Theorizing the Underrepresentation of Black Males in Information Technology (IT)

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Abstract

Through qualitative inquiry, this study identifies and analyzes the factors that support or undermine the achievement of Black males completing IT degrees and entering the workforce. This paper presents the findings of a study examining the underrepresentation of Black male participation in IT guided by the Individual Differences Theory of Gender and IT. Throughout this paper there are common themes related to individual identity, coping mechanisms and environmental influences. This chapter portrays my experience and interactions with these Black men in regards to obstacles, roadblocks, diversions and ultimately success in pursuing and staying on an IT career path. The research centered around three district research questions. The first research question was how do Black male Individual Identity Characteristics influence IT degree pursuit and attainment? The second research question was in which ways do societal characteristics encountered by Black males influence IT degree pursuit and attainment? The final research question was how do Institutional Characteristics encountered by Black males influence IT degree pursuit and attainment? The findings could lead to a better understanding of how the factors that influence Black male participation could be used to recruit and retain Black males.

Keywords

Race, Ethnicity, Individual Differences Theory, Reflexivity, CISE, Computer Science, Information Science, Engineering, Empowerment, Diversity, Multiculturalism

Introduction

The greatest gift my Dad ever gave to me was my first computer, which he built in the mid-1990s. The computer my Dad built for us occupied a lot of my time. I remember breaking it several times to the point where my Dad got tired of fixing it when he would visit. Eventually, when I was in high school my Grandmother bought us a new desktop computer. I am sure the computer cost well over $2000 at the time. It was new, which meant I could play with it and break it. I believe my Grandmother knew that’s what I would do so she invested in an extended protection plan. When I broke it, a repair technician, who happened to be a Black man, Gary Vause, would come out to repair it. He had his own company, Vause Computer Systems. His company handled all the repair work orders in Atlanta from the Home Shopping Network and QVC. After coming to our house a few times he took notice that I was interested and offered me a job in his company where I could make a few bucks on the side while in high school. I quickly became the go-to person for all things technology related at school thanks to his help.

When I finished my Bachelor’s degree in Information Systems Engineering, I had numerous job offers and I initially accepted a position with Duke Energy in Charlotte, NC. The starting salary was more money than I had ever seen in my brief life and after all that’s what I thought people did. In my mind they finished undergrad, if they were lucky enough to graduate from high school, and enter the workforce. My best friend, Kim, who told me I could do better in high school, told me of this thing called graduate school. I had no idea what it was or what it took to get in other than taking the Graduate Record Examination...
(GRE). So I promptly scheduled the GRE and applied for Ph.D. programs in Computer Science, as the end of the fall semester was rapidly approaching. After the initial wave of rejections, I thought well I tried, and was preparing to go into the workforce at the end of the spring semester. Then I began to receive acceptance letters.

I thought to myself, “Wow, go figure, now I have options”. I then scheduled visits to the schools and applied for different types of funding. I narrowed my choices down and looked a little closer at Auburn’s Department of Computer Science and Software Engineering and noticed two Black graduate faculty members, Juan Gilbert and Cheryl Seals. None of the other schools I applied to had a single Black faculty member. I figured that with two Black faculty members that I would eventually find a specialty that I would be interested in and they may understand my background more than other faculty members and be someone I could identify with. One day I was walking to the mailbox at my Grandmother’s house to mail my confirmation of attendance letter, I noticed I received a letter from Auburn University with an offer of a National Science Foundation (NSF) Bridge to the Doctorate Fellowship.

I arrived to Auburn as a starry eyed kid having just finished a Bachelor’s degree and was met with a rude awakening of how different graduate school was from undergraduate work. Aside from the differences in coursework, I noticed a substantial difference in the ethnic makeup of the university in comparison to the one I came from and the environment I had been accustomed to. As I looked around in numerous classes the only Black people I saw were those who were advised by one of the two Black faculty members.

During my first semester as a PhD student, I had to pass the qualifying exam or take the equivalent course that corresponded to that section of the test. I went on to pass the qualifying exam. After my first year, my advisor left the university to go to Clemson University. I opted not to go with him at the time because I had just passed all the qualifications for the qualifying exam and did not want to start over at another university. However, after my advisor left the university, most of the students of color went with him, which meant the already few became fewer.

