New Orleans JAZZED about Engineering Education

An Exploration into the Impacts of the National Society of Black Engineers (NSBE) on Student Persistence

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Introduction

Engineering colleges and universities have taken up the call to action to broaden participation in engineering with efforts such as summer bridge programs, minority and women engineering programs, and other initiatives that have proven to increase retention and graduation rates. These are typically universities that have the financial resources to leverage costly interventions. However, many other universities struggle to broaden underrepresented minority (URM) participation, especially in the absence of dedicated financial resources. At one small, Midwestern, private university, the only such intervention is the presence of a NSBE (National Society of Black Engineers) chapter; since its inception in the Spring of 2005, the chapter has been supported by a faculty member who acts as an unpaid advisor, and by the students who become active members. This research study explores the impact of one NSBE chapter on URM persistence and graduation, and describes the perceived impact of NSBE membership and participation, according to alumni interviews. Quantitative data from 2005-2015 indicate that 29.7% of black students who entered as engineering students graduated with an engineering degree within a 6 year timeframe. Of the students within this population who were non-NSBE members, only 7.7% graduated. Of students who were active members of NSBE, 81.8% graduated. Qualitative data, in the form of interviews with alumni and senior students, indicate that NSBE participation greatly influenced students' perceived integration into both the campus and engineering communities, and contributed to recurring feelings of *family*, *confidence*, and *pride*. This integration into their local NSBE chapter provided a perceived integration into the local university campus; likewise, their perceived integration into NSBE national provided a perceived integration into engineering. This research suggests that relatively minor intervention strategies for underrepresented minorities can have major impact on perceived integration and acceptance at predominately white institutions, ultimately providing a pathway to graduation. Instead of having the luxury of an MEP or access to a pool of scholarships, this chapter had access only to each other – and it was this access that made the difference for these students.

Literature review

Engineering education has declared diversity and inclusiveness an item on the research agenda for the discipline[1]. As such, research fashioned around the persistence and graduation rates of underrepresented minorities continues to be a topic of great discussion. Such scholarly works have spawned the use of frameworks, such as Tinto's theory of student departure[2, 3], Astin's level of student involvement[4], Sedlacek's non-cognitive assessment model of students of color[5], social integration[6] and various identity frameworks[7, 8, 5]. The review of this literature provides context for this study on the influence of NSBE membership on student persistence. It has long been argued that students' social integration into a university is a predictor of their success at a university[2, 9]. Such integration is largely dependent on students' involvement within the institution itself. While academic preparation and success are important and can be strong indicators of persistence, non-cognitive aspects of a student's collegiate experience can outweigh these factors[10]. Tinto's [2] theory of student departure anchored in social integration, defined a student's personal affiliations to peers, faculty, and staff occurring largely outside the academic

realm of the institution as indicators of academic success. Datnow and Cooper[7] investigated the importance of ethnic peer networks to students in developing tools for professional success while still affirming their cultural identity. These findings were further validated in a study that explored the experiences of Black students by Guiffrida[11], in which it was discovered that culturally-situated student organizations allowed students to retain and nurture a sense of ethnic identity on campus. May and Chubin[4] later reported on their recommendation of interventions most successful in increasing graduation rates of underrepresented minority engineering students, which included the amount of participation in student organizations and amount of interaction with other students (presumably through student organization involvement). This strengthens the argument presented by Garibay, Hughes, Eagan, and Hurtado[12], that participation in an engineering student organization helped engineering students identify, persist, and attain educational and career goals. Revelo Alonso[5] reported that Latina/o students attributed their successful development as engineering students on their participation in the Society of Hispanic Professional Engineers (SHPE). Participation in this ethnic professional organization provided a sense of belonging; likewise, this connection was identified as being paramount to these students' ability to achieve success in engineering programs. Students reported that being involved with "people who look like me" provided support and connection and contributed to their academic success and graduation from an engineering program[5]. Alonso's study utilized the Sedlacek non-cognitive assessment model to emphasize that students who had access to, and participated in, a community they identified with, were more successful than students who were not involved.

This study explores the graduation rate of Black engineering students at a small university, with particular interest in student involvement in an ethnic and professional student organization such as NSBE. In reviewing descriptive statistical data on Black engineering student graduation rates, there is a stark difference between Black students who actively participated in a local NSBE chapter and those Black students who were not active NSBE members. The research questions for this study are the following:

1. What effect does NSBE membership have on graduation rates at the university?
2. What are students' perceptions of the impact of participation in NSBE?

