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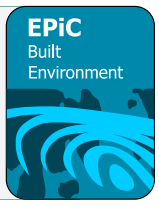

Where Do Minority Serving Institutions Stand in the U.S. Construction Education? – Exploring ASC and ACCE Communities

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The construction industry is facing workforce shortages and a low retention rate for new professionals. Embracing diversity has been identified as a critical factor that can remediate this situation. Minority Serving Institutions (MSIs) are recognized as an important source to increase the diversity of minority representation to foster a next generation of diverse professionals. However, construction lacks an understanding of what MSIs actively take part of the current educational community across the U.S. This study investigates MSIs within the context of construction disciplines in the U.S. as an important part of the construction educational community. An exploratory analysis of the existing databases that contain MSI denominated institutions under the listings by the U.S. Department of Education was performed to identify the proportions of MSIs that offer construction programs, the types of programs being offered, the degree levels of the educational programs, and the participation of MSI within the Associated Schools of Construction (ASC) and the American Council for Construction Education (ACCE) academic communities. Based on the results from the MSI exploration in construction, a discussion is provided to stress the importance of connecting with these educational institutions to increase the number of new, diverse professionals into construction careers.

Key Words: Education, Construction, Minority, Diversity, Workforce Development

Introduction

Demand for construction professionals at all levels (i.e., skilled labor, managers, engineers) continue to increase in the U.S. every year. The U.S. Bureau of Labor Statistic reports that construction occupations are expected to grow between 4% to 8% from 2021 to 2031, with over 700,000 jobs projected to come from new and replacement positions (BLS, 2022-a; BLS, 2022-b). Importantly, the U.S. construction industry highlights issues with replacing an aging workforce. Older professionals

leaving the industry once they reach retirement age are often not replaced due to a low influx of new incoming professionals (Suryadi, 2018). Workforce replacement issues have generated labor shortages and disruptions for the construction industry as a whole (Topping, 2018). Furthermore, the construction industry has unique challenges that reduce the likelihood of new professionals considering it as a career of choice. Some studies report that construction is negatively perceived by youth's parents (e.g., physically demanding, limited career progression, unsafe), with over 70% of parents indicating that they would not advise their children to pursue a construction career (NCCER, 2020). Other studies indicate that students simply do not get sufficient exposure to the construction industry in terms of career exploration, work experiences, or field trips (Bigelow et al., 2018).
More recently, there has been an on-going discussion in academia regarding the lack of representation of minorities in construction (Cho et al., 2022). In the largely White, male-dominated construction domain, race and gender have been identified as critical factors that directly affect the influx of new professionals into the discipline (e.g., student retention rates, graduations) (Al-Bayati et al., 2017; Manesh et al., 2020). Diversity challenges to engage, attract, and retain new, diverse professionals to the workforce are not unique to construction. There is well documented literature in science, technology, engineering, and math (STEM) that shows similar diversity challenges to those experienced in construction (Fry et al., 2021). Race underrepresentation, gender imbalances, and wage gaps are some of the problems that are continually faced by minorities in STEM (Fry et al., 2021). Complex solutions that tackle these multidimensional problems of diversity in STEM education and workforce are still under continuous research. One approach that has been emphasized as a potential solution by the National Academies of Sciences, Engineering, and Medicine (NASEM), is the bolstering of Minority Serving Institutions across the U.S. (NASEM, 2019). These types of educational institutions are of interest to solve the diversity issue in STEM because they provide a clear pathway to educational success and workforce readiness centered on minority communities (NASEM, 2019).

Although Minority Serving Institutions (MSIs) are recognized as an important source to increase diversity of minority representation within the STEM workforce, these educational institutions have not been studied in the context of construction. Currently, there is a gap in understanding what Minority Serving Institutions actively form part of the construction educational community to foster and guide the next generation of diverse professionals towards the workforce. This study focuses on exploring who are MSIs in the U.S. that provide construction educational programs, what types of degrees are offered, and what is their relationship with established educational communities in construction (i.e., the Associated Schools of Construction (ASC) and the American Council for Construction Education (ACCE). This paper contributes to the on-going discussion in academia regarding diversity, equity, and inclusion by identifying what MSIs are currently within the U.S. educational community of construction. Moreover, this paper highlights the need to engage and connect with the existing MSIs across the U.S., as these educational institutions offer opportunities to increase recruitment and retention of much needed new professionals into construction careers.

Background

What is the State of Gender and Racial Diversity in the U.S. Construction Industry and Education?

