

Applying IRSS Theory: The Clark Atlanta University Exemplar

Fay Cobb Payton, Ph.D.

Associate Professor of Information Systems

North Carolina State University

College of Management

Box 7229

Raleigh, NC 27695

fay_payton@ncsu.edu

Tiki Suarez-Brown, Ph.D.

Associate Professor of MIS

Florida A&M University

School of Business & Industry

One SBI Plaza, 417 EW

Tallahassee, FL 32307

tiki.suarez@famuedu

Courtney Smith Lamar, Ph.D.

courtneylamar@gmail.com

**Submitted to the *Decision Sciences of Innovative Education* – Special Issue on Expanding
Minority Representation in Management Education**

March 2012

Abstract

The percentage of under-represented minorities (African American, Hispanic, Native Americans) that have obtained graduate level degrees within computing disciplines (computer science, computer information systems, computer engineering, and information technology) is dismal at best. Despite the fact that academia, the computing workforce, professional associations, and scientific societies have identified procedures, models, and best practices in an attempt to increase the number of individuals within these under-represented communities, the number of minorities receiving MS and PhDs in these fields have only increased marginally. In this paper, we discuss how Boice's four-part IRSS model (i.e., Involvement, Regimen, Self-Management, and Social Networks) combined with effective mentoring models as introduced in Payton et al. (2006), is a promising framework for addressing the longstanding issue of under-represented minorities in management education, which tends to mirror findings in science, technology, engineering, and mathematics (STEM) disciplines. The focus of this paper is to illustrate the application of these theories at the undergraduate level by discussing two pre-college/early college/scholarship programs implemented at Clark Atlanta University (CAU). These CAU programs provide the field with an exemplar which can serve as a foundational example for institutions seeking to foster, retain and graduate under-represented minorities in higher education management disciplines, in general, and offer lessons learned from historically black colleges and universities (HBCUs), in particular. Using a "360-degree mentoring" model to supplement the IRSS framework, our study concludes with implications for future research regarding how academic institutions can create, foster and sustain programs for effective recruitment, retention, and training of under-represented minorities.

Keywords: Recruitment, Retention, Under-represented Minorities, Mentoring, Management Education, Computing Disciplines, Diversity

Introduction

Multiple sources, such as the National Science Foundation (2008), the Association to Advance Collegiate Schools of Business (2003), Coalition to Diversify Computing (Aspray and Bernat, 2000) along with the Association of Computing Machinery (Klassen, Stockard, and Akbari, 2004), have stated that there is a shortage of individuals from under-represented communities within computing fields (computer science, computer information systems, computer engineering, and information technology). These organizations have cited the small percentage of under-represented individuals receiving graduate level degrees on numerous occasions inside their research reports. Moreover, they have also discussed the importance of diversifying both the academic classroom and the nation's workforce. Not only is diversity necessary to increase the recruitment and retention of under-represented minorities in higher education in an effort to meet the competitive workforce needs, it also offers the benefits associated with diversity in higher education both in the executive ranks and in the classroom. The American Speech-Language-Hearing Association (2009) along with Smith (1991), Knepelkamp and David-Lang (2000), and Carnevale and Fry (2000) highlighted the following benefits of diversifying higher education:

- Increases the quality of learning
- Diversity in the college classroom fosters intellectual development
- Reduces students' level of racial prejudice
- Increases their tolerance towards racial and gender differences, and
- Facilitates students' explorations of diverse perspectives

According to Steven Diner, Rutgers University Chancellor:

Every year hundreds of graduating seniors, responding to open-ended questions on exit surveys, say that the diversity of the campus contributed profoundly to the quality of their Rutgers-Newark education (<http://www.newark.rutgers.edu/diversity/>). Within the corporate domain, results from Catalyst's (2004) report have offered that diversity contributes positively to the return on equity and total return to shareholders with a significant number of companies reporting a 24.8 percent higher return over 10 years with dividends reinvested.

Although most academic and corporate institutions indicated there is value in diversity, why have the percentages of under-represented minorities, both entering graduate schools and obtaining graduate level degrees within the management education (particularly computing disciplines) and STEM disciplines not improved? Burge and Suarez (2005) stated there are financial, social, and cultural factors that affect minorities as they pursue degrees in the computing. Further evidence to support this idea is found within the discussion entitled "Lack of Diversity in Science and Engineering Graduate Enrollments" (Cajun, 2010) and Schmidt (2010) as well as American Speech-Language-Hearing Association (2009). Relative to management education, in general, and computer information systems, in particular, Payton, et al. (2005) reported that others may be inclined to articulate there is an absence of racioethnicity and mentoring within the more STEM-oriented fields. Nonetheless, it is paramount that both academic and corporate entities come together to understand, stimulate, and ultimately train the workforce of tomorrow on the nature and effects of ethnic under-representation.

