Session T1G:12-17.

Ortiz, A. (2016). The qualitative interview. In Stage, F. K., & Manning, K. (Eds.). *Research in the College Context: Approaches and Methods*. New York, NY: Routledge.

Purcell, K. (2012). STEM Careers for Women. *Career Planning and Adult Development*, 56-57.

- Rankins, C., Rankins, F., & Inniss, T. (2014). Who is minding the gap? *AAC&U*, 5-8.
- Richardson, L. (2000b). Writing: A method inquiry. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (2nd ed., pp. 923-943). Thousand Oaks, CA: Sage.
- Rothwell, J. (2013, June). The hidden STEM economy. Washington, DC: Brookings. Retrieved from <https://www.brookings.edu/research/the-hidden-stem-economy/>
- Santamaria, L. J., & Santamaria, A. P. (2015). Counteracting educational injustice with applied critical leadership: Culturally responsive practices promoting sustainable change. *International Journal of Multicultural Education*, 17(1), 22-41.
- Savin-Baden, M., & Major, C. H. (2010). *New approaches to qualitative research: Wisdom and uncertainty*. New York: Routledge.
- Senator Ted Kaufman. (2009, July 10). *Senate Floor Speech on the STEM Education Coordination Act of 2009*. Retrieved April 1, 2017, from <http://www.allamericanpatriots.com/48753434-senator-ted-kaufman-on-stem-education-coordination-act-of-2009>
- Schuster, C. & Martiny, S. E. (2017). Not feeling good in STEM: Effects of stereotype activation and anticipated effect on women's career aspirations. *Sex Roles: A Journal of Research*, 76, 40-55.
- Smith, K., Jagesic, S., Wyatt, J., & Ewing, M. (2018). AP® STEM Participation and

Postsecondary STEM Outcomes: Focus on Underrepresented Minority, First-Generation, and Female Students. College Board. Last accessed on October 1, 2020 at:

<https://files.eric.ed.gov/fulltext/ED581514.pdf>

STEM Academies Design Blueprint. (2015). Retrieved June 19, 2017 from

<http://www.thsp.org/initiatives/>

STEM Education Caucus. (2005). Why was the STEM Education Caucus created? Retrieved

April 24, 2017, from <http://www.stemedcaucus.org/>

Strayhorn, T. (2010). *Work in progress-Social barriers and supports to underrepresented minorities' success in STEM fields*. Paper presented at 40th ASEE/IEE Frontiers in Education Conference, Washington, D. C.

The STEM Workforce Challenge. (April, 2007). The STEM workforce challenge: The role of the Public Workforce System in a national solution for a competitive science, technology, engineering, and mathematics (STEM) workforce: U.S. Department of Labor.

Terrell, N. (Spring, 2007). STEM occupations. *Occupational Outlook Quarterly*: Office of Occupational Statistics and Employment Projections.

Texas, Science, Technology, Engineering, and Math (T-STEM) Initiative (2018). Retrieved from www.tea.texas.gov/T-STEM

Theoharis, G. (2008b). Woven in deeply: Identify and leadership of urban social justice principals. *Education and Urban Society*, 41(3), 3-24.

- Theoharis, G. (2010). Disrupting injustice: Principals narrate the strategies they use to improve their schools and advance social justice. *Teachers College Record*, 112 (1), 331-373,
- U.S. Bureau of Labor Stastics. (2010). *Employed persons by detailed occupation, sex, race, and Hispanic or Latino ethnicity*. Retrieved from U.S. Bureau of Labor Statistics: www.bls.gov/cps/cpsaat11.pdf
- U.S. Department of Education. (2003). National Center for Education Statistics, *2003 National Study of Postsecondary Faculty* (NSOPF:04).
- U.S. Department of Education, Office for Civil Rights. (2014). Civil Rights data collection: Data snapshot: College and career readiness (Issue Brief No. 3). Washington, DC: Author. Retrieved from <http://www2.ed.gov/about/offices/list/ocr/docs/crdc-college-and-career-readiness-snapshot.pdf>
- Yin, R. K. (2014). *Case study research: Design and methods*. Los Angeles, CA: Sage Publications.
- Wasonga, T. A. (2009). Leadership practices for social justice, democratic community, and learning: School principals; perspectives. *Journal of School Leadership*, 19, 200-224.
- Weber, K. (2011). Role Models and informal STEM-related activities postively impact female interest in STEM. *Technology and Engineering Teacher*, 18-21.
- Weiss, T. (2009). The 10 hardest jobs to fill in America. Retrieved December 2018 from <http://www.forbes.com/2009/06/03/hard-jobs-fill-leadership-careeremployment.html>.

Whalen, D. F., & Shelley, M. C. II. (2010). Academic success for STEM and Non-STEM majors. *Journal of STEM Education*, 11(1/2), 45-60.

Xu, Y. J. (2008). Gender Disparity in STEM disciplines: A study of faculty attrition and turnover intentions. *Research in Higher Education*, 607-624.