The current trends in industry employment show a lack of minority participation in the construction domain. The U.S. Bureau of Labor Statistics data highlights a large imbalance among the total employed persons in construction in terms of race and gender. White Americans represent a large proportion of the construction industry, composing 87.9% of the construction workforce (BLS, 2022-

c). Female professionals compose a very small percentage of the workforce with 11% of all people in the industry (BLS, 2022-c). Racial minorities also represent smaller portions of the workforce, with Hispanics (32.6%) presenting higher participation when compared to African Americans (6.3%) and Asian Americans (2.1%) (BLS, 2022-c). Participation of Native Americans, Pacific Islanders, Alaska Natives, and Native Hawaiians appears to be so reduced that data is not shown for labor workforce within the construction industry (BLS, 2022-c). These participation patterns of minorities in construction can be observed across multiple employment levels, including skilled labor (BLS, 2022-a), construction managers (BLS, 2022-b), and architecture and engineering positions (BLS, 2022-d).

Similar participation patterns in terms of diversity can be found in the U.S. construction education. The number of degrees awarded within higher education institutions (2-year or 4-year institutions) for students in construction are still largely obtained by White American students (55.3%) (DataUSA, 2022). Gender imbalances are also a prevalent problem, with a very small proportion of construction degrees obtained by female students (DataUSA, 2022). Similarly, racial minorities have a smaller number of degrees awarded at U.S. educational institutions. Mirroring the construction industry participation, Hispanics (21.9%) represent a larger proportion of the degrees awarded in construction when compared with African Americans (11.3%%), Asian Americans (2.42%), Alaska Natives (1.44%), and Native Hawaiian and Pacific Islanders (0.39%) (DataUSA, 2022). These patterns in higher education can also be found within labor trade educational programs. The latest reports by the U.S. Department of Labor (2021) highlight a lack of participation and graduation of minorities in apprenticeship programs. White American apprentices who completed their apprenticeship training in 2021 accounted for 42% of all trade graduates. On the other hand, Females (16%), Hispanics (18%), African Americans (6%), Asian Americans (1.5%), Pacific Islander Americans (0.7%), and Native Americans (1%) achieved much lower completion rates (U.S. Department of Labor, 2021).

What are Minority Serving Institutions (MSIs)?

The U.S. Department of Education defines Minority Serving Institutions (MSIs) as institutions of higher education (2-year or 4-year institutions) whose enrolling populations of minority students exceeds a given percent of the total student enrollment (U.S. Department of Education, 2011). These programs are explicitly supported by grant programs that can be obtained through the U.S. government to advance their goals and aims, while supporting equity, excellence, and economic opportunity within their communities. MSIs are grouped into seven minority student-serving categories as described below. It is important to highlight that higher education institutions under these categories are not monolithic and can have intersectionality of identities and communities across multiple of these groupings (i.e., institutions can have multiple MSI denominations).

- *Historically Black Colleges and Universities (HBCUs):* Colleges or universities established prior to 1964, whose principal mission was, and is, the education of Black Americans. The colleges or universities are accredited by a nationally recognized accrediting agency or association (National Center of Education Statistics, 2020).
- *Hispanic Serving Institutions (HSIs):* Higher education institutions that aim to improve the academic attainment of Hispanic students. These intuitions must have an enrollment of undergraduate full-time students that is at least twenty-five percent Hispanic (U.S. Department of Education, 2022-a).
- *Tribal Colleges or Universities (TCU):* Colleges or universities serve Native American and Alaska Native populations and are operated by tribes. The mission of these colleges or universities is to maintain, preserve, and restore Native languages and cultural traditions; offer a high-quality college education; and provide career and technical education, job training, and other career building programs (U.S. Department of Education, 2022-b).

- *Alaska Native-serving and Native Hawaiian-serving Institutions (ANNH):* Higher education institutions that aim to improve and expand their capacity to serve Alaska Native students and Native-Hawaiian students. To qualify as one of these institutions, undergraduate students who identify as Alaska Native must make up at least 20 percent of total enrollment, or students who identify as Native Hawaiian must make up at least 10 percent of total enrollment (U.S. Department of Education-c).
- *Asian American and Native American Pacific Islander-serving Institutions (AANAPISI):* Colleges or universities that aim to increase education achievement for underserved students including Asian American and Pacific Islander student populations. These intuitions have an undergraduate enrollment that is at least 10 percent Asian American and Native American Pacific Islander and at least half of the institution's degree-seeking students are denominated low-income (U.S. Department of Education, 2022-c).
- *Predominantly Black Institutions (PBI):* Higher education institutions that aim to serve more low- and middle-income Black American students. These institutions must have at least 40% African American student enrollment to be considered PBI. Differently from other group denominations, PBIs cannot intersect other MSI denominations such as HBCUs or HSIs (Jones, 2019).
- *Native American-serving Nontribal Institutions (NASNTI):* Higher education institutions that aim to improve and expand their capacity to serve Native Americans and low-income individuals. Enrollment of undergraduates in these institutions must be at least 10 percent Native American students. However, these are different from the TCU denomination, as these institutions are not controlled by tribes (U.S. Department of Education, 2022-d).

