

Increasing African American Participation in the Construction Industry

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In 2010, less than 4% of construction managers and less than 5% of first-line supervisors in the U.S. were African American (U.S. Department of Labor and U.S. Bureau of Labor Statistics, 2011). These percentages were well below any other major racial group for which date was reported. This data suggests a greater lack of awareness and/or interest among African Americans than any other racial group to pursue careers in the construction industry. At the same time, the U.S. construction is facing a skilled labor shortage as the construction workforce continues to age. As a result, there is a need to increase recruitment efforts aimed at middle school and high school students, especially African American students, for construction related careers. This study will present how a construction course for middle school and high school students was incorporated into an existing after-school curriculum offered by the Colorado Association of Black Professional Engineers and Scientists (CABPES). CABPES has implemented its construction course over the past three years, during which time a total of 20 students have taken the course. This paper will explore the development, implementation, and observed outcomes of this course along with suggestions for improvement of the course.

Key Words: recruitment, construction education, minorities, after school programs

Introduction

High academic performance and educational attainment constitute valuable assets that enable students to compete for desirable employment opportunities in a growing and technologically advanced global economy (Bailey & Bradbury-Bailey, 2007; Fredricks, Blumenfeld, & Paris, 2004; Henfield, Owens, & Moore, 2008). Attaining a post-secondary education in the twenty-first century is arguably more important than at any other time in American history. It signifies, in large part, the degree of social mobility one has or will have in American society (Jackson & More III, 2006).

Unfortunately, educational attainment has been elusive and difficult for minority students, most notably in science, technology, engineering, and mathematics—the fields collectively known as STEM. In 2008, the National Action Council for Minorities in Engineering (NACME) published a report entitled *Confronting the New American Dilemma* that found the disparity in the representation of minorities and women in STEM education a growing concern given the demographic changes occurring in society (Frehill, Di Fabio, & Hill, 2008). In 2010, African Americans, American Indians, and Latinos were estimated to be 32% of the nation's undergraduate students; they are expected to grow to 38% of the undergraduate population by 2025.

In response to the need to improve students' interest and awareness of career opportunities in STEM education in the U.S., practitioners, researchers, and policy-makers have invested millions of dollars in out-of-school time (OST) settings, which include programs that occur after-school and during the summer ("A Place to Grow and Learn," 2008). After-school programs are gaining recognition as a setting that holds potential for increasing students' literacy and engagement in STEM education (Hussar, Schwartz, Boidelle, & Noam, 2008).

Nature of the Problem

In general, students tend not to be exposed to construction professions until their teenage years, often too late for them to develop an interest in pursuing construction careers (Gehrig, 1992). By the time these students are

introduced to careers in construction, they have often developed a misconception of the construction industry. A 1992 report entitled *Characteristics of the Construction Craft Work Force* stated that young people about to join the workforce perceive construction work as dirty, non-professional, and non-technical (Gehrig, 1992). Since then, there is some evidence that this perception is changing due to the growth seen in undergraduate construction science and/or management higher education programs. This growth, however, tends to come mostly from an increase in white males students—reflecting the composition of the construction industry—whichs tend to be a Caucasian male-dominated industry (Jackson, 2004). There has yet to be a significant increase in the number of minority students entering undergraduate construction science and/or management programs reported in the published literature.

