



Levon T. Esters is an associate professor of youth development at Purdue University and a Senior Research Associate at the Penn Center for Minority Serving Institutions. Levon's research focuses on the STEM career development of underrepresented minorities (URMs), mentoring of females and URM graduate students in STEM, and the role of historically Black land-grant institutions in fostering the STEM success of females and underrepresented minorities. He is also Director of the Mentoring@Purdue (M@P) program, which is designed to increase the number of women and URMs receiving post-secondary STEM-based agricultural and life sciences degrees in Purdue University's College of Agriculture. He is a proud alumnus of two HBCUs (B.S. from Florida A&M University and M.S. from North Carolina A&T State University). He received his doctoral degree from The Pennsylvania State University.

Readers with any questions or comments should email Levon directly at [lesters@purdue.edu](mailto:lesters@purdue.edu)

# CMSI RESEARCH BRIEF

## Support Mechanisms that Facilitate Black Graduate Student Success and Degree Completion

by Levon T. Esters, Purdue University

### Executive Summary

Over the past 50 years, changes within the U.S. population have resulted in significant increases in the number of racial and ethnic minorities enrolling in institutions of higher education. These demographic shifts will undoubtedly have a major impact on the diversity of students enrolled in graduate programs. In particular, institutions across the country will experience growth in the number of ethnic minorities pursuing graduate degrees. However, current data indicate that among the top three racial and ethnic minority groups, Blacks have the lowest enrollment and graduate degree completion rates. The low levels of degree completion among Black graduate students often result from the institutional barriers that exist on the campuses of Predominantly White Institutions (PWIs). Using examples of how Historically Black Colleges and Universities (HBCUs) support their Black students, the purpose of this research brief is to provide policymakers, college administrators, faculty, staff, and students with information on support mechanisms that help facilitate Black graduate student success and degree completion at PWIs. Specifically, this brief will highlight: 1) national enrollment trends among Black graduate students, 2) institutional barriers hindering Black graduate student success and degree completion at PWIs, 3) support mechanisms that enhance Black graduate student success and degree completion, and 4) recommendations for PWIs to facilitate Black graduate student success and degree completion. To reflect the diversity of contemporary society, it is imperative that graduate programs increase

their efforts to support Black students in particular, as they are one of the most historically underrepresented minority groups in higher education today.

### Introduction

Recent statistics indicate that by 2060, the U.S. population is projected to increase from its current level of 319 million to 417 million (Colby & Ortman, 2015). However, delving more deeply into recent U.S. Census data reveals that in addition to population growth, the demographics of the United States are shifting in what some experts are calling the “browning” of America. The Pew Research Center, for example, notes that in 1960, 85% of the United States’ population was White, while population projections suggest this percentage will dwindle to only 43% by 2060 (Taylor, 2014). In other words, the United States is becoming significantly more racially, ethnically, and culturally diverse. Currently, non-Hispanic Whites are the largest racial and majority group and account for 62.2% of the total population, followed by Hispanics (17.4%), Blacks (12.4%), and Asians (5.2%) (Colby & Ortman, 2015). These numbers reveal that minorities currently account for 37.8% of the United

SPONSORED BY



Graduate School of Education  
**Penn GSE**

Center for  
**MSIs**

States population. However, the U.S. Census estimates that by 2060, non-Hispanic Whites will decrease to 43.6% of the total population while the three largest minority groups will experience growth. By 2060, the total population is projected to be 28.6% Hispanic, followed by Blacks (13.0%) and Asians (9.1%). Collectively, these population estimates indicate that by 2060, 56.4% of the population will identify as people of color, with minority crossover occurring in 2044 (Colby & Ortman, 2015).