Research Motivation and Goal

Although the U.S. construction industry continues to grow, the domain still faces challenges with workforce shortages and lack of diversity. Bolstering Minority Serving Institutions (MSI), as an asset to create new pathways to educational opportunities for minority professionals, have been identified by other STEM disciplines as a potential solution for workforce shortages and diversity issues. However, MSIs are largely unexplored in construction literature. The goal of this study is to explore what MSIs provide construction degree programs and participate actively in the construction educational community. By identifying these institutions, this paper aims to contribute a new direction that the on-going discussion in academia regarding diversity, equity, and inclusion can take in construction to foster new, diverse professionals to join the workforce.

Research Methodology

An exploratory analysis was performed using existing databases that contain MSI denominated institutions under the listings by the U.S. Department of Education. The 2022 Eligibility Matrix by the U.S. Department of Education (U.S. Department of Education, 2022-e) contains a programmatic list of all institutions that meet the federal definitions for MSI program for fiscal year of 2022. The Eligibility Matrix listing contains over 900 MSI that can apply to federal grants under each corresponding minority-serving program for their respective student communities. Using the list of MSI, each institution's website was visited and investigated between April of 2022 and August of 2022 to search for the offerings of construction programs by each institution. Three key terms were used to identify construction programs on each university or college website: (1) "Construction"; (2) "Building Science"; (3) "Architecture & Engineering". Data was collected regarding the name of the program offering and the educational level of the program (e.g., Associates Degree, Bachelors, Master's). The resulting dataset was then cross referenced with the member listing of the Associated Schools of Construction (ASC) by region and the American Council for Construction Education

(ACCE) by program. The resulting programs were analyzed with descriptive statistics to understand the proportions of MSI that offer construction programs, the types of programs being offered, the degree levels of the educational programs, and the participation of MSI within the ASC and ACCE academic communities. Based on the results from the MSI exploration in construction, a discussion is provided to stress the importance of connecting with these educational institutions to increase recruitment and retention of much needed new professionals into construction careers.

Results and Discussion

Construction Degrees Offered by MSIs in the U.S

The 2022 Eligibility Matrix of the U.S. Department of Education (U.S. Department of Education, 2022-e) reports total 966 MSIs across the nation. From those institutions, the proportion of MSIs that offers construction degrees is 212 (includes institutions with overlapping denominations). From these MSIs, there are 196 unique MSI offering 2-year (AS/ASS) and 4-year (BS, MS, PhD) construction programs. Current reports show that there are 6608 institutions that offer 2-year (AS/ASS) and 4-year (BS, MS, PhD) construction programs across U.S (DataUSA, 2022). Consequently, MSIs are only 3% all institutions that offer Construction Degrees in the U.S. (Table 1). Across all seven types of MSIs, the percentage that offered construction degrees is less than 25%. The largest provider of construction degrees among the U.S. MSI is HSI (Count: 125; Percentage: 24%), followed by AANAPSI (Count: 52; Percentage: 27%), HBCU (Count: 17; Percentage: 17%), PBI (Count: 20; Percentage: 31%), TCU (Count: 6; Percentage: 17%), NASNTI (Count: 6; Percentage: 20%), and ANNH (Count: 4; Percentage: 25%) (Table 1). Most of these MSIs are geographically located in the Southern and Western States of the U.S with the exception of TCUs that are often located in the Northern Midwest and Rocky Mountains states.

Table 1.

MSI Construction Program Offering Across the U.S.