Historically black colleges and universities (HBCUs) have proven to be vital educational institutions in preparing its students for graduate education and careers. According to the

Educational Effectiveness of Historically Black Colleges and Universities briefing report by the United States Commission on Civil Rights (2010), students who attend HBCUs are more likely to pursue careers in STEM which includes computing disciplines. Despite the controversy surrounding academic mismatch in this report and the myopic perspective of Jason Riley's *Wall Street Journal* article, "Black Colleges Need a New Mission" (Walsh, 2010), it is critical to note that HBCU graduates account for 33 percent of the African-American students in doctoral level STEM programs. Further evidence from the graduate research exam (GRE) database of 351,017 students of which 30,203 were African American offered the following as reported by the American Youth Policy Forum (Wenglinsky, 1999; Gasam, 2011):

- Roughly 34% of African-American HBCU undergraduate program graduates obtained graduate degrees as compared to only 20.5% of African-Americans nationally.
- The top five institutions producing African-Americans pursuing graduate STEM degrees are all HBCUs as were 20 of the top 50 producers.
- A higher proportion of African American HBCU students aspire to go to graduate school than African American students at traditionally white institutions. About 33% of African Americans who took the GRE in 1993 went to HBCUs, even though only 28% of all African American college graduates had attended HBCUs.
- By 1994, HBCU alumni were more likely to remain in graduate school or have achieved their PhD than alumni of traditionally white institutions (82% vs. 66%).
- HBCU alumni finished their PhDs faster (5.57 years) than their peers who had attended traditionally white institutions (6.14 years).
- HBCU alumni earned their PhDs at slightly higher rates than alumni of traditionally white institutions (21% vs. 18%), but the small numbers of African American PhDs in the database limited the significance of this finding.

Though we included a partial listing from the American Youth Policy Forum, the above statistics delineate the relevance of HBCUs and provides educational opportunities that address twenty-first century issues impacting the United States global competitiveness. Despite these facts,

Figure 1 shows the STEM doctoral degrees earned by U.S. citizens by gender and race/ethnicity. Though this figure illustrates upward trends, these data are presented over a 12-year horizon with deliberate increases among under-represented groups in the sciences and engineering. Hence, it is these shortfalls that motivate this research paper.

Specifically, we seek to overview the STEM (**particularly the T**) data and examine pre-college/early college/scholarship programs offered at Clark Atlanta University (CAU), an HBCU co-located in the Atlanta University Center Consortium with Spelman College, Morehouse College, Morehouse Medical School, Morris Brown College and the Interdenominational Theological Center. Figure 2 provides a Google map to the general location, which shows CAU's proximity to Georgia Institute of Technology and Georgia State University.

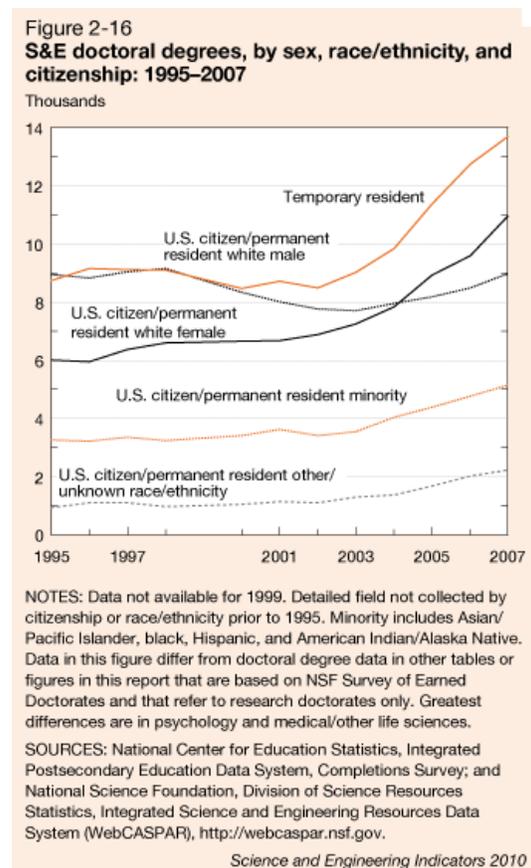
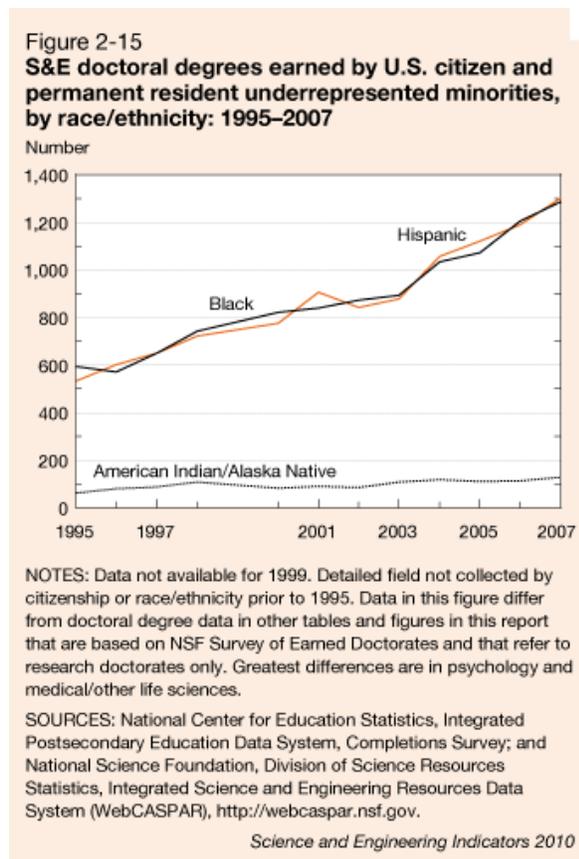


