”Can Construction Management Education Programs at HBCUs Increase the Number of African-American Construction Managers in the United States?

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Abstract – The U.S. Construction Industry continues to grow even as other industries slow down or decline. This growth fuels a need for more people to enter the field of construction not only as tradesmen or laborers, but also as construction managers. According to the Bureau of Labor Statistics, in 2022, 89.8% of construction managers in the U.S. were white. [1] Although debate continues about the value and necessity of affirmative action and diversity, equity, and inclusion (DEI) initiatives, with the abundance of opportunities and vacancies in construction management, increasing interest and participation by members of historically marginalized racial/ethnic minority communities may be an effective way to partially address the growing demands of the industry.

It has been suggested that the phrase "historically marginalized communities" better conveys the fact that underrepresentation of racial/ethnic minorities usually doesn't reflect a lack of interest or effort, but instead a lack of opportunity. [2] In the field of construction management, African-Americans compromise only 4.8% of the construction managers in the U.S. in 2023 [1] while constituting 12.6% of the U.S. workforce and 13.6% of the U.S. population. [3,4]

While tradesmen and laborers are often not required to have prerequisite skills as entry level employees and may receive on the job training, construction managers are expected to have some level of formal education and/or certification. [5] For this reason, it is reasonable to conclude that four-year Construction Education Programs (CEPs) contribute to the supply of entry level construction managers.

A cursory review of the demographics of the graduates of CEPs accredited by the American Council for Construction Education (ACCE) and the Accreditation Board for Engineering and Technology (ABET) reveals that most graduates of these programs are white males. While there is some research regarding the relative lack of African-American (AA) STEM students and graduates, little research has been conducted that specifically explores (1) AA enrollment and retention in CEPs, (2) AA graduation from CEPs, (3) the role that HBCUs might play in increasing AA interest and success in CEPs. The overwhelming majority of the 77 four-year CEPs accredited by the ACCE are offered by PWIs (Predominately White Institutions) with only four of the four-year accredited CEPs being offered by HBCUs.

This study seeks to (1) explore how AA participation and success in HBCU CEPs compares to AA participation and success in PWI CEPs, and (2) identify factors that may contribute to AA selecting successfully completing CEPs by examining select characteristics of CEPs and enrollment, retention and graduation data for two public, land grant institutions located approximately fifty miles apart, one of which is HBCU (Historically Black College and University). The characteristics examined include the size of the institution, demographics of the student population, size of the CEP, and curriculum requirements.

Introduction

There continues to be a shortage of qualified construction managers in the U.S. construction industry. [5] In 2018, Choi et al asserted that women and racial/ethnic minorities have been suggested as potential resources to address this shortage. [6] Because most entry level construction management (CM) positions require an undergraduate degree in construction management or a related field [1], tapping this resource will mean graduating more women and minorities from construction education programs (CEPs).

There have been numerous studies on the enrollment, retention, and graduation rates of women and minorities in undergraduate STEM programs and how those rates can be improved. [7,8] However, there is little research and literature specifically related to enrollment, retention, and graduation of African-Americans in Construction Management. Beginning to fill this knowledge gap may be crucial in the development of strategies to increase African-American participation in CM. Perhaps an appropriate place to begin is researching existing African-American participation in CEPs and possible factors contributing to the choice of CEP.

This paper aims to investigate the similarities and differences between two higher education institutions and their respective CEPs. The two schools are located approximately 50 miles from each other, and both are within 100 miles of a large, major metropolitan area. In addition, this paper explores the possibility of a correlation between the similarities and differences of the institutions and their respective CEPs and the enrollment, retention, and graduation rates of African-American (AA) students participating in those programs.

Relevance

CEPs are offered with varied emphases, curricula, and Classification of Instructional Programs (CIP) Codes. In the United States, CEPs are offered under a variety of names (e.g. Construction Management, Construction Science, Construction Engineering, Construction Engineering Technology, etc.) by various departments and colleges (Applied Science, Engineering, Business, Management, etc.). To recognize CM as a STEM field, more specifically an engineering field, the definition of "engineering" by Lucas and Dobrijevic as "the application of science and mathematics to solve problems" [9] is considered. While CM students do apply science and mathematics to develop cost estimates and schedules, it should be also noted that successful construction relies on the application of several other engineering concepts including statics, dynamics, structures, hydraulics, and soils analysis. Graduates of CEPs must understand how these concepts apply to the construction projects which are undertaken. CM remains inextricably linked with engineering and several ABET accredited construction education programs are still housed within engineering departments.