Type of MSI	**MSI Count**	**Count of MSIs that Does Not Offer Construction Degrees (%)**	**Count of MSIs that Offer Construction Degrees (%)**
HSI	529	404 (76%)	125 (24%)
AANAPISI	192	140 (73%)	52 (27%)
HBCU	100	83 (83%)	17 (17%)
PBI	64	44 (69%)	20 (31%)
TCU	35	29 (83%)	6 (17%)
NASNTI	30	24 (80%)	6 (20%)
ANNH	16	12 (75%)	4 (25%)
Total	**966**	**777 (79%)**	**212* (21%)**

* *Note*: From these 212 programs, there are 196 programs due to overlap in the MSI denominations

An analysis of the 196 MSI that provide construction degrees indicates that different levels of education are offered at different MSI denominations (Figure 1). A large and significant proportion of MSI universities only offer certificate or 2-year (AS/ASS) construction programs. Some examples of programs across the U.S. that offer such degrees include University of Arkansas - Pulaski Technical College (PBI), Bay Mills Community College (TCU), Oklahoma State University Institute of Technology-Okmulgee (NASNTI). Additionally, it was found that only a small proportion of MSIs in proximity to the Hispanic communities provide 4-year (BS, MS, PhD), 2-year (AS/ASS), and

Certificate construction programs. These include Florida International University (HSI), Morgan State University (HBCU), San Diego State University (AANAPISI & HIS), University of the District of Columbia (HBCU), University of Houston (AANAPISI & HSI). Moreover, it was found that only a very small portion of MSIs deliver MS and PhD degrees in construction, mostly in HSI and ANAPISI serving institutions. None of the HBCU, PBI, TCU, NASNTI, or ANNH programs were found to offer PhD programs in construction, but most offer either certificates, 2-year (AS/ASS) and 4-year BS degrees. These findings are consistent with previous reports (DataUSA, 2022) that show Hispanics represent a larger proportion of the degrees awarded compared to other minority groups.

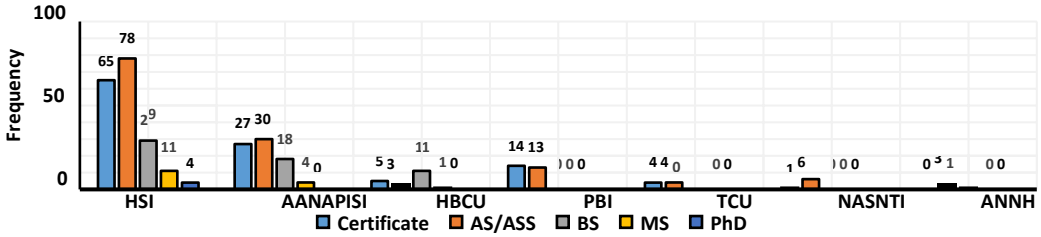

Figure 1. Educational Level by MSI Type for Construction Programs Across the U.S.

An overview of different types of construction programs offered at these MSI universities is given in Table 2. There are multiple programs offered at all MSI denominations. Overall, Construction Management programs are the most common offering across MSIs. The second most offered program across all MSIs is Construction Technology, followed by Building Construction, Construction Engineering, Architectural Engineering, and Construction Science. Variations are found with these offerings as Management and Technology degrees across MSIs. It is important to note that each MSI offers at least more than one construction program. For instance, HSIs offer a total of 157 different types of construction programs, followed by AANAPISI that offer a total of 60 programs. As some institutions can have multiple MSI denominations, there are potentially multiple programs that overlap within each institution.

Table 2.
Common Construction Program Types within MSI Across the U.S.

Program Type	**Number of MSI Programs in the U.S.**						
	HSI	**AANAPISI**	**HBCU**	**PBI**	**TCU**	**NASNTI**	**ANNH**
Construction Management	55	29	7	9	0	2	2
Construction Technology	34	8	3	1	3	3	1
Building Construction	13	1	2	2	0	0	0
Construction Engineering	10	2	0	0	0	0	1
Architectural Engineering	9	4	0	0	0	0	0
Construction Science	2	0	0	0	0	0	0
Others (e.g., Building Construction Management, Construction and Civil Engineering Technology, Engineering and Construction Technology)	34	16	8	9	3	1	0
Total	157*	60*	20	25	6	6	4

* *Note*: There are multiple institutions that offer more than one program type

MSI Programs within ASC and ACCE Educational Communities

It was found that participation of MSIs in U.S. construction educational communities is small. Table 3 shows MSI construction programs that are members of the ASC. In total, there are 148 ASC members in all seven regions across the U.S., but out of 196 MSI types with construction programs, only 29 unique MSIs (15%) participate in the ASC community. Among opportunities that come with being part of ASC, students can network with other students and construction professionals, through ASC Student Competitions and Annual Conferences, and this can potentially provide a recruitment opportunity for construction contractors to get a diverse workforce. Due to the low number of MSIs that participate in ASC, the construction education community has missed opportunities to bolster diverse students and faculty into the existing events for recruitment, engagement, and participation.