In 2010, 93.3% of all construction managers and 92.4% of first-line supervisors were white (many of which were also male) . Hispanics accounted for 8.5% of construction managers and 16.5% of first-line supervisors in 2010. Only 3.5% construction managers and 4.9% of first-line supervisors were African American (U.S. Department of Labor and U.S. Bureau of Labor Statistics, 2011). According to a recent report titled *Labor Force Characteristics by Race and Ethnicity, 2010*, African Americans "continue to have the lowest labor force participation rate among the major race and ethnicity groups … and, Black men were less likely than men in other race and ethnicity groups to be in the labor force" (p. 1). Of Blacks who were in the labor force in 2010, they "were less likely to be in management, professional and related occupations—the highest paying major job category—than Asian and White workers" (p. 2). The percentage of African Americans employed in the skilled trades is also very low. Those construction occupations that have a relatively high percentage of African American are "cement masons, concrete finishers, and terrazzo workers" (12%) and "highway maintenance workers" (14.2%, U.S. Department of Labor and U.S. Bureau of Labor Statistics, 2011). The gap between the percentage of African Americans employed in construction management and skilled trades could lead to a misconception among African Americans that construction is a dead end career for them. While there are ultimately a number of reasons why African Americans are choosing not to pursue construction careers, some very plausible reasons are (a) a negative image of construction, (b) a lack of understanding of construction career options and opportunities, and (c) a lack of positive mentors within the construction industry.

In addition to a lack of minority interest in pursuing construction careers at the college level, the industry is also facing a decline in the number of workers entering into the skilled trades. Since the early 1980s, the construction industry has experienced a shortage of skilled workers (Tucker et al., 1999). The construction industry has made little progress in recruiting minorities. Decisions to eliminate craft training and educational opportunities at vocational high schools, and the decrease in labor union training, have further decreased opportunities for students of all ethnic background to be exposed to the construction industry and career possibilities (Jackson, 2004).

One approach to addressing these challenges is to look to similar industries that are making significant efforts to increase the number of minority students employed within that particular industry. After school programs have been used by other professions such as engineering to increase student knowledge about engineering, to help prepare students for pursuing a degree in engineering, and to provide positive mentors for students (Koch, 2008).

This paper will examine the development and implementation of an after-school program to increase student awareness of construction career opportunities. It will present a descriptive case study of the Colorado Association of Black Professional Engineers and Scientists' (CABPES) after-school program designed to encourage and prepare African American and other underrepresented minority students to pursue STEM careers, including construction science. The CABPES after-school program reviewed in this report is patterned after the Junior Engineers Technical Society (JETS), but is not formally associated with the Junior Engineers Technical Society.

Literature Review

Politicians, educators, and business leaders alike have acknowledged and continue to debate a major concern confronting the U.S. workforce in the twenty-first century, which is the shortage of STEM professionals to replace the retiring generation of baby boomers. Research indicates the development of STEM talent in our educational system is inadequate to quell this growing concern over the shortage of STEM professionals (Hyslop, 2010). STEM education includes not only degrees in engineering and science, but credentials in fields as diverse as automotive technology, computer-aided design and drafting (CADD), electronics, architecture, and construction science (Hyslop, 2010). The U.S. educational system serves as a "pipeline" for K-12 students to pursue opportunities in

higher education and STEM careers in the workforce. It is well documented however that the pipeline is leaky, despite the increasing federal spending on STEM education (Lips & McNeill, 2009).

STEM Education and After-School Programs

In 2000, a nationwide study was conducted by the U.S. Department of Education on parents and their communities' concerns for the safety and well-being of school-age children once they returned home after school. Nearly 100% of parents, teachers, and people in the communities surveyed agreed it was important for students to have an after-school program that helped them develop academic and social skills in a safe and caring environment. The report also noted that many students' reading and math scores improved in large part because after-school programs allowed the students to focus their attention in areas where they were struggling. Many after-school programs connect learning to more relaxed and enriching activities, thereby increasing students' academic performance (Chung, 2000).

Since 2003, The Wallace Foundation has supported a range of initiatives to develop and test new, coordinated approaches to making high-quality out-of-school time learning opportunities available to more students ("A Place to Grow and Learn," 2008). In recent years, after-school programs have attracted a lot of interest and funding. A survey performed by the National League of Cities ranked the availability of after-school programs among the most pressing needs for students and their communities (Walker, Wahl, & Rivas, 2005). Thirty percent of African American and 20% of Hispanic K-8 students are enrolled in after-school programs (Kleiner, Nolin, & Chapman, 2004). "Research shows that participation in after-school programs reduces risky behavior, increases positive attitudes and behavior linked to success in school, and improves academic achievement" (Walker, Wahl, & Rivas, 2005, p. 9). The federal government is spending approximately $4 billion annually for out-of-school time learning, chiefly through the 21st Century Community Learning Centers program and the Child Care and Development Fund ("A Place to Grow and Learn," 2008).