Figure 1: STEM Doctoral Degrees Earned by U.S. Citizens, Gender and Race/Ethnicity

Adopted from National Science Board, *Science and Engineering Indicators 2010*

In this paper, we draw on STEM statistics as a motivation for management education. A review of two pre-college/early college/scholarship programs that were implemented at Clark Atlanta University (CAU), a historically black college and university is presented. Each author of this manuscript participated in one of these CAU pre-college/early college/scholarship college programs. We, then, apply the IRSS Theory offered by Boice (1992) to evaluate two of CAU's pre-college and college initiatives. The Boice's four-part IRSS theory (i.e., **I**nvolvement, **R**egimen, **S**elf-Management, and **S**ocial Networks) is a promising framework for addressing the longstanding issues affecting under-represented minorities in management education. As outlined in Payton, et al. (2005, pp 192-193), the IRSS framework is as follows: *Involvement* is stressed as a major step for new and emerging academics to participate in countless dimensions of university activities. *Regimen* involves issues, such as time management and balancing teaching, research and service activities - three vital components in most academic institutions. *Self Management* points to unanticipated, emerging academic roadblocks that tend to lead one to focus on wrong or unproductive activities, and *Social Networks* builds informal relationships via socialization with other colleagues and university administrators.

The adaptation of this theory is followed by a discussion of best practices from the CAU program experiences and provides lessons learned that can create a foundation to increase minority representation within the technical fields of management education and offer best practices and lessons learned from an HBCU to predominately white institutions (PWIs).

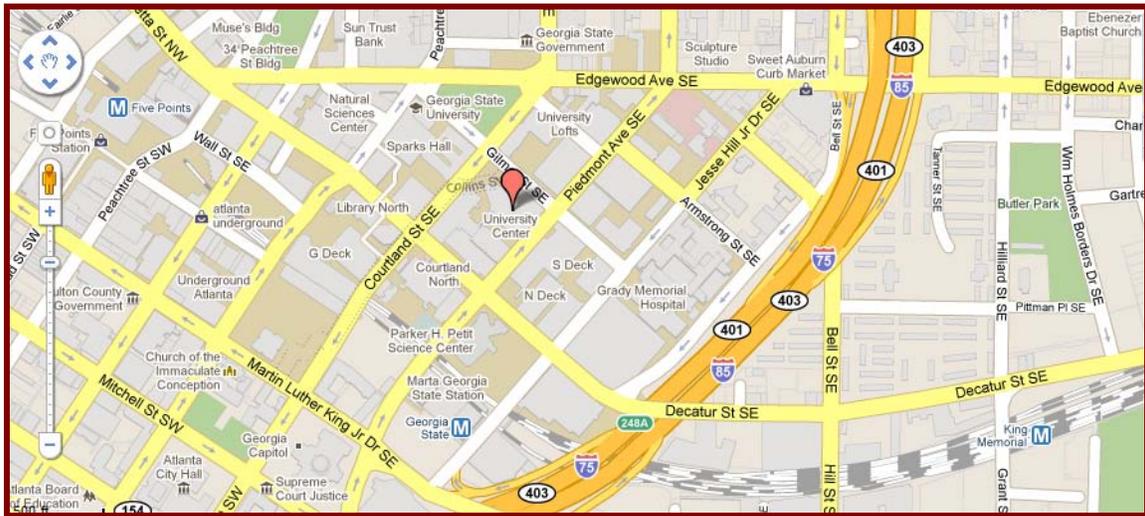


Figure 2: Location of CAU in the Atlanta University Center Consortium

Literature Review

Given the significant impact of technology on society, academia must be committed to the goal of developing diverse, educated, and talented communities to enhance and accelerate the production of technologists, scientists, and engineers. The Computing Research Association (2009) has performed several studies, which unfortunately have shown there is a shortage of African American, Hispanic, Native Americans in Information Technology (the T in STEM) careers.

With a focus on the T in STEM, Table 1 displays the ethnicity percentage of individuals that were awarded Bachelor's, Master's, and Ph.D. degrees in computer science, computer engineering, and information (CS, CE, and I) disciplines at research institutions for the year 2008-2009. This data is based upon the annual 2008-2009 CRA Taulbee Reports.