Table 3.
MSI Members of ASC Construction Programs

ASC Regions	Number of ASC Schools	Number of MSI Programs in ASC Schools						
		HSI	AANAPISI	HBCU	PBI	TCU	NASNTI	ANNH
1	23	0	0	1	0	0	0	0
2	21	2	0	0	0	0	0	0
3	21	0	0	0	0	0	0	0
4	16	0	1	0	0	0	0	0
5	19	7	2	0	0	0	1	0
6	26	5	1	0	0	0	0	0
7	22	9	9	0	0	0	0	0
Total	148	23	13	1	0	0	1	0

Table 4 provides an insight into MSI construction programs Accredited by ACCE. There are a total number of 90 ACCE schools on AS, BS, MS educational levels. Out of 90 ACCE accredited schools, only 20 unique MSIs (22%) are accredited by ACCE. Additional efforts by the construction education community are needed to increase the participation of MSIs in accreditation efforts. Increased accreditation participation can improve student preparation to enter the construction job market. Furthermore, of all MSI institutions in the U.S., only 14 (7%) MSIs that offer construction programs form part of both ASC and ACCE. This means that the educational community in construction has opportunities to reach out and engage MSIs to increase involvement in construction education to help address the issue of workforce shortages and diversity in construction.

Table 4.
MSI Construction Programs Accredited by ACCE

Degree Level	Number of ACCE Schools	Number of MSI Programs Accredited by ACCE						
		HSI	AANAPISI	HBCU	PBI	TCU	NASNTI	ANNH
AS	15	2	0	0	1	0	0	0
BS	75	13	6	3	0	0	0	0
MS	5	0	0	0	0	0	0	0
Total	90	15	6	3	1	0	0	0

Research Limitations

There are three research limitations for this study as follows: (1) the nature of the programs identified, (2) the list of MSI used for the research, and (3) the educational communities explored. First, only

three terms were used to identify construction as a major for the programs within each MSI explored (Construction, Building Science, and Architecture & Engineering). Programs that did not resemble the three terms selected for this exploratory research were not included in the analysis. Moreover, construction programs considered here were only explored as a major. It is possible that departments such as architecture and engineering have minors in construction-related disciplines. These minors in construction were not considered in the analysis. Second, student demographics across the U.S. are constantly changing and evolving. This research provides a snapshot of the programs reported by the U.S. Department of Education for the fiscal year of 2022. The authors are aware that multiple institutions within the ASC and ACCE educational communities obtained their MSI designation during the 2022 year (e.g., Arizona State University, University of Texas A&M) and these are not included in the analysis of this manuscript. Third, only ASC and ACCE educational communities were explored in this paper.

Conclusion and Recommendations

The demand of new professionals into construction careers continues to grow as the industry faces workforce shortages. The lack of diversity in the construction workforce has been identified as one of the factors that influences the low influx of new professionals into the discipline. This study explores what Minority Serving Institutions (MSIs) are actively engaged in the construction education community. The results obtained from an exploratory analysis indicate that only 3% of the U.S. MSIs offer Construction Degrees. Most of these MSI universities are geographically located in the Southern and Western States of the U.S. A small percentage of MSI offers 4-year BS, and MS, PhD programs, with a majority of MSI only offering certificate or 2-year (AS/ASS) in construction. Different construction program types are offered at these MSI universities, largely centered in Construction Management. The participation of MSIs in the construction educational community is small, with low percentages of participation in ASC and ACCE communities. These results indicate that there are large opportunities to engage MSIs to attract new, diverse professionals in construction. It is pivotal to explore how to get more MSIs involved into educational communities such as the ASC and ACCE. These educational institutions offer opportunities to increase recruitment and retention for the construction industry. Therefore, it recommended to establish a taskforce within ASC for Diversity, Equity, and Inclusion (DEI). This new ASC taskforce can create concerted efforts to connect with MSIs that have existing construction programs to get them involved in the academic community. Moreover, the ASC DEI taskforce can ask MSIs regarding their institutional challenges to participate in ASC and get accredited through ACCE. By answering this questions, new MSI members can be encouraged by providing support from ASC and ACCE to become part of the community and potentially foster the creation of new construction programs or expansion of existing ones. We believe the intentional engagement of MSIs would inform ASC community of the actual challenges and effective solutions for students to enter and stay in construction careers, and how the communication can promote DEI into the workforce.

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