Background

The Need for Construction Education Programs (CEPs)

According to the Bureau of Labor Statistics, employment of construction managers is expected to grow by 5% between 2022 and 2032. Approximately 38,700 openings are anticipated per year though many of those openings are expected to be created by attrition. Unlike most other positions

in the construction industry, most entry level positions in construction management require a four-year undergraduate degree in construction management or a related field. [5] This requirement creates a need for CM graduates and the CEPs that produce them.

There are currently, 77 four-year CEPs accredited by the American Council for Construction Education (ACCE) [10] and 69 four-year CEPs accredited by the Accreditation Board for Engineering and Technology (ABET) [11]. There are six programs that are accredited by both bodies. For comparison, there are 362 civil engineering programs accredited by ABET [11] with 21,200 anticipated job openings each year. [12] and the BLS projects 8,200 annual openings for architects with 61 National Architectural Accreditation Board (NAAB) accredited Bachelor of Architecture programs. [13] While it cannot be ascertained solely from this data whether more CEPs are needed, additional graduates are needed. The numbers of accredited civil engineering and architectural programs seem to suggest that additional CEPs would help meet the demand for qualified construction managers as would increasing the number of graduates produced by existing CEPs.

Participation of Historically Marginalized Communities in CEPs

One of the challenges with studying the participation of racial/ethnic minorities in CEPs is the constantly evolving landscape of diversity, equity, and inclusion (DEI) efforts in higher education. Affirmative action in higher education has been challenged. Some schools are renaming their DEI initiatives while others are abandoning them altogether. State legislatures are even banning such efforts. Terms and acronyms such as URM (Underrepresented Racial Minority) despite being deemed outdated (or even offensive) persist in the relevant literature. For this reason, it is imperative that current and future research regarding minority segments of the population carefully establish the definition and constraints of the terminology used and strive to be a consistent as possible when implementing said terminology. Although the National Science Foundation (NSF) continues to define URMs as "[r]aces or ethnicities whose representation in STEM employment and S&E education is smaller than their representation in the U.S. population [including] Blacks or African-Americans, Hispanics or Latinos, and American Indians or Alaska Natives" [14], it has been proposed that a more appropriate term would be Historically Marginalized Communities. It is suggested that "historically marginalized" better reflects the fact that segments of the population were specifically excluded from certain opportunities and thus were unable to be represented in certain areas or fields. [2] The definition of a "racial/ethnic minority" is, however, more straightforward. Non-white students are considered to be racial/ethnic minorities as they are not members of the majority race/ethnic group.[15] It is important to note that not all racial/ethnic minorities are members of the group defined by the NSF definition for URMs. Further, much of the existing research regarding URMs is aggregated or specific to the Hispanic/Latinx segment of the racial/ethnic minority population.

Interest and Leaky Pipeline

Notwithstanding the continued anticipated demand for construction managers and the above-average salaries for those employed in the field, there continues to be a lack of diversity within the field. The construction industry continues to be dominated by white males and the construction management segment of the industry is no exception. In 2023, 89.8% of construction managers

were identified as white, 10.6% were identified as women, and 4.8% were identified as African-American. [1]

Among racial/ethnic minorities, there continues to be a perception that the construction industry is filled with positions requiring manual labor in harsh environmental conditions.[6] This perception may be unintentionally reinforced by non-verbal messaging in the facilities of CEPs. [16] Further, racial/ethnic minorities compromise a disproportionate share of the construction labor segment of the construction industry [6].

Increased diversity has long been identified as a potential strategy in meeting the increasing employment needs of the construction industry. [6] However, the existence of a "leaky pipeline" and opportunity gaps for racial/ethnic minorities remain difficult to overcome. Burgoon et al posit that CEPs are "strategically situated" to influence increased diversity within CM [7] citing work by Hall and Alicandri indicating that improved enrollment, retention, and graduation rates for CEPs is needed to attenuate possible economic impacts of a shortage of qualified construction managers. [17] Therefore, if racial/ethnic minorities are to help fill the burgeoning need for construction managers, strategies to increase their enrollment, retention and graduation rates must be identified.

A Lack of African-American Construction Management Graduates

Much of the existing research and literature regarding racial/ethnic minorities in STEM fields and specifically CM focuses on the Hispanic/Latinx community or aggregated racial/ethnic minorities. There is little research specifically regarding African-American (AA) participation in the construction management field. One possible explanation for this research and literature gap is the relatively small number of AA construction management graduates. Although it is problematic to attempt quantitative analysis with such limited data, there still exists a need to better understand factors contributing the relatively low participation rate of African-Americans in CEPs and by extension the field of construction management.