Theoretical framework

The theoretical framework of social integration is rooted in Durkeim's seminal work on social conditions, and is described as the extent to which individuals participate in a broad range of social relationships[13]. The results of studies in medicine suggest that social integration decreases an individual's susceptibility to depression, recurrence of cancer, and infectious illness. Such findings led to an expansion of the framework to look at the impacts of social integration on student retention at universities[8] and student retention in engineering specifically[6, 14, 15]. Social integration is a multidimensional construct that includes both the behavioral component of active engagement in a wide range of activities and/or social relationships, and the cognitive component of a sense of communality (a feeling of group solidarity) and an identification with one's social roles. One method of measuring social integration is to assess an individual in three categories: role-based integration, participation-based integration, and perceived integration[13]. Role-based integration measures the number of different types of social

relationships in which an individual participates. Participation-based integration measures the frequency an individual engages in various activities. Perceived integration measures the extent to which individuals believe they are embedded in a stable social structure and identify with their fellow community members and social positions[13].

Consequently, this research study measures these three categories based on the ways in which the participants describe the many roles they assumed within NSBE (e.g., members, local executive board member, and regional or national leadership), the activities they participated in as a NSBE member (e.g., regional or national conferences, banquets, study tables, etc.), and their perception of the impact of NSBE membership on them as Black engineering students.

Design and methods

This mixed-methods approach to understanding the influence of NSBE on the persistence of URM students at a small university with limited resource uses descriptive statistical analysis to understand the numerical implications, while qualitative data in the form of interviews with five participants that were either recent NSBE alumni or current NSBE students nearing graduation, provides a rich description of the practices that have contributed to the success of these students. All quantitative data regarding the population and graduation rates was gleaned from the official university database and provided by the institution's designated researcher within the registrar's office. It is worth noting that the data is reported according to cohorts of entering classes, and that racial identifiers were all self-reported.

The NSBE chapter was chartered in 2005, at a small, Midwestern, predominately white university with comprehensive degree offerings focusing on professional programs. Of the approximately 1400 students at the university, many of them are considered 'at-risk' (approximately 60% of students test into developmental math). The average ACT is 21 (composite), and the average SAT is 937 (critical reading and math combined). The university offers degree programs in engineering and computer sciences, business administration, criminal justice, elementary education, and psychology; however, it is historically an engineering college (with ABET accredited programs) and retains that focus and tradition.

In 2015, the population of the college was 1443, with 51% white and 18% African American students. Within the college of engineering, 50% of students were white, and 9% were black. While the university as a whole has a higher percentage of African American students than many other predominately white schools, this number drastically reduces within the College of Engineering, which has its own distinct building on campus. Further, the university does not have any offices or personnel devoted to diversity, it does not have a Minority in Engineering Program, and there are no black faculty or staff within the College of Engineering. Within the student development sphere, there is only one black student organization on campus, and that is the local chapter of NSBE.

Since its inception in 2005, the chapter has gone through active and inactive periods, ranging from membership of approximately 4 students to 20 students, and has seen the transition of 3 different advisors. Though activities have varied over the years, typical NSBE activities include meeting weekly as a group, maintaining connections to the regional and national levels,

hosting a fundraising banquet (for both a scholarship and travel expenses to conferences), participating in regional and national conferences, and volunteering in the community. It should be noted, however, that these activities have waxed and waned over the years. Of special significance is the annual fundraising banquet (discussed later in the qualitative results section), which was initiated by the chartering chapter in order to raise money for an endowed scholarship specifically for NSBE students. The banquet is planned and coordinated by the students, and typically draws corporate sponsors and campus participation and publicity. The size of the banquet has varied over time, but has reached over 100 attendees on multiple occasions. In addition to the banquet, attendance at the national convention has been a consistent goal of NSBE during its duration at the university.

The qualitative data was gathered from interviews with five participants who answered a call for interviews in fall of 2015. All participants signed IRB-approved consent forms and were assured of anonymity. The interviews were conducted according to a semi-structured interview, beginning with standard questions but allowing for follow-up or clarification questions. The interview was designed to elicit students' perceptions of the impact of NSBE on their academic and professional careers. The interviews ranged from 15 to 45 minutes. Interviewees include graduates from Spring 2015, Fall 2015, and anticipated graduation of Spring 2016; therefore, they capture a recent snapshot of impactful practices according to recent alumni. They took the pseudonyms Johnny, Shan, JT, Brie and Marissa.