Table 1. Ethnicity of Bachelor's, Master's, and Ph.D.'s Recipients Results of 2008-2009 Taulbee Survey						
	Bachelor's		Master's		Ph.D.'s	
	(CS, CE, & I)		(CS, CE, & I)		(CS, CE, & I)	
Black or African American	374	4.4%	197	2.3%	26	1.6%
American Indian and Alaska Native	21	0.2%	27	0.3%	1	0.1%
Native Hawaiian or Pacific Islander	46	0.5%	31	0.4%	9	0.6%
Hispanic	487	5.7%	184	2.2%	25	1.6%
Multiracial, not Hispanic	27	0.3%	16	0.2%	7	0.4%
White	5,857	68.4%	2,507	29.8%	532	33.3%
Nonresident Alien	504	5.9%	4,641	55.2%	795	49.8%
Asian	1,250	14.6%	806	9.6%	202	12.6%
TOTAL	8,566		8,409		1,597	

The survey results show that each minority group (African American, American Indian and Alaska Native, Native Hawaiian or Pacific Islander, Hispanic, and Multiracial, not Hispanic) individually holds less than 12% of the total Bachelor's degrees received. These results deteriorate significantly as we examine higher levels at the Master's and Ph.D.'s levels, 6% and 4.3% respectively. If we consider that in 2009, the United States Census Bureau data identified the population to consist of 12.9% Blacks, 15.8% Hispanics, and 1.0% Native Americans, we can see that the percentage of minorities in computing at all levels is significantly lower than the approximately one-third or 34% of under-represented minorities for the 2009 U.S. population. However, the noteworthy increase from Bachelor's to graduate education among nonresident aliens is a notable observation. At the Master's and PhD levels, 55.2% and 49.8%, respectively, were awarded to nonresident aliens.

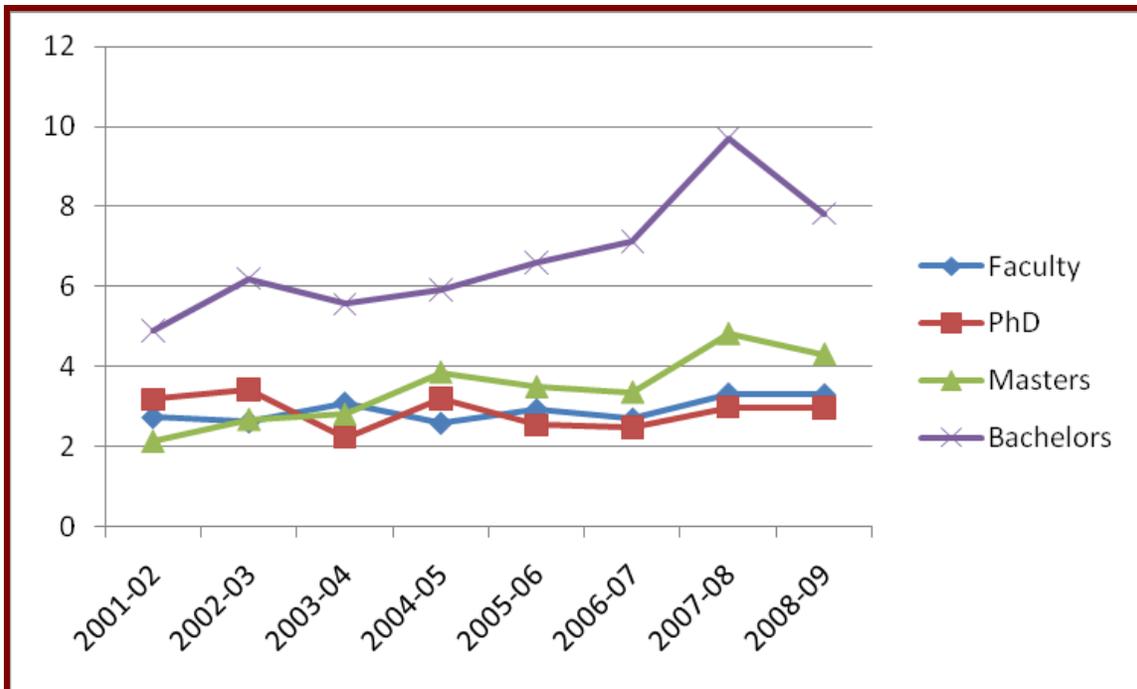


Figure 3: Percentage of Minorities (African Americans, Hispanics, Native Americans) by educational attainment and faculty in computer science, computer engineering, and information science as indicated in the annual CRA Taulbee Reports (2009).

Figure 3 displays the percentage of minorities receiving Bachelor's, Master's, Ph.D.'s degrees, and faculty between the years of 2001-2009 as indicated in the annual Computing Research Agency Taulbee Report (2009). Although the percentage of minorities receiving Bachelor's degrees in computing increased slightly from 2001 until 2008, the number of minorities receiving Master's, Ph.D.'s, and obtaining faculty positions remains flat. In addition, one can observe the critical disparity between Bachelor's and Faculty as well as Bachelor's and PhD attainment. Despite the fact that these studies confirm the numbers of higher-level degrees are not consistent with the minority population, Figure 4 displays that HBCUs grant a consistent number (more than 20%) of the percentage of science and engineering degrees received by individuals. working with HBCUs is important because of the vital role they play in creating African researchers and scholars. Though they comprise only three percent of U.S. colleges and

universities, they award approximately 23% of bachelors degrees earned by African-Americans. In the field of computer science, HBCUs award 35% of all degrees earned by African-Americans. Thus, HBCUs continue to play an important role in computing workforce development and graduate education.