It was around this time that I saw something that I had not seen before. I was accustomed to being around Black students as I graduated from an HBCU. However, when my advisor left the university and the vast majority of the Black students left with him I noticed that students were not sold on the institution or even their primary focus area but rather on the individual. I never realized how much one individual meant in the eyes of students. I became curious as to why one faculty member meant so much to the underrepresented population? I was curious as to why students within a couple years of graduating with a doctorate in Computer Science would drop everything and start over fresh. This institutional and environmental change left me intrigued. A college with nearly two dozen Black students instantly became one with a handful. As I looked around the college I noticed something about Auburn and other universities I visited, their lack of diversity.

With my advisor now gone, I turned my focus to ethnocomputing, which focuses on computing technologies that are designed for a particular population or ethnic group. I changed my advisor to the only Black faculty member left. She took me into her already overcrowded lab for which I was greatly appreciative. She said when she first saw me, I had on a shirt that said “Genius by Birth, Slacker by Choice”. She went on to say that I should not wear shirts like that. I took her advice as a way saying that as a young Black male, that I should mindfully shield myself from stereotyping. While I saw the usefulness of ethnocomputing and I devoted much of my time to building applications and programs I could not help myself from thinking about the lack of diversity within the college and my curiosity to want to understand why. I would attend conferences and symposiums where the topic of diversity would be the theme and I would hear the same things, “that’s an interesting topic but where would you study that?” or “that’s a great topic but wait until you have tenure to study it.” I understood that being in a Computer Science program, that this particular type of research (i.e. IT Education and Human Resource Development) was seen as community service as opposed to research. This particular vein of research was ill-suited for a traditional Computer Science program, which primarily focused on Operating Systems, Algorithms and Architecture. It and was regarded as intervention and community service work as opposed to research. However, I could not see myself graduating in one area when the issue that drives my curiosity goes neglected in another. I could not fathom why talented researchers put such critical issues on the back burner. I also could not see myself working diligently to achieve tenure before addressing the issue of underrepresentation. I was two years away from finishing my doctorate in Computer Science and finally came to a crossroad. What do I do?
Many of the factors that precluded women’s participation in IT are applicable to Black men. In the early 2000s there was a movement, which the National Science Foundation led, to increase women’s participation in STEM. Some of the barriers that impeded women’s adoption of IT careers were beliefs about one’s intelligence, stereotypes, male university faculty and bias. The understanding of social factors plays a major role in understanding women’s underrepresentation (Trauth, 2002). For example, a stereotype about men being intellectually superior to women in mathematics has an impact on women entering fields that rely heavily on mathematical concepts. Similarly, understanding social factors plays a major role in understanding Black male representation in IT. Significant research has been done on the digital divide, stereotypes and stereotype threat, and the academic pipeline, but more needs to be done to help us understand the dearth of Black males’ participation in IT. We need to understand how the combination of these issues impact Black male participation in IT.

**Literature Review**

There has been a significant amount of research done on the adjustment, academic achievement, persistence, and rates of enrollment and graduation in postsecondary institutions. A large amount of the literature on Black males within educational environments, however, features quantitative studies comparing them with other subgroups. The academic pipeline refers to how individual, environmental and institutional factors influence, hinder or divert a person as one progresses along the path towards a goal (Margolis, Estrella, Goode, Holme & Nao, 2008). Researchers have studied pipelines related to minorities and women for completion of secondary, post-secondary, graduate and professional education (van Anders, 2004; Evans, 2001; Hopkins, 1997).

A 2003 study by Jackson using national databases discovered that there are wide gaps between Black males’ and White males’ educational attainment (Jackson, 2003). Brown v. Board of Education (1954) was a landmark case in which the United States Supreme Court ruled that separate public schools for Whites and Blacks was unconstitutional. However, more than 5 decades later, students of color are still exposed to different educational settings than Whites. Margolis et al. (2008) studies the vast differences in educational settings for students of color. They posit that America struggles with a stratified intellectual class system for which there are unintended consequences of well-intended policies at every level. They position the argument of inequality as the access and denial of access to Information Technology (IT), satisfactory educators and resources. They state the lack of the aforementioned resources, which are based on race, sex and socioeconomic status becomes the accepted norm.