Opportunity Gaps in Construction Education for African-Americans

The existence of opportunity gaps in higher education has been explored since the publication of the 1966 "Equality of Educational Opportunity" report, commissioned by the U.S. Department of Education. [18] Multiple studies have concluded that students belonging to historically marginalized communities attending higher education institutions are less likely than their peers to attend selective colleges and universities if they even attend college at all. [19] A study published in 2023 compared the enrollment and academic success rates of Hispanic/Latinx students to Non-Hispanic/Latinx students and also compared students meeting the NSF definition of URM students to their non-URM counterparts that were enrolled in a CM program at a public university in the western US and found that at the POI, evidence of opportunity gaps in URM recruitment and academic support existed. [7] While comparable or even greater opportunity gaps likely exist for African-American CEP students, research supporting this assertion specifically for African-American CEP students is not readily available. It is this knowledge gap that this paper seeks to begin to address.

African-American CEP Selection

A variety of factors influence a student's choice of higher education institution. Individual preference plays a major role in the selection process. Previous studies have shown that African-American high school students attending schools with predominantly white populations tend to prioritize consideration of HBCUs while African-American high school students attending schools with predominantly minority or African-American populations tend to prioritize consideration of PWIs. In addition to the type of institution that students want to attend, they also consider institutional selectivity, the campus environment and affordability. [20]

Methodology

Problem Statement

African-Americans hold a disproportionately low number of positions in the construction management segment of the U.S. construction industry when compared to the proportion of the U.S. population comprised by African-Americans. [1] The overwhelming majority of undergraduate CM degree programs are offered at PWIs. [10,11] Since HBCUs are known to produce more African-American graduates in STEM fields [21], research is warranted on the potential impact of HBCU CEPs.

This study compares participation and success by African-Americans in two CEPs offered by land grant institutions, operated within the same State &M University System, that are located 58 miles apart. In addition, select characteristics of the campuses and the CEPs are compared as well to begin to identify potential factors in the choice of CEP or institution. The objectives of the study are to determine if the successful production of AA CM graduates varies between the two programs and if so, what characteristics of the institutions and/or programs might be contributing to the variance.

There are two programs of interest (POIs) for this study. Texas A&M University, a is large PWI with a student population of approximately 71,000. It is located in a college town (population 120,511 per 2020 census) [22] approximately 100 miles outside of a major metropolitan area, Metro. It is a land grant institution established in 1876. The CEP is offered by the Department of Construction Science within the School of Architecture.

Prairie View A&M University is a HBCU located approximately 50 miles from Texas A&M University and 50 miles outside of Metro. It is also a land grant institution and was established in 1878. Although Prairie View A&M University has a significantly smaller student population of approximately 9,400. This institution is also located in a college town (population 8,184 per 2020 census). [22]

Both institutions belong to the State A&M University System. Data regarding characteristics of each institution and its respective CEP provided online by each university's Office of Institutional Research was collected and tabulated for comparison.

Research Questions

This non-experimental, explanatory, descriptive study. Seven research questions were developed to guide data collection.

RQ1. Are there differences in characteristics of Texas A&M University and Prairie View A&M University and their respective programs that could influence CEP selection by prospective African-American students?
RQ2. Are significant numbers of African-American students enrolling at Texas A&M University?
RQ3. Are significant numbers of African-American students enrolling in the POI at Texas A&M University?
RQ4. Are significant numbers of African-American students graduating from Texas A&M University?
RQ5. Are significant numbers of African-American students graduates of Texas A&M University majoring in Construction Science?
RQ6. How do the enrollment numbers and graduation rates of Texas A&M University and Prairie View A&M University compare?
RQ7. How do the enrollment numbers and graduation rates of students majoring in Construction Science at Prairie View A&M University compare with those of students majoring in Construction Science at Texas A&M University?

Data Collection and Preparation

The enrollment, retention and graduation data for this study was collected from self-reported, aggregated data generated by the Office of Institutional Research of each POI and published on the institutions' websites. This data did not include any identifying information for any of the students enrolled in the POIs and is readily available to the public. Data regarding enrollment totals, retention rates and graduation rates was aggregated and tabulated.

Data Analysis

Select characteristics of the subject institutions and POIs were tabulated and compared for similarities and differences. As this study is concerned with the patterns of participation and success of African-Americans in the POIs and each data point is described by both a categorical variable, race/ethnicity, and a continuous variable, the number of students, bivariate graphical exploratory data analysis (EDA) is appropriate.[23]

Findings and Discussion

Possible factors for CEP choice include prestige of institution, type of institution (PWI or MSI), campus location, area demographics, campus demographics, faculty demographics, cost of attendance, institutional selectivity, and academic rigor of the curriculum. [24] The campus environment can play a large role in influencing prospective students. Campus size and demographics may influence a student's ability to develop a sense of belonging. Table 1 below summarizes campus environment characteristics of the two subject institutions. Prairie View A&M University is located in a much smaller town without immediate access to many of the

comforts and conveniences of larger municipalities. Despite its proximity to Houston, Texas, some students may be discouraged by the almost rural environment.