The racial and ethnic population changes occurring in the United States will continue to reshape the American identity and the composition of its workforce (Allen-Ramdial & Campbell, 2014). Moreover, finding innovative solutions to many of the challenges facing the United States and the world in the 21st century will depend upon a creative, knowledgeable, and highly skilled workforce (Wendler et al., 2010). In many ways, the creative approaches needed to address national issues as well as what are known as “Global Grand Challenges” (21st Century Grand Challenges, 2015) can be best achieved by individuals who reflect the racial, ethnic, and cultural diversity of American society (Phillips, 2014). No longer will problems related to energy, health, education, the environment, and national security concern only a population who is majority White—they will impact the most diverse population in our nation’s history. Hence, greater participation of individuals from underrepresented populations is critical in order to more fully contribute to the innovations needed to solve the complex problems facing today’s society.

Without question, a highly trained and diverse workforce is essential to America’s future economic competitiveness, scientific capacity, and national security (Council of Graduate Schools, 2007). It is also well understood that undergraduate education plays a critical role in providing students with the foundational knowledge and skills needed for a wide range of employment options. However, graduate education is what provides students with the advanced knowledge and skills that

will strengthen intellectual leadership in our future knowledge economy (Wendler, et al., 2010). In particular, graduate education prepares the knowledge creators and innovators of tomorrow with the skills, expertise, and cultural awareness needed to compete effectively in the knowledge-based global economy (Council of Graduate Schools, 2007). As such, in order to ensure a steady pipeline of talent that has the expertise necessary to solve society’s grand challenges, developing a pipeline of talent within graduate education programs will be essential.

Though developing a pipeline of talent within graduate programs is critical, enhancing diversity within the ranks of those obtaining graduate degrees is even more necessary because having a cadre of highly trained individuals from diverse backgrounds will contribute to a more innovative and comprehensive understanding of the social, environmental, and economic issues facing society. Further, because the diversity needed within graduate programs must come from underrepresented populations, there should be a particular emphasis placed on supporting the most underrepresented students: those who are Black. Ensuring that graduate programs reflect the diversity of contemporary society—especially that of Black populations—is important because they have been historically underrepresented within graduate programs, especially within the STEM disciplines. For example, the disproportionately low level of STEM participation and degree completion among Blacks calls into question the extent to which Blacks have equitable access to and opportunities in STEM academic pathways from undergraduate to doctoral education (Upton & Tanenbaum, 2014).

## **Enrollment and Degree Completion Rates among Black Graduate Students**

In order to fully understand the need for increased participation of Blacks in graduate education, it is critical that we examine their current levels of enrollment and degree completion rates. For example, regarding

Field	All Graduate Students	Black Graduate Students	% Black
Education	460,445	66,257	14.4%
Business Management & Administrative Services	455,216	73,251	16.1%
Engineering	166,758	4,035	2.4%
Law	121,485	10,507	8.6%
Biological Sciences/ Life Sciences	84,523	4,273	5.1%
Medicine	81,665	5,100	6.2%
Physical Sciences	52,457	1,178	2.2%
Mathematics	27,858	772	2.8%
Dentistry	23,616	1,213	5.1%
<b>Total</b>	<b>1,474,023</b>	<b>166,586</b>	<b>11.3%</b>

overall graduate student enrollment as of 2015, the top three fields of study that featured the highest proportion of Blacks were Business Management and Administrative Services (16.1%), Education (14.4%), and Law (8.6%). Overall, Blacks accounted for 11.3% of students enrolled in graduate programs (see Table 1).

The relative percentage of Black graduate students becomes even smaller when examining only full-time graduate student enrollment. With regard to full-time graduate student enrollment, the top three fields of study for Blacks were Education (14.4%), Business Management and Administrative Services (13.9%), and Law (8.1%). Among full-time graduate students, Blacks accounted for only 9.0% of students enrolled in graduate programs (see Table 2).