Because STEM fields have been championed as a perennial pathway of success and innovation technology and engineering have been strongly emphasized as the primary driving force of the economy. The economy has shifted from an industrial economy, where goods were manufactured, to a knowledge and information economy, where the focus is on the intangible (Margolis, 2008).

Black American recruitment and retention has been a major focal point in Science, Technology, Engineering and Mathematics (STEM) fields (National Science Foundation, 2007). Despite increasing research and intervention initiatives designed to reverse the trend of underrepresentation within STEM, Black Americans obtaining degrees in STEM has declined (National Science Foundation, 2007, 2009). Stereotypes and stereotype threat are partial factors contributing to the decline of Blacks obtaining STEM degrees.

A stereotype is a widely held but fixed and oversimplified image or idea of a particular type of person or thing. There are many stereotypes and some can be broken down into two categories: those that are imposed and those that are not. Of the many stereotypes of Black males, aggression is a common (Fein and Spencer, 1997; hooks, 2004; Steele, 2010). However, the stereotype of being aggressive requires nuanced analysis to understand how that anger manifests. An example of aggression being imposed could be linked to gang affiliation that requires a certain level of aggression. The case of the aggression stereotype could come from a number of different lived experiences.

A second common stereotype is that Blacks are intellectually inferior to Whites, which scholars have refuted (Franklin, 1999; Cokley, 2005). Scholars have contended that Black students are intrinsically highly motivated; this motivation is not related to how they perform academically or to their academic self-concept (Cokley, 2005; Cokley, 2002; Cokley, 2003; Carter & Goodwin, 1994). While most racial
subgroups have seen significant progress in their postsecondary enrollment, little or no progress has been made in increasing participation rates among Black men over the last quarter of a century.

According to the Bureau of Justice Statistics (2010), it is a fact that Black minors are nearly eight times more likely to have a parent in prison than White minors. In addition, more than 4 out of 10 Black males in prison are fathers. This fact provides evidence that more Blacks are likely to be raised in Black single parent household. Despite this fact, there are situations where extended family, such as grandparents plays an active role in the raising of children. There are also instances where Blacks are raised without both parents in the household but there are also situations where Blacks are raised by a community, which serves as a healthy alternative to both parents in the household.

Stereotype threat is defined as being at risk of confirming, as self-characteristic, a negative stereotype about one's group. Blacks are susceptible to stereotype threat (Steele, 1997; Steele and Aronson, 1995). In essence, stereotype threat is an internal characteristic. Blacks are generally stereotyped, in the media, as superstitious, lazy, happy go-lucky, aggressive, intellectually inferior, ostentatious, active in sports, entertainers and poor performers in academics (Fein & Spencer, 1997; Aronson, J. & Good, C., 2000; Aronson, J. Fried, C.B. & Good, C., 2002). Within IT there is a lack of research that identifies positive stereotypes for Blacks that they can embrace. Instead Blacks are still mired by general negative stereotypes of their race.

According to Jackson et al. (2001), there are two factors that influence self-doubt about the IT domain. The first is making a group aware of their own ethnic and class-based identities through a negative stereotypic association. The second is the group’s ability to use technology effectively. These two factors can evoke self-doubt about the ability to gain mastery in this domain. The presence of individual and group identity may be a contributing factor that leads to evoking self-doubt and the ability to gain mastery of a domain.

Two problems result from IT being a predominately White male field. First, since there are fewer women and Black men in IT, their perspectives may not be brought to the forefront in policy, instruction, learning style and administration. Second, Black men may have a more difficult time adjusting to the profession due to a lack of identity affiliation (Jackson et. al, 2008).

In a study by Trauth et. al (2012), a survey was administered to explore the effects of race, ethnicity and socio-economic class on gender typing in IT. The study was conducted at twelve universities throughout the United States. Of the over 4000 survey participants, of whom 377 were Black males, the researchers found evidence of the influence of race on gender stereotypes about IT professionals. These two problems are evident by the identity constructs of a male in IT, which is White-male dominated. Furthermore, of the 39 IT skills survey participants were asked to rank as masculine, feminine and gender neutral, Black males classified no skill as feminine, which is a stark contrast to White males. One of the findings from the study was the Black male’s reluctance to assign any skill as feminine speaks to their desire to not feminize their work. Their reluctance can be traced back to and partially explained by their identity, which forces them to assume masculine traits.