The interviews were transcribed by-hand, imported into NVivo, and analyzed utilizing a combination of structural coding and In Vivo coding. Analysis began by identifying segments in the transcripts that were consistent with the three social integration categories (role-based, social participation, perceived integration), as well as In Vivo coding. Emergent themes in the In Vivo coding prompted some focused coding[16], and the following categories emerged: *family, confidence*, and *pride* (in later discussions of the interviews, these words are underlined for emphasis). These categories, evidenced by quotes, provide a rich description of the students' perception of NSBE's impact on their academic career.

Results of quantitative study

The quantitative data analyzed consisted of cohort data from 2005-2015, looking specifically at six-year graduation rates. This means that if a student enrolled in 2005, they were included in the statistical analysis if they graduated between 2009-2011. If they graduated in 2012 or later, they were not included in the statistical analysis. As such, the results of the descriptive statistical analysis indicate that from 2005-2015, 29.7% of black students who entered as engineering students graduated with an engineering degree within a 6 year timeframe (some students in the study ultimately graduated, but not within the 6 year timeframe chosen for this study). This percentage is fairly consistent with the national graduation rate of 31% that was reported by the National Action Council for Minorities in Engineering[17] for 2003 and 2004 first-year black engineering students. However, once the data particular to this study is split by NSBE and non-NSBE participation, an interesting contrast emerges: of the students within this population who were non-NSBE members, only 7.7% graduated. Of students who were active members of NSBE, 81.8% graduated (see figure 1).
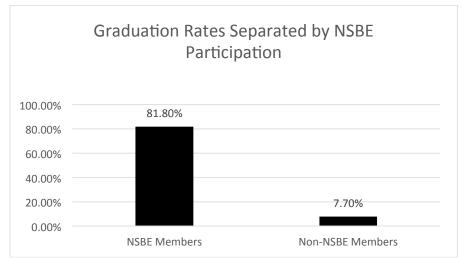
Figure 1 Graduation Rates This chart represents the stark difference in graduation rates of NSBE members and non-NSBE members for the 2005-2015 cohorts.

While the population of this study is admittedly small (37 total students), this data nevertheless shows a stark contrast that can hardly be ignored. However, it also begs the question: in what ways does NSBE membership have an impact on students' experiences and their resulting graduation? The next stage in this research, interviews with participants, was designed to capture this information.

Results of qualitative study

According to this study, social integration via active participation in NSBE contributed dramatically to students' continued engagement in engineering through to graduation. The three categories identified in the social integration framework (role-based, social-participation, and perceived integration) were prevalent in the qualitative interviews. Perceived integration in the local NSBE chapter contributed to integration into the greater university community and had positive side effects of increased confidence as engineers and increased pride in self and profession. The sense of *familia* that Revelo Alonso[5] reported was also prevalent among this group of participants, as evidenced in the ways they spoke about other NSBE members and the greater NSBE community.

The five participants (three women, two men) of this study have either graduated or are near graduation (May 2016). The students were enrolled in one of four different engineering disciplines from 2008 – 2016. Table 1 (below) outlines each participant's name (self-selected pseudonym), years of enrollment, major, initial date of active participation in their local NSBE chapter, the roles they assumed while participating in NSBE, and social-participation (that they recalled during the interview).

Name	Years	Major	Membership	Roles	Participation
Brie	2008-2015	Industrial Manufacturing & Business Administration	Sophomore	1. Vice President 2. President (2) 3. Regional board member (2)	1. National convention (3) 2. Regional conference (2) 3. SEEK 4. Study groups

				4. Member 5. SEEK Mentor	
JT	2010-2015	Electrical	Sophomore	1. Vice President 2. Senator (2) 3. Member 4. SEEK mentor	1. National convention (4) 2. Regional conference 3. Banquet 4. SEEK 5. Study groups
Johnny	2010-2016	Computer	Sophomore	1. Member 2. Secretary 3. President 4. Regional leadership 5. Treasurer 6. Regional Fall Conference Chair	1. National convention (3) 2. Regional conference (3) 3. Banquet 4. Regional leadership conference (2) 5. National meeting
Shan	2011-2015	Industrial Manufacturing	Sophomore	1. Member 2. Vice President	1. National convention (2) 2. Banquet 3. Karaoke
Marissa	2011-2015	Biomedical	Sophomore	1. Member 2. Parliamentarian	1. National convention 2. Regional conference 3. SEEK
() Indicates that they either assumed a role for many years (i.e., 2 indicates 2 years as vice president) or attended an activity more than once (i.e., 3 indicates that they attended the national conference 3 times).					