Field	All Graduate Students	Black Graduate Students	% Black
Education	165,589	23,819	14.4%
Business Management & Administrative Services	224,828	31,269	13.9%
Engineering	115,491	1,901	1.6%
Law	107,241	8,740	8.1%
Biological Sciences/ Life Sciences	65,587	3,100	4.7%
Medicine	79,000	4,916	6.2%
Physical Sciences	41,855	809	1.9%
Mathematics	19,879	398	2.0%
Dentistry	23,547	1,199	5.1%
<b>Total</b>	<b>843,017</b>	<b>76,151</b>	<b>9.0%</b>

Conversely, the data regarding part-time graduate students show an increase in the relative proportion of Black student enrollment. For this subpopulation, the top three fields of study in which Blacks enrolled were Business Management and Administrative Services (18.2%), Education (14.4%), and Law (12.4%). Although the field of Dentistry had the highest percentage of Black part-time students enrolled (20.3%), the total number was based on a significantly smaller ratio (14 of 69 students). Overall, Blacks accounted for 14.3% of part-time students enrolled in graduate programs (see Table 3).

Among all students receiving graduate degrees, Blacks earned 7.1% of research/scholarship doctoral degrees (e.g., Ph.D., Ed.D., etc.); 6.2% of professional practice doctoral degrees (e.g., M.D., J.D., D.D.S., etc.); and 10.9% of other doctoral degrees (i.e., doctor's degrees that do not fall

**TABLE 3: Part-Time Graduate Student Enrollment Numbers by Major Field (Fall 2014)**

Field	All Graduate Students	Black Graduate Students	% Black
Education	294,856	42,438	14.4%
Business Management & Administrative Services	230,388	41,982	18.2%
Engineering	51,267	2,134	4.2%
Law	14,244	1,767	12.4%
Biological Sciences/ Life Sciences	18,936	1,173	6.2%
Medicine	2,665	184	6.9%
Physical Sciences	10,602	369	3.5%
Mathematics	7,979	374	4.7%
Dentistry	69	14	20.3%
<b>Total</b>	<b>631,006</b>	<b>166,586</b>	<b>14.3%</b>

into either of the former categories). Of the various types of graduate degrees available, Blacks earned the largest number of degrees in the master's category (80,839), constituting 10.7% of all master's degrees earned. Overall, of the total number (936,087) of graduate degrees completed, Blacks earned 92,504 of them, totaling 9.9% (see Table 4) (NCES, 2015).

Degree completion rates across the not-for-profit and for-profit institutional types also provide additional insight among Black graduate students. For example, among all not-for-profit institutions, 8.3% of Blacks earned graduate degrees. Among degree type earned at not-for-profit institutions, Blacks earned the largest percentage of degrees within the doctoral degree (other) category (10.9%), followed by master's degrees (8.3%).

**TABLE 4: Distribution and Level of Degrees Conferred to Black Students by Degree-Granting Institutions**

Type of Degree	All Graduate Students	Black Graduate Students	% Black
Master's Degrees	758,404	80,839	10.7%
Doctor's Degrees - Professional Practice	108,646	6,691	6.2%
Doctor's Degrees - Research/Scholarship	67,279	4,782	7.1%
Doctor's Degrees - Other	1,758	192	10.9%
<b>Total</b>	<b>936,087</b>	<b>92,504</b>	<b>9.9%</b>

Among for-profit institutions, 26% of Blacks earned graduate degrees. Blacks also earned the largest number of graduate degrees within the master's degree category, followed by research/scholarship doctoral degrees. Finally, though more than a quarter of graduate degrees earned by Blacks were earned at for-profit institutions, this number only represents 2.3% of the total number of graduate degrees earned across all institutions types. However, the data also reveal that a disproportionate number of Blacks obtain their graduate degrees from for-profit institutions.

## Institutional Barriers Hindering Black Graduate Student Success and Degree Completion at PWIs

The enrollment and degree completion data in the previous section reveal a disturbing problem, most notably that fewer Black students enroll in graduate education and complete their degrees relative to other minority groups. Unfortunately, many of the barriers that contribute to the low attrition rates among Black graduate students at PWIs are institutional in nature and often tied to issues of race. Providing a thorough examination of all of the possible challenges facing Black graduate students is beyond the scope of this brief. However, what follows is a summary of five major institutional barriers that hinder Black graduate student success and degree completion at PWIs. These institutional barriers include: 1) lack of a welcoming institutional climate, 2) lack of quality mentoring, 3) poor socialization experiences, 4) hostile institutional environments, and 5) lack of a sense of belonging.