Campus Environment

Texas A&M University has a modest African-American population and African-American students seeking a collegiate experience with more opportunity to develop a sense of community with other African-Americans may prefer the predominantly African-American environment of Prairie View A&M University.

Table 1. Campus Environment

	Texas A&M University	Prairie View A&M University
General [25,26]		
Public/Private	Public	Public
Land-Grant	Yes	Yes
Founded in	1876	1878
Age	148	146
PWI/HBCU	PWI	HBCU
Urban/Rural	Urban	Urban
Campus Size [25,26]		
Land Mass	5200 acres	1440 acres
Number of Buildings	>200 buildings	50 buildings
Location [27,28]	College Station, Texas	Prairie View, Texas
Retail	Mall Mid-Size Retailers	Outlet Mall 10 minutes away
Restaurants	Wide Selection	Limited Selection
Area Demographics [22]		
Total Population (2020)	120,511	8,184
Non-White Population	50,256 (41.70%)	7,895 (96.47%)
African-American Population	10,659 (8.84%)	6,766 (82.67%)
Campus Demographics [29,30]		
Total Population (Fall 2023)	71,127	9,415
Non-White Population	35,001	9,284
African-American Population	2,331	7,844

Cost of Attendance

Cost of attendance can be a big factor in college selection for African-Americans many of whom may have socioeconomic challenges and be forced to rely on financial aid. Table 2 below summarizes the cost of attendance for both institutions. The In-State Tuition and Fees and Cost of Attendance for Texas A&M University is not substantially more than that of Prairie View A&M University. This may be attractive to students desiring to attend the State's flagship university. There does, however, appear to be a substantial difference in the Out-of-State fees charged by the

subject institutions. These fees may make it prohibitive for a non-resident to attend Texas A&M University.

Table 2. Cost of Attendance

	Texas A&M University	Prairie View A&M University
Cost of Attendance [25,26]		
In-State Tuition and Fees	$11,550	$11,299
Out-of-State Tuition	$39,796	$26,872
In-State Average Cost of Attendance	$31,058	$28,155
Out-of-State Average Cost of Attendance	$59,336	$43,731

Institutional Selectivity

Institutional Selectivity can also be an important deciding factor. Students may opt not to apply to institutions offering CEPs if they feel that they are unlikely to be admitted. Table 3 summarizes application, admission, and enrollment data for the 2024AY and shows that while Prairie View A&M University admits a greater proportion of applicants, the resulting enrollment proportion is similar to that of Texas A&M University.

Table 3. Institutional Selectivity

	Texas A&M University	Prairie View A&M University
Institutional Selectivity [31,32]		
Applied	69,011	11,280
Admitted	39,244 (57%)	8,833 (78%)
Enrolled	19,919 (29%)	3,367 (30%)

CEP Characteristics

While previous tables have focused on institutional characteristics, Table 4 summarizes CEP characteristics of each institution.