Table 1 Participant profiles

As described in detail in the remainder of this study, the most profound finding of this research was the students' perceived integration into NSBE and the subsequent integration into other larger communities. The integration into their local NSBE chapter provided a perceived integration into the local university campus; likewise, their perceived integration into NSBE national provided a perceived integration into engineering (see Figure 2). Perceived integration was measured in the ways that student's talked about communality and belongingness when discussing their involvement in NSBE[12].
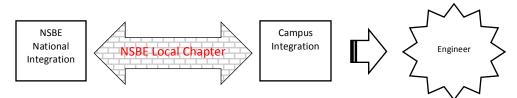

Figure 2 Perceived Integration Effect

1. Local NSBE Integration

Participants from this local NSBE university chapter spoke with great endearment and appreciation of both NSBE and their fellow members. Throughout the interviews, participants repeatedly spoke about *family, confidence*, and *pride*.

Each member recalled their involvement in NSBE being prompted by other students on campus that were actively involved in NSBE. The membership grew organically, as there was no

diversity program or minority engineering organization that advertised or recruited on NSBE's behalf. Once involved, they described NSBE as a supportive space. JT and Johnny described NSBE as a community that provided purpose, support, and encouragement. These were attributes that they identified as contributing to their success in engineering. JT described NSBE as

> *"[…] a movement that involved African Americans that struggle in engineering in school. It made me feel like I wasn't alone. I mean, I was alone at first at [my university], but it made me feel like the struggle wasn't by myself. Everybody's going through it."*

Johnny shared the sentiment when he described NSBE as a place to

> *"[…] network with other people that, you know, are trying to do the same thing that you're doing and also to let you know that you are not the only one that's you know, struggling, and you know, in the classes like you are. You know there are other people that are out there that can help you and support you, and uh I think, you know it's like, it's like an extended <u>family</u> that I have."*

This sense of shared "struggle" coupled with the student-run model, for JT meant that *"[…] NSBE was more about the students themselves and uplifting."* This was counter to his experiences in engineering where he described an isolating and unwelcoming environment,

> *"[…] there were some classes where I was the only one. Where at the time I was asked a question and they would just look at me like I was a total retard. Or you should know this. Or you should have learned this in high school. I always felt like I was down. That pressure. Being like I don't want to ask a question to single myself out. 'Oh it's that Black kid again, asking too much questions'."*

For many participants, the NSBE local membership also provided a mechanism to establish meaningful relationships with other students and faculty.

> *"It [NSBE] got me closer to students in other classes. Because before, when I was there two years ago, I wasn't talking to too many people. Before I got involved with NSBE I was probably talking to two or three other people. But when I became a NSBE [member] I started or created close relationships […]."(JT)*

> *"[NSBE] has definitely had an impact on the students, you know, at my school because of the fact that we, like I didn't just treat them like anybody else, I treat them like they was <u>my family</u> . . . my . . . friends, I treated them as my <u>brothers and sisters</u> and it just gives us a chance to help them outside of school with people I probably normally would've, you know, if it wasn't for NSBE I probably would not have hung it with them or we probably wouldn't have been as close. It was you know my local <u>support family</u> that helped me get through certain things or certain classes." (Johnny)*

> *"I feel like because I was able just to learn more about engineering since I was around people that were in the same degree as me. So I kind of just felt like, I don't know, it was*

just easier. I kind of felt at <u>home</u> almost, like cause when I would talk to them, they would know what I was talking about, not just gibberish coming out of my mouth (Marissa)

These relationships with other engineering students provided a safe space to ask questions about classes and coursework,

> *"[…] before [NSBE] I couldn't talk to my classmates and say 'hey did you do the work, or do you understand this'? Having this close relationship with [other NSBE member] I [began to] understand my strengths and weaknesses. I could struggle with a program anytime and be like 'hey I'm struggling in this class' and he would understand how to program in Java and he would be like 'oh yeah, this is how you do it' and show it to me. And when he was struggling in circuits, after I had it, I could teach him circuits. Teaching him allowed me to understand it a little better."(JT)*