For the remainder of this brief, literature highlighting the experiences of Black graduate students attending PWIs will be complemented by research that focuses on the experiences of Black students attending HBCUs. This latter research has been included because it provides evidence that supports the notion that HBCU attendance contributes significantly to Black student success (Bridges, Kinzie, Nelson-Laird & Kuh, 2008).

### 1) Lack of a Welcoming Institutional Campus Climate

The lack of a welcoming campus climate is a common barrier experienced by Black graduate students attending PWIs. For example, it is common for Black students to describe their campus climate as being “chilly” when sharing their experiences of attending a PWI. Unlike HBCUs, which provide more nurturing, family-like, and affirming environments, PWIs have been characterized as being more hostile, isolating, and marginalizing, all of which negatively affect Black students’ academic

success and degree attainment (McGaskey, 2012; Nettles & Millett, 2006). It is worth noting that campus climate comparisons are commonly made between PWIs and HBCU primarily due to the fact that HBCUs have a strong history of engendering environments that are more welcoming and supportive (Palmer & Gasman, 2008; Strayhorn, 2013; Toldson, 2013).

### 2) Lack of Quality Faculty Mentoring

Relationships, in the form of faculty mentoring, are vital to the success of Black students in advanced degree programs (McCallum, McCoy, & Winkle-Wagner, 2012). Mentoring relationships with faculty provide graduate students with psychosocial (i.e., counseling) and instrumental support (i.e., career guidance) that enables them to navigate the academic environment and helps them become a part of a disciplinary community (George & Neale, 2006; Noe, 1988). However, the lack of quality mentoring is all too common for Black graduate students. Though interactions with faculty mentors have been found to be a key factor in fostering Black graduate student success (Nettles & Millett, 2006; Patton & Harper, 2003), Black students report being more dissatisfied with their mentoring relationships and receiving less support than White students (Ellis, 2000; Nettles, 1990).

### 3) Poor Socialization Experiences

The role of socialization is critical to graduate student development and success, especially among underrepresented minority populations. The goal of socialization is to foster the development and acclimation of doctoral students into the roles associated with the discipline (McGaskey, 2012). A number of studies have suggested that underrepresented groups, especially Black doctoral students, experience difficulties in the socialization process (Nettles & Millett, 2006; Felder, Stevenson, & Gasman, 2014; Gildersleeve, Croom, & Vasquez, 2011). Poor socialization experiences often lead to higher attrition rates among Black graduate students, especially in the STEM disciplines. More

problematic is that poor socialization experiences creates a feedback loop where fewer Black graduate students completing their doctoral degrees results in lower numbers of them pursuing faculty careers, thus perpetuating an environment where future Black graduate students have difficulty finding same-race mentors.

#### **4) Hostile Institutional Environments**

Some of the most significant barriers Black graduate students face are the hostile institutional environments that can exist at PWIs. The hallmarks of these hostile environments often include Black graduate students being subjected to racial discrimination, insensitive comments, alienation, and stereotyping. Exclusionary practices performed by faculty, staff, and peers also contribute to hostile environments. Unlike the more supportive environments that exist at HBCUs, the race-related stress resulting from hostile institutional environments often results in lower retention and graduation rates among Black graduate students (Figueroa, 2015; Gasman, Hirschfeld, & Vultaggio, 2008; Johnson-Bailey, Valentine, Cervero, & Bowles, 2008; Nettles & Millett, 2006).