Table 4. Construction Education Program Characteristics – Academic Rigor

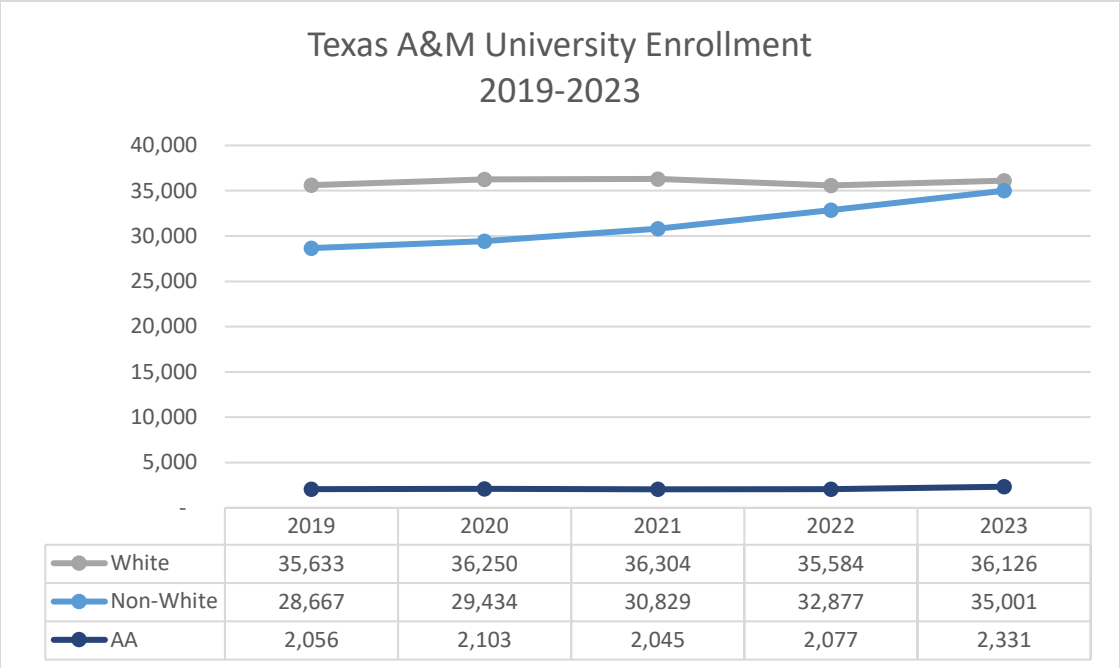
	Texas A&M University	Prairie View A&M University
CEP Characteristics		
Academic Rigor		
Credit Hours Required	120	120
Math Courses Required	2 (6hrs)	2(6hrs)
Science Courses Required	3 or 4 (9hrs)	2(6hrs)
Internship Requirement	Yes	Yes
Capstone Requirement	Yes	Yes

Table 5. Construction Education Program Characteristics – Demographics [29, 30]

	Texas A&M University	Prairie View A&M University
CEP Characteristics		
Campus Faculty Demographics		
Total Population	3,201	534
Non-White Population	1,197 (37%)	454 (85%)
African-American Population	123 (3.8%)	312 (58%)
Program Demographics		
Total Population	1,480	75
Non-White Population	530 (36%)	72 (96%)
African-American Population	5 (0.38%)	57 (75%)

Texas A&M University Campus Enrollment

Texas A&M University is a PWI established in 1876 and as expected has a majority White student population. However, as shown below in Figure 1, the Non-White student population has grown steadily from 45% in 2019 to 49% in 2023.



	2019	2020	2021	2022	2023
White	35,633	36,250	36,304	35,584	36,126
Non-White	28,667	29,434	30,829	32,877	35,001
AA	2,056	2,103	2,045	2,077	2,331

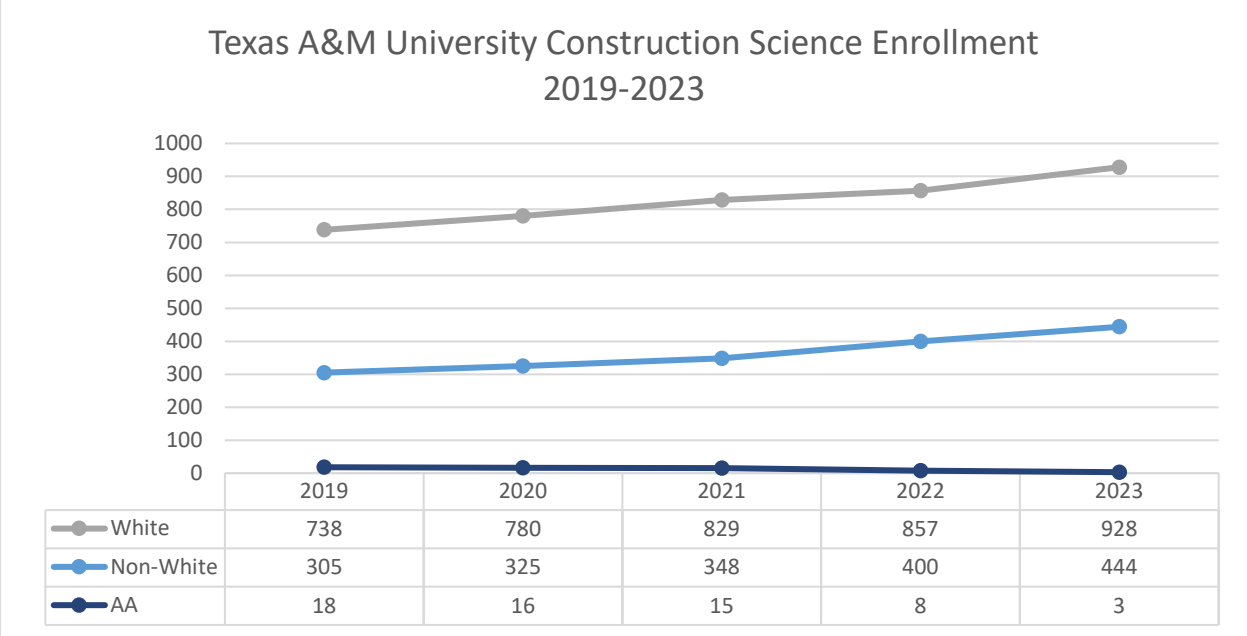
Figure 1. Texas A&M University Enrollment by Racial/Ethnicity 2019-2023