What is lacking is sufficient research to analyze and understand the problem of underrepresentation of Black males in IT, which provide the basis for interventions that could lead to the reversal of the trend. Despite the dismal outlook for many Black males, there are those who successfully navigate through the higher education system to attain a baccalaureate degree. These are the men able to provide new insights about Black males who do participate in IT and persist, and perhaps their experiences illustrate strategies that may assist those in the future. Studies, which analyze the factors that influence Black male participation, may provide new insight into the disparity of Black males and their White counterparts.

Similar to stereotypes about Black males in IT, there is a lack of research that attempts to understand the Black male identity within IT. This lack of research may lead to Black males struggling to find their identity in a domain where they are a minority in society as well as the field. Within the cultural framework of America, the systemic structure is characterized by White male patriarchy that allows for Black males to have the ability to negotiate the way in which they have been socialized and institutionalized to think, act, and behave because they are men (Harris, 1995). hooks (2008) asserts that, race and the lack of diversity, cripples the Black male’s ability to truly transition into manhood. He is left to constantly struggle and fight for an identity, for power, for respect, and for understanding of who he is versus what he is projected and stereotyped as being (Harris, 1995; hooks, 2008).
Given the current economy, careers that can offer lucrative pay and opportunity are more important than ever. The culmination of these issues motivates a need for a better understanding of the ways in which academia is cultivating and nurturing the needs of Black male students pursuing degrees in IT.

There needs to be more research on what individual influences and increased agency leads to greater participation.

Theory

Some have explained the low participation of women in technical fields by positing that women are either biologically limited (gender essentialism) or influenced by social messages (social construction). Trauth (2002, 2006) posits that these explanations are insufficient to truly address the complexities of women’s technical abilities, interactions, barriers and the wide variation among women. Therefore, instead of grouping together individuals of a particular gender, the Individual Differences Theory of Gender and IT approaches underrepresentation in the IT workforce from the vantage point of adding individual agency, identity and experience in relation to life choices and societal influences (Howcroft and Trauth, 2004). The notion of individual agency is also crucial in the underrepresentation of Black male participation in IT to understand how they navigate socially imposed stereotypes.

Trauth advocates for investigation into influences that draw from a combination of socio-cultural themes and individual differences. Thus, the Individual Differences Theory of Gender and IT provides recognition of the importance of social influences, while emphasizing that personal characteristics, interests, and abilities are also significant shaping factors (Morgan, 2008). In this paper, I used Trauth’s Individual Differences Theory of Gender and IT that is being applied to a new domain: Black males.

Trauth’s Individual Differences Theory of Gender and IT, which has been successful in understanding the underrepresentation of women in IT was used in this research to analyze Black male undergraduate students in IT fields.

The Individual Differences Theory of Gender and IT, consists of three major constructs to explain gender variation in participation in the IT field: individual identity, individual influences, and environmental influences (Trauth et al, 2009; Morgan, 2008; Quesenberry, 2007). The individual identity construct consists of two sub-constructs: personal demographics (e.g. ethnicity, socio-economic class, family background) and career items (i.e., type of IT work). The second construct, individual influences, consists of two sub-constructs: personal characteristics (e.g., educational background, personality traits) and personal influences (e.g., mentors, role models, and significant others). Lastly, the environmental influences construct consists of four sub-constructs related to the geographic region; cultural influences, economic influences (e.g. cost of living, cost of education), policy influences, and infrastructure influences (e.g. institutional climate) (Trauth et al, 2009).