Of the different forms of race-related experiences that may impact the functioning and engagement of ethnic minority graduate students, racial microaggressions may be among the most damaging (Clark, Mercer, Zeigler-Hill, & Dufrene, 2012). Racial microaggressions are intentional and unintentional exchanges in the form of verbal, behavioral, or environmental messages, which communicate hostile, derogatory, or negative slights and insults (Sue & Sue, 2013). Microaggressions take three primary forms: microinsults, microassaults, and micro-invalidations (Sue et al., 2007). Microinsults are behavioral or verbal comments that convey rudeness or insensitivity and demean a person's racial heritage or identity (e.g., comments such as "You are so articulate," which can imply a sense of surprise that an ethnic minority student can speak intelligently). Microassaults are more blatant forms of racism that are meant to hurt the intended victim and may be revealed verbally (e.g., referring to someone using a racial slur), behaviorally (e.g., deliberately

providing assistance to an ethnic majority student while making an ethnic minority student wait), or environmentally (e.g., posting racially insensitive flyers or signs in an area frequented by minorities). Microinvalidations are statements or actions that invalidate or nullify a person's feelings, experiences, or beliefs that are connected to his or her racial identity (e.g., comments that minimize race, such as "I don't see you as Black, I see you as a human being"). Racial microaggressions take a toll on an individual's physical, mental, and emotional health, which in turn can lead to them not completing their graduate degree programs.

#### **5) Lack of a Sense of Belonging**

Cultivating a sense of community that fosters a feeling of belonging is critical to the academic success, persistence, and degree completion of Black graduate students. In particular, an institutional culture and environment where students feel a sense of community is one that offers students support, connectedness, and a sense that they belong with and matter to others (Strayhorn, 2012). Unfortunately, Black graduate students at PWIs often find themselves in hostile environments where they are marginalized and socially isolated, both of which contribute to their feelings of being an outsider within a department or their college at large. These experiences are especially pervasive in the STEM disciplines where Black students are often few in number. Simply put, when a sense of belonging is not present within an institutional culture, Black graduate students tend to be less motivated, experience greater mental and emotional stress, and are at a greater risk for leaving their graduate program without completing their degree.

### **Institutional Support Mechanisms that Enhance Black Student Success and Degree Completion**

Though seemingly few in number, the institutional barriers highlighted in the previous section are significant and should not be treated casually. Rather, PWIs should take it upon themselves to act in a proactive

manner in dealing with each barrier in an authentic and transparent manner. Much can be learned from how HBCUs foster a culture and environment that reflects a supportive community. What follows are six institutional support mechanisms informed by the practices embedded within the HBCU institutional culture that model how PWIs may enhance Black graduate student success and degree completion. These practices include: 1) fostering a campus climate that builds a sense of belonging, 2) promoting enhanced faculty and peer mentoring, 3) creating opportunities for academic professionalization, 4) providing opportunities for social integration, 5) encouraging identify formation, and 6) providing opportunities for socialization.

### **1) Fostering a Campus Climate that Builds a Sense of Belonging**

One of the hallmarks of HBCUs has been their ability to provide a more supportive, nurturing and engaging environment that fosters a sense of community and, therefore, belonging. Creating a campus climate that builds a sense of belonging is critical to the success of Black graduate students. Graduate programs that provide opportunities whereby Black students feel a sense of community that is supportive rather than hostile can help them feel more comfortable participating in their department's institutional structure and allow them to more openly contribute to their program's social and cultural networks. In turn, this sense of belonging greatly increases Black students' likelihood for academic success and degree completion.

### **2) Promoting Enhanced Faculty Mentoring**

Faculty at HBCUs have a reputation for providing quality mentorship and support for students, both of which contribute to students' academic success and degree completion, especially in the STEM disciplines. For example, Hirt et al. (2006) found that faculty at HBCUs are particularly supportive of Black students, making the environment more welcoming. As such, academic departments at PWIs should work closely with faculty at HBCUs to learn best practices of how to mentor Black graduate

students and develop the support mechanisms that should be in place to help them be successful. Additionally, non-minority faculty should be trained in cross-cultural mentoring practices that will help enhance their mentoring skills and further help them mentor Black students.