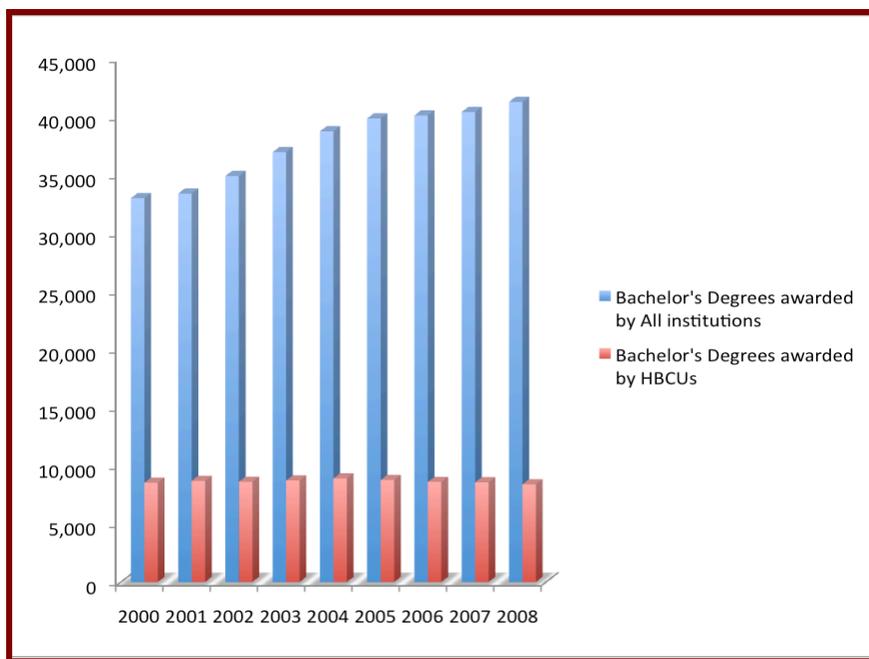


Figure 4. Science and Engineering (S&E) Bachelor's degrees awarded by historically black colleges and universities to U.S.-citizen and permanent-resident blacks, by field: 2000–08

To address these disparities, the Enhancing Diversity in Science Retreat Summary Report (2008) listed a number of recommendations to assist in the recruitment and retention of under-represented minorities. A subset of recommendations includes the following:

1. Incorporate diversity goals into their strategic plans;
2. Provide tools, resources, and incentives to improve mentoring and provide support to under-represented minorities;
3. Provide and identify financial support for professional development workshops, and
4. Identify, highlight, and reward model programs and best practices for enhancing

diversity.

While the lack of minority faculty in STEM fields continues to demonstrate cases of under-representation, management education is not without its challenges. As reported in Payton, et al. (2005) in the *Journal of the Association of Information Systems*, AACSB International and the National Science Foundation reported faculty vacancy rates. Payton, et al. (2006, p 38) noted these issues as cited below:

In its August 2002 publication, Management Education at Risk, AACSB International reported that National Science Foundation data revealed that the number of business doctorates granted between 1995-2000 declined by more than 19%. To compound the problem, only 62% of those newly granted doctorates sought academic positions. In what AACSB defined as “slumping supply and bulging demand,” among business school faculties, IS faculty were in highest demand. According to the report, “while vacancy rates for finance, accounting and marketing doctoral faculty had converged to the overall vacancy rate, the 2001-2002 vacancy rate for IS doctoral faculty among AACSB member schools exceeded 14%” (p 14). Seen as the most critical environmental trend driving change among AACSB institutions, the doctoral faculty shortage is said to be at the “choke” point for future direction and change in business education.

These rates have stimulated organizations, such as the Graduate Management Admission Council, Management Leadership for Tomorrow (MLT) and the Consortium for Graduate Study in Management, to increase minority student enrollment in undergraduate and graduate management education programs. MLT focuses on channeling minorities toward Master's degrees in business administration (Yates, 2001), while INROADS partners with organizations to diversify their workforce by providing minority students with internships in positions designed to prepare them for leadership in management (Clarke, 1995). The Diversity Alliance Pipeline is a collaborative initiative among these organizations that share the mission of increasing the entry of African, Hispanic, and Native American students into business and management professions. Then, there is the PhD Project which was created in 1994 and aims to increase African, Native

and Hispanic Americans in business school professorships. The PhD Project has supported over 1,000 minority faculty in business schools, including information systems. The PhD Project IS Student Association hosts its annual meeting in conjunction with AMCIS and provides a forum for its students and IS faculty to discuss pertinent research and professional topics. Even with the assistance of these organizations, however, the number of under-represented minorities visible within management education disciplines remains a persistent challenge.

We turn to CAU, as an exemplar, for how to minimize the challenges associated with fostering graduate education among under-represented groups. While the CAU scenario focuses on STEM disciplines, it provides the field with lessons learned and best practices that can be adapted and cultivated within the context of management education. Further, the exemplar offers interdisciplinary knowledge (science/computing/engineering) to management and from HBCUs to PWIs.