<table>
<thead>
<tr>
<th>Construct</th>
<th>Subconstruct</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Identity</td>
<td>Personal demographics</td>
<td>age, ethnicity, socio-economic class</td>
</tr>
<tr>
<td></td>
<td>Type of IT work</td>
<td>software development, IS design</td>
</tr>
<tr>
<td>Individual Influences</td>
<td>Personal characteristics</td>
<td>educational background, personality traits, abilities</td>
</tr>
<tr>
<td></td>
<td>Personal influences</td>
<td>mentors, role models, significant life experiences</td>
</tr>
<tr>
<td>Environmental Influences</td>
<td>Cultural influences</td>
<td>attitudes about women &amp; IT</td>
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</table>
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<table>
<thead>
<tr>
<th>Economic influences</th>
<th>cost of living</th>
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<tbody>
<tr>
<td>Societal infrastructure influences</td>
<td>availability of childcare</td>
</tr>
<tr>
<td>Policy influences</td>
<td>laws about gender discrimination</td>
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Table 1. Constructs of Individual Differences Theory of Gender & IT (Source Trauth et al., forthcoming)

Methodology

Interpretive studies generally attempt to understand phenomena through the meanings that people assign to them (Myers, 1997). The participants in the study may find commonalities of lived experiences with the researcher. Most of the participants are attending HBCUs and majoring in Computer Science, Information Science or Engineering (CISE) disciplines.

In this research, my understanding of the participants comes from lived experiences. Personal reflexivity requires that I analyze the research from different perspectives. Essentially, not one, single interpretation of reality is experienced by many. Reflexivity comes by way of giving my participants a voice while also telling my own story. This leads to the importance of keeping a reflexive journal while conducting research. I can voice my opinions and interpretations in the journal and when appropriate in the write-up and dissemination phases include those reflections. Reflexivity in qualitative research is necessary for transparency and rigor. The best way it seems to address reflexivity is to simply write about it. As I present the results reflexivity will be added to each section as a means to discuss my life experiences.

The data collection for this study was comprised of a structured interview guide. The interview guide was developed by Eileen Trauth (NSF Grant# 0204246, 2002). The guide was informed by the Individual Differences Theory of Gender and IT and used to determine how different factors influence Black male participation in IT (Trauth, 2002). The interview guide was modified and adjusted based on prior studies to suit the Black male audience (Cain, C.C., Trauth, E.M, 2012; 2013). A digital voice recorder was used, with participant consent, to capture the interview dialog to be analyzed later. Interviews ranged in time from 30 minute to an hour.

Results

RQ1: How do Black male Individual Identity Characteristics influence IT degree pursuit and attainment?

The first research question has themes from both the Individual Identity and Individual Influences constructs. There were a total of seven themes from the two constructs, four from Individual Identity and three from Individual Influences.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Sub-construct</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Identity</td>
<td>Personal Demographics</td>
<td>Race, Age and Family</td>
</tr>
<tr>
<td></td>
<td>Type of IT Work</td>
<td>IT Identity</td>
</tr>
<tr>
<td>Individual Influences</td>
<td>Personal Characteristics</td>
<td>Personal Identity, personality and exposure</td>
</tr>
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</table>

Table 2. Constructs of the Individual Differences Theory of Gender and IT Related to Research Question 1
Theorizing the Underrepresentation of Black Males in IT

The first theme is race. Race in its most basic form is a group of people who share distinct and similar characteristics. This study focused on Black males. Black is not necessarily an indicator of skin color or ethnic origin but is a socially based ethnical classification related to being African American, with a family history related to institutionalized slavery (i.e. raised in the United States).

The second theme was age. In this study age references the number of years a person has been alive. Experience varies based on age group and thus this construct was important because it provides context to the generation these Black males were raised.

The third theme was family. Family is a group of people associated by consanguinity, or birth. The concept of family presented itself in this study by the influence, or importance, of family on the participant’s desire to pursue IT as a career path.

The fourth theme was IT identity. IT identity is whether or not a Black male associates himself with the IT field. Association with the IT field consists of feeling like he belongs in the field.

The first research question also had themes from the Individual Influences construct. Individual Influences are the people or things that shape or mold an individual to become who they are. These influences can be imposed by others or derived from life experiences.

The themes that were present were personal identity, personality and exposure. Personal identity is individual characteristics that make a person unique. It is the individual characteristics arising from personality by which a person is recognized or known.

The next theme is personality. Personality refers to individual differences in characteristic patterns of thinking, feeling and behaving. These three themes comprised the Individual Influences construct in RQ1 and the Individual Differences Theory of Gender and IT.

**RQ2: How do Black male Societal Characteristics influence IT degree pursuit and attainment?**

The second research question has themes from the Individual Influences constructs. There were a total of five themes from this construct.