With the expansion of the after-school educational community, serious attention is now being dedicated to understanding the potential contribution of these programs to engage young people in the engineering and science disciplines, and build their capacity as STEM scholars and professionals. *NASA and Afterschool Programs: Connecting to the Future* states that afterschool educational communities are uniquely suited for implementing learning experiences that can contribute significantly to helping young people discover who they are, what they love to do, and how to pursue those interests in school, work, and life (Walker et al., 2005).

In the published literature on minority recruitment, there is significant research available on after-school programs as they relate to engineering professions, some of which is referenced in this paper. Research is lacking on after-school programs targeting the construction industry. A literary search of the Associated Schools of Construction Proceeding only results in one article by Koch (2008) that addressed recruitment of high school student into construction programs. Additionally, no articles were found in the International Journal of Construction Education and Research. This report presents how the Colorado Association of Black Professional Engineers and Scientists (CABPES) is using its STEM education model, which includes a course in construction science, to encourage African-American and other underrepresented minority students to pursue post-secondary education in construction science.

Methodology

This study is a descriptive case study, which is a methodology used to describe an intervention within the real-life context in which it occurred (Yin, 2003). There are four situations where it is appropriate to use case study methodology. Those are when (a) the focus of the study is to answer "how" and "why" questions, (b) you cannot manipulate the behavior of those involved in the study, (c) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study, or (d) the boundaries are not clear between the phenomenon and context (Yin, 2003). The present study meets both the *b* and *c* requirements for descriptive case studies. This descriptive case study presents the development of CABPES' after-school program, and the ideas behind introducing a construction class into this program. Observation outcomes will also be presented, along with future recommendations to improve the program.

History of the Colorado Association of Black Professional Engineers and Scientists (CABPES)

The Colorado Association of Black Professional Engineers and Scientists (CABPES) was founded in Denver, Colorado, during the late 1970s by a group of African American engineers who shared a vision of increasing minority representation in technical careers. In 1980, CABPES formed its Junior Engineers Technical Society (JETS) program to expose elementary, middle, and high school students to career choices related to STEM education. This is an annual program that runs from September to April with one 2-hour after school meeting per week at the CABPES Technical Research Center (CTRC). The classes that have been regularly taught in the JETS program include civil, mechanical, electrical, biomedical, and aerospace engineering. Other courses have included architecture, Lego Robotics, web-design, and scalable game design. In 2007, CABPES added construction science to its after school program offerings. The decision to incorporate construction science into the after-school program was made due to the limited knowledge students had about the construction industry and construction related careers.

During 30 years of community service, it is estimated that more than 3,000 students have participated in CABPES's JETS program. Of those students, an estimated 50% were girls. Historically, 80% of the students are inner-city students. Ninety-eight percent these students have entered post-secondary institutions and 78% of these students study a STEM curriculum while in college.

Recruitment

There are two recruitment components utilized for the CABPES's after-school program: advisor recruitment and student recruitment. The students are selected from grades 5 to 12 and are encouraged to have an interest in the classes taught in the program. Historically, students are African American and other underrepresented minority students from inner-city public schools in Denver, Colorado; however all ethnicities, including Caucasian students, are welcome and have joined CABPES' after-school program.

Recruitment of students occurs in multiple ways. The most effective recruitment method, although an informal approach, has been word-of-mouth. Students, parents, and teachers who are knowledgeable about the program are eager to share program information with potential students and their parents.

In an effort to both broaden and formalize recruitment efforts, CABPES has implemented a formal recruitment process that center on presentations given at Denver Public Schools (DPS). These presentations are given annually in early fall to students taking STEM related classes and their teachers. The majority of these presentations have been given at DPS because a high percentage of students attending DPS match CABPES's target demographic (i.e. inner-city students). Presentations include information about the JETS program, its curriculums, and directions to the CABPES website for additional program information. Flyers and applications materials are also provided to the students and their teachers. Interested students are asked to share this information with their parents and must obtain parental permission before applying to the program. As part of the application process, students are required to write a 250-word essay discussing why they want to participate in the CABPES after-school program.