### **3) Creating Opportunities for Academic Professionalization**

Graduate programs that create opportunities for academic professionalization contribute greatly to the academic success and achievement of Black graduate students. Graduate programs should provide experiences which foster academic development and motivation (Essien-Wood & Wood, 2013). Experiences reflective of academic professionalization could include meeting regularly with mentor study groups, professional development opportunities that focus on academic writing and publishing, and applying for fellowships or postdoctoral positions.

### **4) Providing Opportunities for Social Integration**

It is also important that graduate programs provide opportunities for social integration of Black graduate students. Social integration refers to the experiences that lead to students' psychosocial development and involvement in the social fabric of a campus environment (Essien-Wood & Wood, 2013). Examples of social integration include peer-to-peer interactions, student support groups, and formal and informal interactions with faculty—especially positive cross-racial interactions. Graduate programs that create opportunities for enhanced social interaction among Black graduate students will ultimately result in greater commitment to the institution, thus leading to an increased likelihood of degree completion.

### **5) Encouraging Identify Formation**

The fostering of identity is an important aspect that is especially salient for Black students. In particular, racial identify has been noted by scholarship as being key to the academic achievement of Black

college students (Awad, 2007; Bonner, 2010). Unlike PWIs, HBCUs are generally perceived to place a distinctive emphasis on the formation of student identity, with one such area being racial identity (Gasman & Arroyo, 2014). One reason the formation of racial identity is encouraged at HBCUs is because these institutions have greater numbers of Black instructors who serve as students' role models. Seeing and interacting with individuals that look like them can instill confidence in Black graduate students and reinforce the idea that they can succeed in their pursuit of a particular major or career. The reinforcement of seeing others similar to oneself achieve success cannot be overstated. As such, graduate programs that provide opportunities for Black students to interact with Black faculty and Black guest speakers can help foster identity formation, which in turn can lead to greater academic success and persistence.

#### **6) Providing Opportunities for Socialization**

For many women and minorities, especially Black graduate students, access to proper socialization experiences often occurs infrequently. Ensuring that opportunities exist for optimal socialization of Black graduate students is critical for their growth, development, and career success as faculty members. An important outcome of socialization for Black students is that it can help decrease the likelihood of attrition. Evidence from limited inquiry into the graduate experiences of Black graduate students at HBCUs supports the idea that faculty at HBCUs may have an advantage in providing greater levels of academic interactions than faculty at PWIs (McGaskey, 2012). As such, PWIs should ensure that Black graduate students are afforded numerous opportunities for integration into the culture of an academic department. This can be achieved by ensuring that positive academic interactions are occurring between faculty and students as well as providing students with a variety of teaching and research opportunities that will help prepare them for an academic career.

### **Recommendations for PWIs to Facilitate Black Graduate Student Success and Degree Completion**

Facilitating Black graduate student success and degree completion begins with action. PWIs that are committed to the ideals embedded within the following recommendations should commit to working until permanent change is realized on their campuses. For some institutions, implementing these recommendations may be just the beginning while for others they may be a continuation of progress already taking place.

1. PWIs should promote a culture that supports a sense of belonging for graduate students—especially for Black and other minority students who often face greater difficulties acclimating to racially hostile environments.
2. PWIs should develop structured faculty mentoring programs based on the two tenets of mentoring: instrumental (i.e., career-related advice) and psychosocial support (i.e., counseling & role modeling). These programs should also be developed such that socialization is realized and graduate students are given the opportunity to start building social and cultural capital.
3. PWIs should develop structured peer mentoring programs that provide opportunities for social integration between graduate students so that they may learn from and support one another.
4. PWIs should promote a climate of racial identity formation and help Black students develop strong racial identities. This could be achieved by working collaboratively with Black cultural centers, offices of diversity and inclusion, and other campus affinity groups to create culturally relevant programs and initiatives.
5. PWIs should partner with HBCUs to develop joint programs that would enable PVI faculty to learn how to develop and integrate

culturally relevant teaching and learning approaches into their course curricula.