Clark Atlanta University Programs

CAU is the nation's first private liberal arts college for African Americans and was established in 1988 by combining independent institutions, Clark College (founded in 1869) and Atlanta University (founded in 1865). Clark Atlanta University is the largest of the 39-member UNCF colleges. It is a United Methodist Church-related, private, coeducational, urban research university that offers undergraduate, graduate and professional, and non-degree certificate programs. CAU is classified by Carnegie as a Research University/High Research Activity (RU/H) institution and is accredited by the Commission on Colleges of the Southern Association of Colleges and Schools (SACS). The University offers 38 major areas of study through four

schools – Arts and Sciences; Business Administration; Education; and Social Work and awards Bachelor’s, Master’s, Specialist, and Doctoral degrees. During the 2009-10 year, CAU awarded a total of 716 degrees (517 Bachelor’s; 172 Master’s; 27 Doctorates). Figure 5 shows the STEM departments located at the university. Note that CAU houses other STEM disciplines in management education, such as Decision Sciences (located in the School of Business) and Information Sciences is co-located with Computing.

Research at Clark Atlanta University

Clark Atlanta University has a Carnegie classification of Research University - High Research Activity and is one of only four Historically Black Colleges and Universities to earn such a classification. CAU has built a significant base of basic and applied research and development activity in a variety of areas that are of national and global importance.

"At Clark Atlanta University, we believe that research and education cannot be decoupled. Research at CAU is essential in providing a world-class educational experience for our students. We leverage the diverse skills and expertise of our faculty, researchers, staff and students to make significant discoveries and contributions to the knowledge of humankind." - Marcus W. Shute, P.E., Ph.D., Vice President, Research and Sponsored Programs (RSP).

STEM faculty at CAU continue to perform extensive science research, including, but not limited to:

- Molecular Approach to Cancer and Chlamydial

STEM Departments

Biological Science.....	404.880.6790
Chemistry.....	404.880.6850
Computer and Info Science.....	404.880.6951
Dual-Degree Engineering.....	404.880.6940
Mathematical Science.....	404.880.8199
Physics.....	404.880.8797
Psychology.....	404.880.8236

Application and Program Requirements

Program applications and information may be obtained at the HBCU UP Office located in the Research Center for Science and Technology, room 3013. Information will also be posted each semester at the following locations: McPheeters-Dennis Hall, and Carl and Mary Ware building, and in all STEM departments.

Applicants must meet the following criteria: 1) be enrolled full time at CAU , 2) be a U.S. citizen/permanent resident, 3) have and maintain a GPA of 3.0 or higher, 4) provide a copy of an unofficial transcript, and 5) provide two academic refer...

CLARK ATLANTA UNIVERSITY

HBCU UP

Science * Technology
Engineering * Mathematics

Figure 5: STEM Overview at Clark Atlanta University.
<http://www.cau.edu/CMFiles/Docs/HBCU%20Up%20Brochure%20Final%20Revised%20Jan%202009.pdf>

Within the context of its STEM departments, CAU established two elite pre-college initiatives with one dating back to the 1970s. We describe these programs in the sections to follow.

The Rowland Scholars Program

The Rowland Scholars Program began at Clark College (now Clark Atlanta University) in 1976 and ended in 1985. Initially, the program served mostly African American and Puerto Rican students who had recently graduated from high school and accepted at the institution for matriculation in STEM curricula. The Rowland Scholars Program was two-tiered with pre-

college and scholarship components. In the pre-college component, the program focused on mathematics (calculus and above), physical sciences (mechanics and laboratory experiments), technical writing and communication prior to the fall enrollment in the core curriculum at CAU. All summer courses were taught by tenured CAU faculty in their specializations, and Rowland Scholar faculty also taught both undergraduate and graduate courses during the traditional academic year. The Rowland Scholars dwelled in living and learning environments for their pre-college experience, had graduate student mentors and attended campus and city cultural activities. Students could earn up to eight semester hours of credit, and if they maintained a 3.0 grade point average during their matriculation, the program provided scholarship support.

Alumni scholars have matriculated and successfully completed master and doctoral programs in engineering, mathematics, computer science, information systems, physics, chemistry, business, psychology, just to name a few. A significant percentage of Rowland Scholars participated in the Atlanta University Dual-Degree Engineering Program, which is a 3-2 course of study. Leveraging the location of the Atlanta University Center consortium, Rowland Scholars would matriculate three years at CAU with the availability to enroll in courses at neighboring Spelman, Morris Brown and Morehouse Colleges. During these three years, students would study and/or major in a STEM discipline (such as physics, mathematics, chemistry, computer science), and during the final two years, students enrolled at Georgia Tech, Auburn University, MIT, or RIT to complete their perspective engineering disciplines. After the five years concluded, students earned a Bachelor's degree from CAU and a Bachelor's degree in an engineering discipline from one of the partnering engineering institutions. Internships and, in some cases, summer

undergraduate research were critical components to the success of the Rowland Scholars Program.