Despite increasing minority enrollment, African-American enrollment remained relatively flat for this same period with a meager increase from 3.2% in 2019 to 3.3% in 2023. While these numbers

speak to the diversity of the student population, no assertions can be made from this data regarding the inclusiveness of the environment.

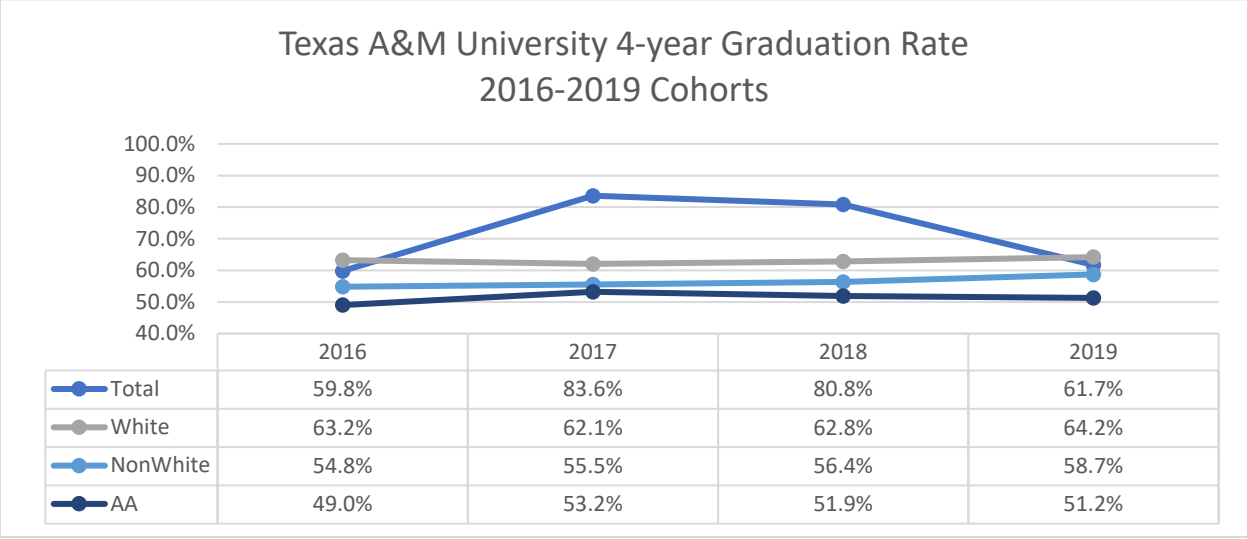
Texas A&M University CEP Enrollment

Not surprisingly, most of the students enrolled in the POI at Texas A&M University in 2023, 68% of all enrolled students identified as White. It is the limited number of African-American students enrolled in the POI that is surprising. Despite modest growth in the enrollment of White and total Non-White students from 2019 through 2023 (see Figure 2), in 2023, there were only three African-American students enrolled in the POI comprising 0.22% of the student population of the program.



	2019	2020	2021	2022	2023
White	738	780	829	857	928
Non-White	305	325	348	400	444
AA	18	16	15	8	3

Figure 2. Texas A&M University Construction Science Enrollment by Race/Ethnicity 2019-2023



	2016	2017	2018	2019
Total	59.8%	83.6%	80.8%	61.7%
White	63.2%	62.1%	62.8%	64.2%
NonWhite	54.8%	55.5%	56.4%	58.7%
AA	49.0%	53.2%	51.9%	51.2%

Figure 3. Texas A&M University Graduation Rate by Race/Ethnicity - 2016-2019 Cohorts

An examination of the four-year graduation rates for cohorts of students matriculating at Texas A&M University between 2016 and 2019 shows that there is only a slight increase in graduation rates between the 2016 cohort, 59.8%, and the 2019 cohort, 61.7%.

The graduation rate for African-American students for all four cohorts averaged 51.4%, while substantially lower than the graduate rates of the overall student population, increased by 2.2%, slightly more than the overall increase of 1.9% (see Figure 3). This may indicate that although African-American students attending Texas A&M University may not be successful as their White counterparts or even other Non-White counterparts, the rate of success is growing at the same pace as that of the overall student population.