> *"He [other NSBE member] was always driving me to uh not just settle for doing things, to always go out and try to, you know, be the best and then, because he believed in me, like no one really like, he believed in me more than I believed in myself at certain times. And he always had my back. He was always there for me, so and uh, just you know, things like that." (Johnny)*

> *"So there's people I can fall back on, like, hey, I need your help with this, or what have you, so I think those are […] reasons how NSBE had an impact on me." (Marissa)*

The relationships not only provided support, they established a community of practice in which JT and Johnny could feel comfortable discussing difficult concepts, which in turn strengthened their understanding and confidence. Confidence became a common theme that emerged in the interviews. Many participants described a boost in confidence as African American engineers:

> *"NSBE gave me the <u>confidence</u>, the <u>confidence</u>, you know, of being like an African American in engineering is something that you know most people can't you know, ultimately identify with, and with NSBE it gives you something to really like identify myself […]. Being African American and just being a … and because of like I you know have the <u>confidence</u> of being like you know a bright engineer knowing that I <u>belong here</u> and knowing how important and how significant I am to not only to my family, but to others as well." (Johnny)*

> *"[…] when I went to the conference I'm walking around and I'm seeing people that look like me. That have you know, did such things with their lives, so they just gave me the <u>confidence</u>, like, hey, if I wanna get out and do this, I can actually do it. I can actually put my mind to it and do it, […]. [NSBE] kind of just showed me that you can be black and be an engineer, which at one point, you know, was crazy, there weren't a lot of black people that were being engineers." (Marissa)*

> *"I think NSBE, the impact that NSBE had on me was actually <u>confidence</u>. Seeing other people on the national, regional level…like a chairperson do different things in their lives. They put themselves out there and believe in the mission. And that was a positive*

impact that it had. When I started school I didn't have people to look up to, you know what I'm saying?" (JT)

Such confidence may have contributed to their interest in leadership roles. Each participant assumed at least one local executive board role or local leadership role and a minimum of three major activities during their participation as a NSBE member. In some cases their involvement in leadership was out of necessity, "*When I first started I started in a leadership role as a VP, because there were only 3 people that were active."(JT)*, while others wished to do more but were limited by other commitments:

> "*I just felt like I could add and do a lot more for the group, and like kind of just bring us together and make us more organized and stuff like that, but I just couldn't devote as much time that was needed to do that." (Marissa)*

Ultimately, some students directly credited their success and the completion of their undergraduate degree to their participation in NSBE. Brie began her academic career in Industrial Manufacturing Engineering; however, her experiences in engineering prompted her to pursue a degree in Business Administration. When asked about the impact of NSBE on her remaining engaged in engineering she stated,

> "*I give NSBE the credit for me graduating from college with my engineering degree because after my business degree I was like okay I don't wanna go back. But just being around NSBE people, going to NSBE meetings and just kind of having that mentorship from people in NSBE is what made me stay in engineering."*

Brie's involvement in NSBE had a profound impact on her academic success, "*I had never made straight A's, and so I found that the more involved in NSBE I became the better my grades were and my last semester of college I ended up making the dean's list […]."* A young lady that had effectively abandoned engineering used her integration in the local and regional NSBE community to remain engaged and successfully complete her undergraduate degree in both engineering and business. She cited graduation as her most memorable moment as a NSBE member, not because of her accomplishment but instead due to the camaraderie visibly present:

> "*My most memorable experience I would have to say was graduation. To me, and it wasn't even just my you know, my graduation, but it was sitting in the audience looking up and seeing people walk across the stage with their NSBE sashes. That was something that I hadn't seen in all the time that I was at [my university] and I don't think anyone else seen that. So to me that was, it was huge to be able to see other members walking across the stage, proudly wearing their NSBE sashes."*

Johnny also attributed his success in engineering to his involvement in NSBE:

> "*NSBE has you know definitely impacted my life. I can't really think of how my collegiate career would've went if it wasn't for NSBE. I felt like I might have probably switched majors […]. I feel like, a part of NSBE has got [sic] me to where I am today, and uh, I am thankful for that as well."*

The participants in this study demonstrated their perceived integration into the local NSBE engineering community in the ways that they spoke about themselves in NSBE, their peers as family, and their belief in the mission and value of NSBE on their academic careers. Their willingness to assume leadership roles, to participate in the various social events, and their transformation into confident and proud black engineers is evidence of their social-integration into the local NSBE chapter.