6. PWIs should provide psychological services to combat the race-related microaggressions faced by Black graduate students. The feelings of discrimination and isolation that stem from microaggressions can often have a negative impact on students' mental and emotional health. Ensuring that psychological services are available to address these stressors can go a long way to ensuring students adjust normally and persist in their graduate programs.
7. PWIs should invest in the hiring and retention of Black faculty. Having a large number of Black faculty not only contributes to campus diversity efforts but also serves as a mechanism to help recruit graduate students, especially in the STEM disciplines, which have historically experienced low numbers of Black students pursuing graduate degrees.
8. PWIs should invest funding into the development of programs that provide Black graduate students with opportunities for academic professionalization so that they are better prepared for the rigors of academia, both socially and culturally.

## REFERENCES

- 21<sup>st</sup> Century Grand Challenges. (2015). Retrieved from <https://www.whitehouse.gov/administration/eop/ostp/grand-challenges>
- Allen-Ramdial, S.A., & Campbell, A.G. (2014). Reimagining the pipeline: Advancing STEM diversity, persistence, and success. *BioScience*, 64(7), 612-618.
- Awad, G.H. (2007). The role of racial identity, academic self-concept, and self-esteem in the prediction of academic outcomes for African American students. *Journal of Black Psychology*, 33, 188-207.
- Bonner, F.A. (2010). Focusing on achievement: African American student persistence in the academy. In Strayhorn, T. L. & Terrell, M. C. (Eds.). *The evolving challenges of Black college students*. Sterling, VA: Stylus.
- Bridges, B. K., Kinzie, J., Nelson Laird, T. F., & Kuh, G. D. (2008). Student engagement and student success at HBCUs and HSIs. In M. Gasman, B. Baez, C. Turner (Eds.). *Understanding minority-serving institutions*. Albany, NY: State University of New York Press.
- Clark, C., Mercer, S.H., Zeigler-Hill, V., & Dufrene, B.A. (2012). Barriers to the success of ethnic minority students in school psychology graduate programs. *School Psychology Review*, 41, 176-192.
- Colby, S.L., & Ortman, J.M. (2014). *The baby boom cohort in the United States: 2012 to 2060*. Current Population Reports, P25-1141. U.S. Census Bureau, Washington, DC.
- Council of Graduate Schools. (2007). *Graduate education: The backbone of American competitiveness and innovation*. Retrieved from [http://www.cpec.ca.gov/CompleteReports/ExternalDocuments/GR\\_GradEdAmComp\\_0407.pdf](http://www.cpec.ca.gov/CompleteReports/ExternalDocuments/GR_GradEdAmComp_0407.pdf)
- Ellis, E. (2000). Race, gender, and the graduate student experience: Recent research. *Diversity Digest*. Retrieved from [www.diversityweb.org/Digest/F00/graduate.html](http://www.diversityweb.org/Digest/F00/graduate.html)