Race/Ethnicity of Texas A&M University Construction Science Graduates.

Between 2019 and 2023, there were only 23 African-American graduates of the POI at Texas A&M University (TAMU) comprising only 1.58% of total number of program graduates in that period (see Figure 4).

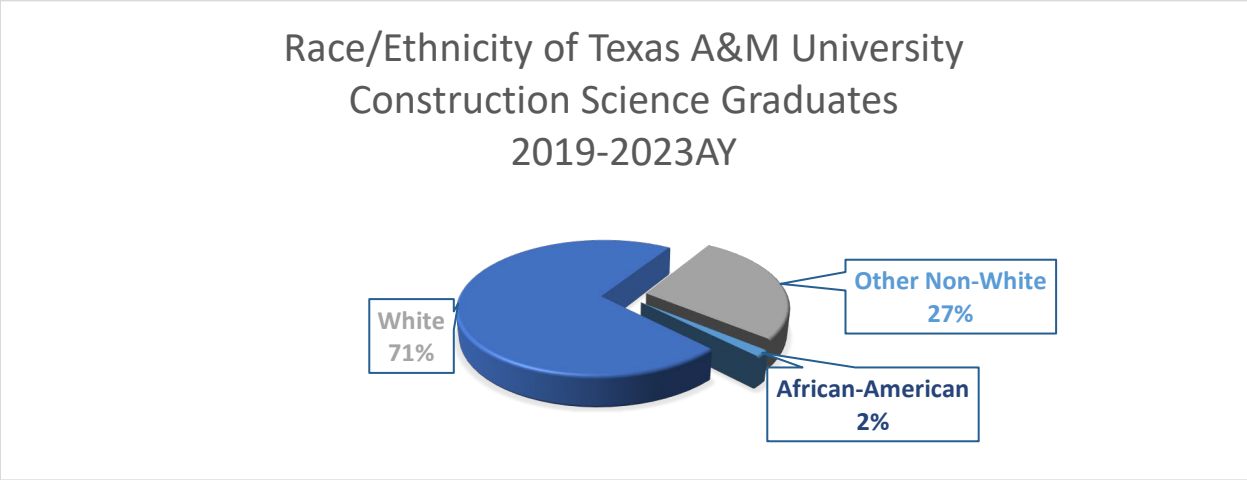


Figure 4. Race/Ethnicity of Construction Science Graduates 2019-2023

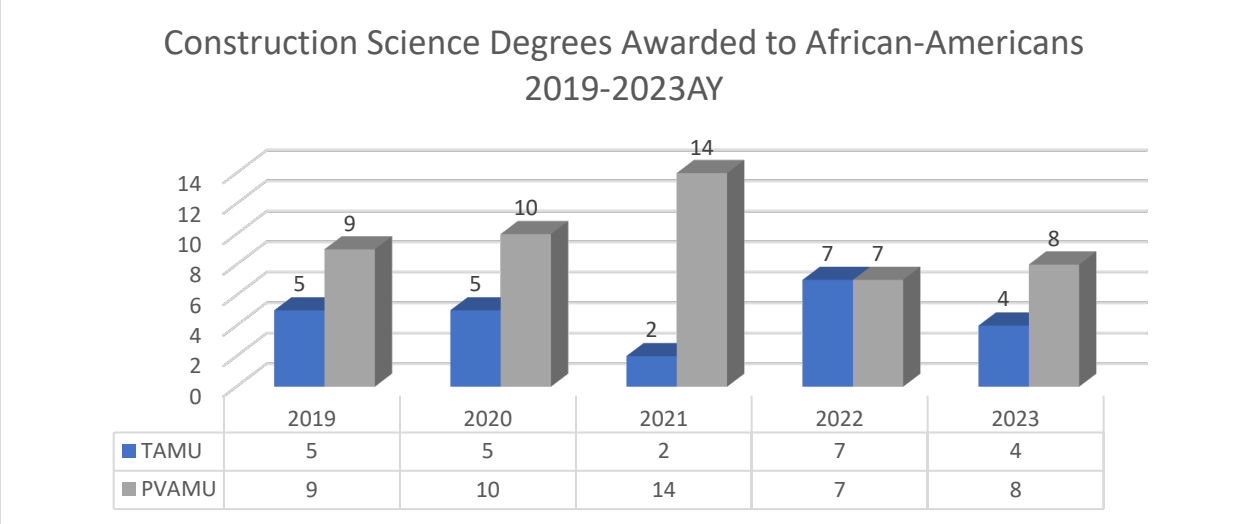


Figure 5. Construction Science Degrees Awarded to African-Americans

In that same period, the POI at Prairie View A&M University (PVAMU) graduated over twice as many African-American students (see Figure 5).