2. Campus integration

In the interviews, the participants not only described the ways that they were integrated into NSBE, but they also described the ways that their participation in NSBE increased their integration into the campus community. As individuals, they were small numbers that were lost in the population; however, collectively, and as an incredibly active organization, they found that they had a voice:

> "[…] we just continued to express to them [university administrators] that they're leaving out an entire demographic of people. That they bring in all these African American students on campus and they have nothing for us, like no type of entertainment, no type of help, no type of studying assistance. They have nothing for us. And I feel like it really changed the way they viewed the African American students that they were bringing on campus. And they started to provide more activities and more things for us." (Brie)

Their accomplishments as a chapter began to garner the attention of the faculty, staff, administrators, and other students on campus:

> "I know that […] faculty members, they were really impressed to see what NSBE was doing and how we were really kind of overcoming some of the obstacles." (Brie)

> "[NSBE] gave us an opportunity to stand out. If you look at our track record, before when you would say, 'NSBE' they would think a couple of black students getting together. Instead we changed that track record by first off showing we are our own students. We made an impact as the only organization with their own scholarship awarded to their members. And then our banquet that we offered on campus that was all put together by students. To the point when other organizations began to mimic what we do. Before they were kind of shy and to the side, now they were trying to change their organization to do what NSBE does. They were trying to copy what we do or be like us." (JT)

> "[…] a lot of people became aware of who I am because of NSBE because they, you know, attended our banquet, they heard about me and some of the things I've done . . . or, some things have done both like locally in the community and also just on a regional level. So I think at that time it brought me closer to . . . people as far as faculty-wise." (Johnny)

> "[..] the banquets that we host at our school […] bring attention to what some of the students are doing. You know, letting the faculty know that 'hey', that we are active, that

you have students that are doing x, y, z, you know, over here at the Boys & Girls Club. You have, you know, a member that's leading community events in, you know, Indianapolis or Michigan, but, you know, he hosted programs in particular, you know, you have a student that, you know, put together a program that was recognized nationally, you know, as being… it became the national model for how things operate within NSBE. You know, it brings awareness to those people and lets them know that they're not just students at [my university] but they also have other involvements outside of [my university]." (Johnny)

"I think for our chapter, and I feel like everyone else would probably back me up too, our banquet was our biggest accomplishment. That's when we raised the most money, got the most publicity, and, you know, once that gets put on, it kind of helps us propel for the year coming because if it's a good event, everybody's gonna say, 'NSBE events are really good, I'm gonna go.' I think it [the banquet] made people, I guess, know me more and faculty and stuff like that which helped in the long run because if I needed something, then someone could be like, oh yeah I know [Shan], like she's you know, she's volleyball, she's NSBE […]." (Shan)

"[…] we always won the organization of the year. […] we started doing the poetry slam, people would be asking me, so when's the poetry slam? When are you doing it? Or, when's karaoke? People would look forward to come to those. So, I definitely, we had a major impact on the students. […] it's nice to know that people are recognizing what we're doing, you know, that they need to step up in their organization if they want to be on the same caliber as us." (Marissa)

The accomplishments of this chapter on campus, their regional recognition, their experiences of seeing "people that looked like me" at conferences, and their being part of something bigger than themselves, manifested a clear sense of "pride" in the interviews:

"I think it [NSBE] gave me a greater sense of <u>pride</u> so when we would go to conferences and we would sit in like certain seminars, […] we learned like a lot of statistics about how many African American students go off to college, how many end up leaving, or switching their majors, different things like that … and just to sit in there and say, wow, I'm one of the you know 4% of [black] women who actually graduated with an engineering degree. It definitely makes me hold my head up high and be proud even though I struggled the whole time I was there. It makes me be proud of the fact that I stuck it out." (Brie)

"[…] it [NSBE] gave me a little bit of <u>bragging rights</u>. Because I want to say, I am [JT] and then in school I can show what I can do. And then I say, 'oh by the way, I am a NSBE member.'"(JT)

These NSBE alumni and students found that their involvement in NSBE provided an opportunity to increase visibility on their campus that they may have otherwise not had. This allowed them to create authentic, meaningful relationships with faculty and non-NSBE students on campus. Their chapter's events, such as their annual *Operating in Excellence* banquet (to raise money for a student-established NSBE scholarship and conference funding), provided a platform for them to

demonstrate to the campus their leadership skills, their involvement in the community, and their accomplishments regionally and nationally within NSBE. The participants perceived that events like the banquet showcased their best attributes and likewise garnered them respect and admiration on the campus.