Students and their parents also attend a fall kick-off meeting to learn more about the program's policies, procedures, and rules. At this meeting, they are introduced to class instructors, who give short presentations about their professions and course syllabus. An open question/answer session is also held for the students and their parents. There is a $50 fee for students to enroll in the program, which students are requested to pay at the kick-off meeting.

Application materials are due two weeks after the kick-off meeting. When students turn in their application packets, they identify three classes they would like to take. For instance, a student could choose architecture as the first choice, web-design as a second choice, and construction as a third choice. What class students actually are enrolled in is determined by a combination of when they finalize their enrollment and space availability in classes; therefore, not all students will get their first choice. CABPES' goal is to place at least 10 students in every class. Actual class sizes have ranged from 6 to 12 students, depending on instructor approval.

Conditions for acceptance into the CABPES afterschool program are based on (a) a demonstrated desire to be in the program and commitment to following the rules, policies, and procedures; and (b) parent and/or guardian commitment. Parents and/or guardian commitment includes (a) bringing the students to the CABPES Technical Research Center (CTRC) for classes and picking them up after classes are over, (b) volunteering 12 hours annually, (c) assisting in making sure their student(s) abide by the rules, policies, and procedures established by the organization; and (d) paying the $50 fee. Occasionally transportation and/or the $50 fee have become a hardship for parent(s) and/or guardians. When transportation issues have arisen, students have been required to leave the program because CABPES is not able to provide transportation for students. Financial hardships arise frequently, making it difficult for parent(s)/ guardians' to pay the annual $50 per student fee. In this situation, it is the policy of the CABPES Board not to disqualify students from the program. Instead, the situation is discussed with the parent(s)/ guardian to come up with a payment plan. In certain situations, fees may be waived in exchange for an additional six hours of volunteer work.

CABPES recruits instructors from the engineering, architecture, and construction sectors, and from academia. These instructors are selected based on their industry experience and their ability to serve as role models for minority students. Ideally, those selected to teach in this program are from racial backgrounds similar to the students and have (or had) successful careers. Instructors volunteer their time to teach in the program. They learn about the program through presentations presented by the CABPES Board of Directors and CABPES staff at engineering, architecture, and construction companies and/or associations. The CABPES Board of Directors and staff members also attend network meetings or professional society meetings and discuss the organization with potential volunteers. Volunteers are identified for recruitment by word-of-mouth, parents' recommendations, and existing volunteers. Volunteers in CABPES often remain with the program from 5 to 30 years, donating their time, talent, and money to the organization and taking on a variety of positions in addition to teaching the after school programs.

Construction Class Structure and Implementation

A construction class was added to CABPES' after-school program in 2007. The class is held at the CABPES Technical Research Center (CTRC) on the first two Tuesdays of every month from 6:00 to 8:00 p.m. Classes run from late September through the end of April, with 2-3 field trips to provide "real life" examples of the course content. Course content is designed by the instructor and is approved by the CABPES program committee. There has been some variation of course content as the course has developed. The goal is to provide a comprehensive and insightful overview of the fundamentals of construction and the different careers the industry has to offer through a combination of presentations, hands-on activities, videos, displays, and field trips. Course content includes:

- an overview of the different types of construction,
- examples of material testing and inspections procedures,
- examples of different types and functionality of heavy equipment used on construction projects,
- an introduction to surveying, including basic set up and use survey equipment, and
- an overview of career possibilities.