CEP Enrollment

While enrollment of African-American students in the POI at Texas A&M University consistently declined between 2019-2023 (see Figure 5), enrollment of African-American students in the POI at Prairie View A&M University not only steadily grew between 2019 and 2023, in 2019, there were almost three times as many African-American students enrolled in the POI at Prairie View A&M University (52) as enrolled in the POI at Texas A&M University (18). By 2023, the difference in enrollment numbers was even greater with only three African-American students enrolled in the POI at Texas A&M University and 64 African-American students enrolled in the POI at Prairie View A&M University.

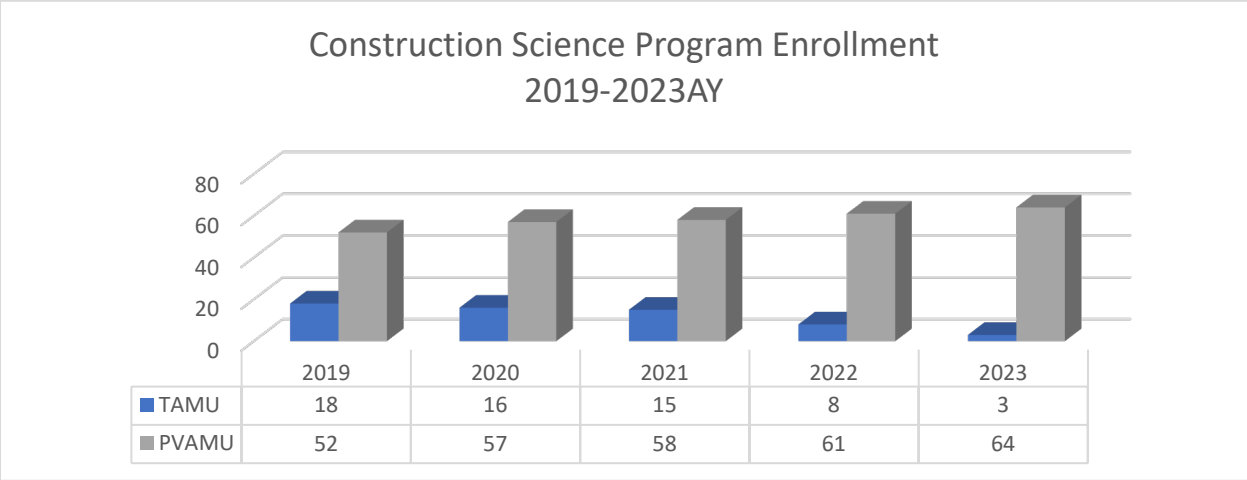


Figure 6. Construction Science Enrollment 2019-2023

Conclusion and Recommendations

Given that the POI at Texas A&M University is well known as one of the oldest and most robust CEPs in the U.S. and that the campuses of the two subject institutions are only fifty miles apart, additional research regarding what campus and program characteristics influence the choice of African-American students to choose the POI at Prairie View A&M University is warranted. Readily identifiable differences include the size of the campus, ethnic diversity of the student population, the size of the African-American student population and the number of African-American faculty members. There do not appear to be significant differences in the rigor of the curriculum or the cost of attendance for In-State students. Texas A&M University appears to have significantly higher Out-of-State Fees.

One limitation of this study is that it involved only two institutions. Additional research regarding enrollment and academic success of African-Americans in CEPs located at PWIs with a nearby HBCU that also offers a similar CEP would be necessary to help validate the findings of this study. Further, additional research regarding factors influencing African-American students to choose CEPs at a PWI over a CEP at a HBCU and vice versa may provide a rationale and support for other HBCUs to consider offering a CEP. This additional research could give insight into how the CEPs

at different institutions could work together as partners and collaborators to produce needed qualified construction managers by reaching differing potential student populations.

Based on the 2019-2023 enrollment numbers, there is a potential for Prairie View A&M University to produce more African-American Construction Science graduates than Texas A&M University for the next several years without a substantial increase in enrollment of African-American students in the Texas A&M University POI. Prairie View A&M University seems positioned to contribute to increased numbers of qualified African-American construction managers entering the workforce.

Although additional research is needed with a larger data set, the results of this study suggest that establishing or expanding CEPs at HBCUs to provide alternatives to CEPs at PWIs might contribute to increased numbers of qualified African-American construction managers. In addition, more in-depth future research regarding how the selection of an institution influences the major selections of African-American students might yield additional insights into the findings of this study.

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