Office of Naval Research / PRISM-D Program

The Office of U.S. Naval Research (ONR) / Program for Research Integration and Support for Matriculation to the Doctorate (PRISM-D) Program was established in 1990 with its first cohort of 24 students majoring in the following fields: Computer Science, Chemistry, Mathematics, Biology, and Physics. The program was created to increase the number of minorities with advanced degrees within mathematics, computer science and physical sciences by having them participate in a rigorous, accelerated curriculum, which if completed, would bestow both BS and MS degrees within five years. The Office of U.S. Naval Research awarded nearly \$14 million dollars to six Black colleges and universities. The funding was allotted for establishing programs and direct financial assistance to students at HBCU institutions: CAU, Hampton University, Florida A&M University, Grambling University, Lincoln University, and Xavier University. CAU and Hampton University, however, received the largest awards to execute their respective programs.

The CAU ONR program included pre-freshman summer courses, which gave the students an accelerated start on their English, mathematics, and science courses. Upon matriculation, each student was also responsible for obtaining a research internship each summer either with a major company/research institution or with a member of faculty at the university. Mentoring and other resources were also provided on a regular basis by the director via monthly meetings. All students were required to maintain at least a 3.0 cumulative grade point average, participate in

Graduate Record Examination (GRE) preparation courses, complete the GRE examination, and apply to Ph.D. programs within their research areas.

Table 2 summarizes the common threads of the two CAU Programs.

Table 2. Common Threads of CAU Scholarship Programs		
	Office of Naval Research (ONR) Program for Research Integration and Support for Matriculation to the Doctorate (PRISM-D)	Rowland Scholars Program
Funding Source	Office of Naval Research	Rowland Foundation; Department of Defense
Degree Received	Bachelor of Science/Master of Science	Bachelor of Science from CAU; Engineering from Georgia Tech, RIT, MIT, Auburn, etc.
Program Duration	5 years	4-5 years
Targeted Population	Under-represented minorities	African Americans & Puerto Ricans
Targeted Disciplines	Computer Science, Chemistry, Physics, Biology and Mathematics	Chemistry, Computer Science, Physics and Mathematics
Program Components	Pre-Freshman Summer courses, Monthly meetings, Mentoring/Tutoring, Required Summer Internships, complete GRE, apply to Ph.D. Program	Pre-Freshman Summer courses, Periodic meetings, Mentoring/Tutoring, Summer Internships and/or Research Assignments
Professor-Student Interaction Commitment	Core subjects taught by PhD/MS Faculty	Core subjects taught by PhD/MS Faculty

The table shows the funding sources, namely the Office of Naval Research, Department of Defense and the Rowland Foundation. Both initiatives shared a common theme for preparing undergraduates in STEM training and held 5-year durations for student matriculation. The 5-year matriculation involved multi-curricula and enabled interdisciplinary training. Yet, a key program component was the inclusion of PhD faculty to strengthen professor-student interactions

which varies from the superior-reportee models that tend to shape faculty and students working relationships.

Understanding the CAU Exemplar via the IRSS Framework

In recent years, considerable attention has been given to succession planning in both the corporate arena and higher education, particularly as it relates to sustaining strong executive leadership. Equally important to succession planning in leadership is succession planning for the professoriate, especially in management education. With an imminent faculty shortage as baby boomers exit academe, increased demand for studies in these disciplines, and decreased production of PhDs (AACSB 2002), it is imperative that the higher education community plan now for replenishing a minimally diverse faculty. In this paper, we contend that preparing future faculty, especially under-represented minorities, begins at the undergraduate level. While Payton, et al. (2005, 2006) focused more on the dynamics of supply and demand of computing faculty and doctoral students, we propose an augmentation and adaptation of Boice's four-part IRSS theory (i.e., **I**nvolvement, **R**egimen, **S**elf-Management, and **S**ocial Networks) as a promising framework for addressing the longstanding issues impacting under-represented minorities.

As mentioned in our introductory remarks, each author participated in CAU undergraduate programs specifically aimed at increasing the number of under-represented minorities attaining the baccalaureate, as well as Master's and doctoral degrees in STEM disciplines. In retrospect, the structure and execution of these programs, without formal identification as such, applied the basic IRSS framework. The four components of this theory, supplemented with mentoring in the cases of these undergraduate program models, were instrumental in the academic formation and preparation of the authors, who have pursued careers in the academy.

Traditionally, the IRSS theory has been used in the context of strategies for fostering the success of new faculty. Below we outline how these fundamental strategies can be applied (and supplemented) at the undergraduate level for “effective recruitment, retention and training of under-represented minorities in the management disciplines at the graduate level,” as stated in the Call for Papers for this special issue of the *Decision Sciences Journal of Innovative Education*.

Involvement

The “I” in the IRSS theory borrows from Astin’s (1985) theory of involvement, which posited that students learn more when they are actively engaged in the educational experience. For the undergraduate student being groomed for graduate studies (and potentially as a future faculty member), it is essential that the student begins to engage in activities inherently associated with life as a graduate student and/or ultimately as a professor. These types of discipline-specific activities include, but are not limited to, research paper preparation and submission, poster presentations, conference attendance/participation, and professional organization membership.