Testing and inspection of materials (e.g. concrete, earthwork, rebar, and asphalt) is also included as a course component. Professionals from materials testing firms are invited to give guest presentations on material testing and inspection procedures. The students then go on a field trip to a materials testing lab where they can cast concrete cylinders using the techniques and procedures discussed during the lecture. On a follow-up field trip to the materials testing laboratory, students participate in a competition to break the concrete cylinders they cast seven days prior. The students are rewarded with a gift card or small prize if they win the competition. Other field trips have been to observe dams and bridges under construction. Hands-on projects involved the construction of scale models, which have ranged from building dams and bridges to towers and skyscrapers. Students took great pride in applying the concepts learned in the class to build a project they could call their own and that they would be remembered by.

OBSERVED OUTCOMES

Approximately 20 African American students have participated in the CABPES construction class since it began in 2007. These students ranged in age from middle school to high school. Some of the students that participated in the

construction class during the first year it was offered had already been exposed to other courses in CABPES' after-school programs such as civil engineering, mechanical engineering, aerospace engineering, electrical engineering, architecture, and web-design. This inadvertently created a challenge to getting them interested in the construction course. As a result, none of the initial students selected the construction course as their first choice. This has started to change and in 2010 four students chose the construction class as their first choice.

Based on follow-up discussions with the students, other recruitment challenges identified included a lack of knowledge about the construction industry and peer pressure to enroll in other courses. This lack of knowledge about the construction industry allows students to accept negative perceptions about working in construction. The course coordinator and instructors also believe that a lack of course specific recruiting created additional recruitment challenges. For example, initial recruitment efforts for the CABPES' after school program did not focus on specific courses—all recruitment efforts focused on just getting students interested CABPES' after-school program. This lack of focus early-on on the construction course appears to result in students becoming more interested in other course offerings that they were more familiar with, which made it challenging to interest them in the construction course. This coupled with an overall negative perception about the construction industry and peer pressure to take other courses in the program resulted in many students shying away from the construction course. Of those students that did select the construction course as a first choice, the majority were African American males in middle school. These students also tended to enjoy the course more than the high school students taking the course.

When students were questioned regarding their experience in the construction class, the overall consensus was that they enjoyed the class, especially the hands-on components. Evidence of this can be seen in the students' desire to leave something permanent behind to be remembered by. This showed a respect for the CAPBES' program and a desire to be recognized as alumni of the program. To date, however, none of the students who participated in the construction class went on to study construction in college. Several of these students did choose to study architecture. Although it is not clear from the data currently available why none of the students chose construction as a career path, even though they claimed to enjoy the construction course, a few observations are available from course instructors: (a) students' career decisions are heavily influenced in by their peers and (b) students tended to follow the career path of the CABPES' volunteers and/or instructors they admired and respected the most.

CONCLUSION AND RECOMMENDATIONS

Overall, students who took the construction course indicated through informal feedback that they enjoyed the course, providing some preliminary evidence that students find the course structure and content appealing. And, although none of the students have chosen construction as a career, both their knowledge and their parents' knowledge of construction and construction careers have grown. Although a small step, this is an important step in addressing negative perceptions about construction; especially among African American students and their families given that less than 10% of all construction managers in the U.S. are African American. Additionally, students' desires to build a project they could leave behind provides evidence of their respect for and their desire to be associated with the CABPES after-school program.

The key challenge to the success of CABPES' after-school program that emerged was the initial recruitment of students into the program. To address this challenge, recruitment efforts need to be reevaluated to address the challenges identified in this study. There is a need to modify the recruitment presentations given at schools to provide information earlier about the construction industry and the construction course. One possible approach would to break the overall recruitment presentation into smaller, industry specific presentations that students would rotate through. This would give recruiters a better chance to interact with students and to address their negative perceptions about construction early on in the recruitment process. This better understanding of construction could also lessen peer pressure against enrolling in the construction course since students would be better informed. Another key observation that emerged from this study was that middle school students appeared to enjoy the construction class more than the high school students. This suggests that recruitment efforts aimed at middle school student will be more successful and will be a better use of the limited recruitment resources available.