3. Engineering integration

Being involved in an organization that expanded beyond the confines of their campus provided the students with access to a larger community of black engineers. As reflected in previous quotes, this created a sense of belonging in engineering. These students created an atmosphere of acceptance and affirmation for themselves, but it expanded to the campus and was likewise, recognized by NSBE regional. This acceptance outside of their university provided them with a greater sense of integration into a larger engineering community.

> *"I think from, at least when I was on regional level and looked to award my chapter with an award with participating in a community event that was hosted in Indianapolis, and also of course, in Michigan in Detroit, I think that was the first time from a regional standpoint that we received in years, so that was cool. I think just the way that we all carried ourselves and the way that we…on a regional level, has kind of showed others, you know, what [my university] is and what type of people come out of [my university]."* (Johnny)

> *"[NSBE involvement] was kind of empowering, like we are engineers, we are black, we are out there doing all of these amazing things out in the community, it just really made people know like who you are and it kind of gave you like a sense of … hmm, like a kick in the butt, kind of like, hmm, I can do, like if I can do this with NSBE, I wonder what can happen when I graduate with my actual degree."* (Shan)

The participants of this study described being recognized not only by their university community, but at the NSBE regional level as well. This wide-spread acceptance gave them an overwhelming sense of acceptance in the broader engineering community. These participants identified NSBE as the reason for remaining engaged in an environment that was not always friendly, kind or supportive. Their level of integration in this student-run organization gave them the support they needed from their friends, faculty, and NSBE family to graduate with a degree in engineering.

Conclusion

The stark difference in graduation rates (81.8% for NSBE members, and 7.7% for non-NSBE members), combined with the results of the interviews (regarding perceived engineering integration), demonstrates the influence of this local NSBE chapter on the academic success (measured by graduation) of these students. The participants of this study described the ways that NSBE created a safe space for them to discuss challenges in courses, establish and explore relationships with their peers, and provided a means of establishing a presence on the campus. This integration into an ethnic professional organization provided role models, confidence, and a sense of pride in being not only engineers, but black engineers. These students were encouraged

by their peers and seeing "people that looked like them" at conferences and this fostered increased engagement in their profession, engineering. These findings support the broad theories of social integration into campus communities[2] and engineering communities[6, 14, 15], as well as the more specific studies of Revelo Alonso[5], Garibay, et al., [12], May and Chubin[4], and Datnam and Cooper[7].

For institutions struggling with resources to support their underrepresented and underserved populations, it is important to note that this chapter was supported solely by a faculty member (and not always an engineering faculty member, and not always a Black faculty member) who voluntarily served as their advisor and committed approximately 5 hours per week for NSBE meetings and planning. However, as this chapter experienced at different times, the heavy reliance on one faculty member's volunteer efforts is a precarious position. Should that faculty member leave the institution or cease that supportive role, the chapter's stability is in jeopardy. Even though the chapter is highly visible on campus, its lack of structural support puts it continually at risk. Further, because the organization is not institutionalized, it does not have a structured approach to recruitment. While this organic development of the group likely contributes to the feelings of *familia*, it also likely misses other possible NSBE members because it is not a systematic approach.

The interviews indicate that impactful practices within this chapter include the acquisition of leadership roles (5/5 participants), and travel to national (5/5) and regional conventions (4/5). Participation in SEEK and hosting a banquet for fundraising purposes were also common factors (3/5 participants).

This study presents a single case of success within a local NSBE chapter. It suggests that relatively minor intervention strategies for underrepresented minorities can have major influence on perceived integration and acceptance at predominately white institutions. While the findings may not be generalized for all cases, they certainly demonstrate the extraordinary power of social integration and present possible practices for other local NSBE chapters. Instead of having the luxury of an MEP or access to a pool of scholarships, this chapter had access only to each other – and it was this access that seems to have made the difference.

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