- Essien, I., & Wood, J.L. (2013). Academic and social integration for students of color in STEM: Examining differences between HBCU's and non-HBCUs. In Palmer, R. T., Maramba, D., & Gasman. (Eds.), *Fostering success of ethnic and racial minorities in STEM: The role of minority serving institutions* (pp. 116-129). New York, NY: Routledge.
- Figuroa, T. (2015). *Underrepresented racial/ethnic minority graduate students in science, technology, engineering, and math (STEM) disciplines: A cross institutional analysis of their experiences*. (Unpublished doctoral dissertation). University of California, Los Angeles.
- Gasman, M., & Arroyo, A.T. (2014). An HBCU-based educational approach for black college student success: toward a framework with implications for all institutions. *American Journal of Education*, 121(1), 57-85.
- Gasman, M., Hirschfield, A., & Vultaggio, J. (2008). "Difficult yet rewarding": The experiences of African American graduate students. *Journal of Diversity in Higher Education*, 1(2), 126-138.
- George, Y.S., & Neale, D. (2006). *Report from study group meetings to develop a research and action agenda on stem career and workforce mentoring*. American Association for the Advancement of Science Directorate for Education and Human Resources Programs.
- Johnson-Bailey, J., Valentine, T., Cervero, R.M., & Bowles, T.A. (2009). Rooted in the soil: the social experiences of black graduate students at a southern research university. *The Journal of Higher Education* 80(2), 178-203.
- McCallum, C., McCoy, D., & Winkle-Wagner, R. (2012). Finding support one relationship at a time: The importance of faculty and peers among graduate students in HBCUs. In R. Palmer, A. Hilton, T. Fountaine, *Black graduate education at historically Black college and universities: Trends, experiences, and outcomes*. Charlotte, NC: Information Age Publishing.
- McGaskey, F. (2012). The potential benefits of attending historically Black colleges and universities for Black doctoral studies. In R.T. Palmer, A.A. Hilton., & T.P. Fountaine (Eds.), *Black graduate education at historically Black colleges and universities: Trends, experiences, and outcomes* (pp. 83-104). London, UK: Information Age Press.
- National Center for Education Statistics. (2015). Integrated Postsecondary Education on Data System (IPEDS).
- Nettles, M.T. (1990). Success in doctoral programs: Experiences of minority and White students. *American Journal of Education*, 98(4), 494-522.
- Nettles, M.T., & Millett, C.M. (2006). *Three magic letters: Getting to Ph.D.* Baltimore, MD: The Johns Hopkins University Press.
- Palmer, R.T., & Gasman, M. (2008). 'It takes a village to raise a child': The role of social capital in promoting academic success for African American men at a Black college. *Journal of College Student Development*, 49(1), 52-70
- Patton, L.D., & Harper, S.R. (2003). Mentoring relationships among African American women in graduate and professional schools. In M.F. Howard-Hamilton (Ed.), *Meeting the needs of African American women, New Directions for Student Services*, no. 104, (pp. 67-78). San Francisco, CA: Jossey-Bass.
- Phillips, K.W. (2014, October). How diversity makes us smarter. *Scientific American*. Retrieved from <http://www.scientificamerican.com/article/howdiversity-makes-us-smarter/>
- Sowell, R., Allum, J., & Okahana, H. (2015). *Doctoral initiative on minority attrition and completion*. Washington, DC: Council of Graduate Schools.
- Strayhorn, T.L. (2012). *College students' sense of belonging: A key to educational success for all students*. New York, NY: Routledge.
- Strayhorn, T.L. (2013). Impact of institutional climates of MSIs and their ability to foster success for racial and ethnic minority students in STEM. In R. T. Palmer, D. C. Miramba, & M. Gasman (Eds.), *Fostering success of ethnic and racial minorities in STEM: The role of minority serving institutions* (pp. 33-45). New York, NY: Routledge.
- Sue, D.W., & Sue, D. (2013). *Counseling the culturally diverse* (6th ed.). Hoboken, NJ: John Wiley & Sons, Inc.
- Sue, D.W., Capodilupo, C. M., Torino, G.C., Bucceri, J.M., Holder, A.M.B., Nadal, K.L., et al. (2007). Racial microaggressions in everyday life: Implications for clinical practice. *American Psychologist*, 62, 271-286.

Taylor, P. (2014). *The next America*. Washington, DC: Pew Research Center. Retrieved from <http://www.pewresearch.org/next-america/>

Toldson, I.A. (2013). Historically Black colleges and universities can promote leadership and excellence in STEM. *The Journal of Negro Education*, 82(4), 359-367.

Upton, R., & Tanenbaum, C. (2014, September). *The role of historically black colleges and universities as pathway providers: Institutional pathways to the stem phd among Black students*. Retrieved from <http://www.air.org/sites/default/files/downloads/report/Role%20of%20HBCUs%20in%20STEM%20PhDs%20for%20Black%20Students.pdf>

Wendler, C., Bridgeman, B., Cline, F., Millett, C., Rock, J., Bell, N., & McAllister, P. (2010). *The path forward: The future of graduate education in the United States*. Princeton, NJ: Educational Testing Service.