Additional studies are needed to better understand why students choose other careers despite enjoying the construction course. These studies should include surveys of students' knowledge, attitudes, and norms related to the construction industry and construction careers prior to participation in the construction course. After the completion

of the course, a follow-up survey should be incorporated along with a formal course evaluation to determine how the course improved students' knowledge of the construction industry and if there was a positive change in their attitudes and norms of the construction industry and construction related careers.

REFERENCES

Bailey, D. F., & Bradbury-Bailey, M. E. (2007). Promoting achievement for African American males through group work. *The Journal for Specialists in Group Work, 32,* 83-96.

Chung, A. (2000, June). *After-school programs: Keeping children safe and smart*. Washington, D.C.: Department of Education. Retrieved from http://eric.ed.gov/PDFS/ED438395.pdf.

Frehill, L.M., Di Fabio, N. M., & Hill, S. T.. (2008). *Confronting the 'new' American dilemma: Underrepresented minorities in engineering: A data-based look at diversity*. White Plains, NY: National Action Council for Minorities in Engineering.

Fredricks, J. A., Blumenfeld, P. C., & Paris, A. H. (2004). School engagement: Potential of the concept, state of the evidence. *Review of Educational Research, 74* (1), pp. 59-109. doi: 0.3102/00346543074001059.

Gehrig, G. B. (1992). *Characteristics of the construction craft workforce*. Austin, TX: Construction Industry Institute (CII).

Henfield, M. S., Owens, D., & Moore, J. L., III (2008). Influences on young gifted African Americans' school success: Implications for elementary school counselors. *The Elementary School Journal, 108*, 392-406.

Hussar, K., Schwartz, S., Boiselle, E. & Noam, G.G. (2008, August). Toward a systematic evidence-base for science in out-of-school time: The role of assessment. Retrieved from http://www.pearweb.org/pdfs/Noyce-Foundation-Report-ATIS.pdf.

Hyslop, A. (2010). CTE's role in science, technology, engineering, and mathematics. *Connecting Education and Careers, 85*(3), 16-20.

Jackson, B. J. (2004). *Construction management jumpstart*. Indianapolis, IN: Wiley Publishing, Inc.

Kleiner, B., Nolin, M.J., & Chapman, C. (2004, April). *Before- and after-school care, programs, and activities of children in kindergarten through eighth grade: 2001* (NCES 2004-008). Washington, DC: U.S. Department of Education, National Center for Education Statistics.

Koch, D. C. (2008). *Connecting industry and academics through the ACE mentoring program.* In the International Proceedings of the 44th Annual Conference of the Associated Schools of Construction, Auburn, Alabama.

Lips, D. & McNeil, B.., & Baker, M. (2009, April 15): *A new approach to improving science, technology, engineering, and math education* (No. 2259). Washington, DC: The Heritage Foundation.

The Wallace Foundation. (2008, February). A place to grow and learn: A citywide approach to building sustaining out-of-school time learning opportunities. Retrieved from http://www.wallacefoundation.org/knowledge-center/after-school/key-research/Documents/Sustaining-Out-of-School-Time-Learning-Opportunities.pdf

Tucker, R. L., Haas, C. T., Glover, R. W., Alemany, C., Carley, L. A., Rodiguez, A. M. & Shields, D. (1999, March). Key workforce challenges facing the American construction industry: An interim assessment (Report 3). Austin, TX: Center for Construction Industry Studies, University of Texas at Austin.

U.S. Department of Labor and U.S. Bureau of Labor Statistics. *Labor force characteristics by race and ethnicity, 2010* (Report 1032). Washington, DC: Author.

Walker, G., Wahl, E., & Rivas, L.M. (2005, June). *NASA and after school programs: Connecting to the future*. New York, NY: American Museum of Natural History. Retrieved from http://education.nasa.gov/divisions/informal/overview/R_NASA_and_Afterschool_Programs.html.

Yin, R. (2003). *Case study research: design and methods*. Thousand Oaks, California: Sage Publications.

Yin, R. (2008, December 4). *Qualitative case study methodology: Study design and implementation for novice researchers*. Retrieved from http://www.nova.edu/ssss/QR/QR13-4/baxter.pdf .