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<tr>
<th>Construct</th>
<th>Subconstruct</th>
<th>Examples</th>
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<tbody>
<tr>
<td>Individual Influences</td>
<td>Personal Influences</td>
<td>Stereotypes, Stereotype threat and environmental</td>
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<tr>
<td></td>
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<td>messages</td>
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<td></td>
<td>Personal Influences</td>
<td>Role Models, Mentors</td>
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Table 3. Constructs of the Individual Differences Theory of Gender and IT Related to Research Question 2

The first theme was stereotypes. A stereotype is a widely held but fixed and oversimplified image or idea of a particular type of person or thing. There are many stereotypes and some can be broken down into two categories: those that are imposed and those that are not. Some of the stereotypes of Black males that emerged from the interviews were a lack of intelligence about the field. Most of the Black males chose to combat that stereotype by proving what they were capable of.

The second theme was stereotype threat. Stereotype threat is defined as being at risk of confirming, as self-characteristic, a negative stereotype about one’s group. In essence, stereotype threat is an internal characteristic based on how one responds to what he or she may perceive someone thinks, without definitively knowing.

The third theme was environmental messages. Environmental messages about belonging were present throughout the interviews. This theme is one that participants approached from differing perspectives. For example, some reached this theme by thinking about where they were raised and how the computing field was not thought of as an option. Others approached this theme from a sense of being at times overwhelmed by the pressures to achieve and to make a path for others.
The fourth theme was role models. A role model is a person who is generally successful and positive and thus others desire to be like them. Role model goes together with the fifth theme of mentor. A mentor is someone who teaches or gives help and advice to those less experienced. Throughout the interviews the participants family, friends and others as mentors and role models for them throughout their lives, which made an impact on their direction.

RQ3: How do Institutional Characteristics encountered by Black males influence IT degree pursuit and attainment?

The third research question has themes from the Environmental Influences construct. There were a total of four themes from this construct.

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<th>Construct</th>
<th>Sub-construct</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental Influences</td>
<td>Institutional Environment</td>
<td>Type of institution, Preparation for IT Field, role of advising</td>
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Table 4. Constructs of the Individual Differences Theory of Gender and IT Related to Research Question 3

The first theme was the type of institution. This study interviewed participants who attended PWIs and HBCUs. Because of the difference in schools in student population and demographics we were interested in studying some key differences. To put things in context, the HBCU has a student population of around 2000. The HBCU is an institution that serves only bachelorette degrees. The campus of the HBCU is 105 acres. The PWI has a student population of over 46,000 undergraduates. It also serves graduate degrees with a total student population in excess of 90,000. The campus of the PWI is in excess of 5000 acres.

The second theme was preparation for the IT field. The level to which a student felt prepared for the workforce was a theme that emerged. Some of the interviewees discussed their familiarity with that they would be doing after graduation while some seemed to lack some information about which route to go post-bachelorette.

The third theme was the role of advising. Understanding some of the barriers that Black males faced trying to identify with the IT field and find an advisor that identified with them was of particular interest. Advising students in a academic capacity and a mentoring capacity is key to development and future success. Having an advisor that understands a student on a fundamental and personal level can lead to additional insight, which may help the advisor-student relationship.

Discussion

These results highlight Black male individual, societal and institutional characteristics on the road to IT degree attainment. Many of these men experience similar influences such as identity affiliation with the field, challenging stereotypes, the role of family, the role of advising and finding the necessary resources to be successful. However, the overarching theme is that these men did succeed in overcoming those obstacles to obtain their IT degree. While there are several factors that influence degree attainment, knowing which are particular to Black men can lead us to understanding their individual needs and assist with recruitment and retention efforts. There is evidence that supports the need for increased diversity in IT. Top Silicon Valley companies, Fortune 500 Companies and research show that a diverse workforce is needed to develop innovative solutions.

As researchers there's a need to cultivate the minority population and assist with the removal or successful navigation of obstacles. There results indicate a small piece of that successful navigation. These results indicate that people will have individual routes to their success but after studying several you can begin to see how these common themes manifest themselves into successful traits. One can also begin to identify areas of which to position for future research, interventions and policy making.
Acknowledgements

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REFERENCES