In the undergraduate program models cited from CAU, Rowland Scholar and PRISM-D students were strongly encouraged and expected (by program directors and faculty) to participate in research and professional activities which often led to student research and/or internship opportunities, as well as leadership opportunities at the University level. Hence, undergraduate students gained a greater understanding and exposure to the best practices of their respective disciplines, in addition to previewing the academic rigor and preparation necessary for excelling in the discipline. Given this level of exposure and academic research training, students who

completed the programs were better positioned to model these experiences and inherently meet the demanding expectations associated with graduate education external to the CAU environment.

Regimen

In Boice’s original context of IRSS theory, “regimen” involved new faculty development of systematic ways for managing and balancing tasks associated with the professoriate (e.g., teaching, research, and service). A similar regimen must be developed and practiced by undergraduate students as they learn to effectively and efficiently manage competing priorities – studying, co-curricular/extra-curricular activities, and in some cases working and navigating family life.

Though involvement was strongly encouraged and expected by administrators for the undergraduate CAU programs referenced, students were also held accountable for time-management and meeting minimal program requirements (e.g., minimal grade point average, summer research apprenticeship/internship experiences). For instance, students in these programs were required to attend six-week, residential pre-freshman bridge-type programs to acclimate them to the collegiate environment, as well as to the academic rigor and preparation required for successful matriculation and completion. Upon the student's matriculation, periodic meetings of program participants and frequent academic advisement sessions with faculty advisors were key components of these programs to cultivate student persistence in and timely completion of the degree programs. With practiced success in maintaining balance at the undergraduate level, students in these programs were accustomed to making similar adjustments while in graduate school.

Self-management

The self-management aspect of Boice's IRSS model focused on future faculty members solving the right problems rather than spending too much time on specific tasks. An over commitment to service and neglecting research that is most essential in obtaining a doctoral degree should be minimized with a focus on timely program completion. Hence, we offer that undergraduate students being prepared for graduate studies and beyond must learn to properly interpret and manage the distinct demands of those tasks that present themselves both in and out of the classroom; this concept is akin to time-management necessary in the "regimen" component of IRSS theory.

As an example, students in the CAU programs learned early on how to navigate their undergraduate experience (i.e., self-management) by forming and sustaining relationships with faculty, peers, and professionals internal and external to the University. In many cases, these relationships have resulted in career and graduate school opportunities and expanded social networks - the fourth and final part of Boice's theory discussed below. These relationships fostered internship, research and professional opportunities for Rowland Scholar and PRISM-D students, and faculty expectations aligned with exposing CAU students to the rigors of graduate education.

Social Networks

The fourth and last component of Boice's IRSS theory suggested that social support and collaborations are necessary for new faculty. We maintain that this same level of support and collaboration is instrumental for the survival and success of undergraduate students preparing for graduate school and the professoriate. The support network should begin at the institutional

level and extend to similarly interested persons and institutions/organizations external of the academic environment university. The explosion of social media makes it easier for the Social Networks principle in IRSS theory to be realized among future graduate students and future scholars.

Relative to CAU, informal student learning communities – another form of social networks – emerged among participants with specific courses of study. The activities of these communities were many and varied; for example, students collaborated on course assignments, research projects, summer internship and co-op opportunities, and even prepared graduate school admission materials, such as GRE test-taking and statements of purpose. Key to this process was the presence of Ph.D. faculty who reviewed and provided feedback on student materials from these activities. Lastly, it was customary procedure for these materials to be reviewed by interdisciplinary teams of faculty with formal and informal feedback to students.

Mentoring

To expand on the social networks component of Boice's IRSS theory, we recommend the application of the "360-degree mentoring" model as a necessary supplement to successful preparation of undergraduate students for graduate school, in general, and management education, in particular. This model of mentoring consists of a small network of mentors from all levels (department, college/school and institutional) within the academy, in which the relationships are often reciprocal in nature.

The concept of "360-degree mentoring" is an adaptation of the 360-degree employee feedback evaluation (also known as multi-source feedback), popularized in the 1980s by former General Electric CEO, Jack Welch. Using this feedback mechanism for employees, particularly managers, encourages evaluation from the employee's supervisors, peers, and subordinates. In a

March 2008 article in the *Harvard Management Update*, Collins offered three (3) key components for establishing an optimal and effective mentoring network of supervisors, peers, and subordinates. First, she suggested that the goals and expectations for the mentoring relationships be established and agreed upon by mentor and mentee/protégé. Second, she advised that the mentoring relationships take on a reciprocal nature, in which each person teaches the other from his/her wealth of knowledge and experience. Finally, she advocated periodic assessments of the mentoring relationship, at which time both parties determine if the relationship is "working" and meeting the established goals and expectations.

Though often informally implemented, this type of 360-degree mentoring model was often the experience of the students in the CAU PRISM-D and Rowland Scholar programs. Students were mentored by faculty members, academic advisors, graduate students, departmental executive assistants, and by peers within the program and/or major. These peer mentors also provided mentoring to underclassmen as they advanced in the degree programs and formally and informally shared key insights for coursework successes and challenges, internship experiences, research topics and professional conferences information. Hence, a community approach to fostering success along with a view of undergraduates as future peers contributing to the academic and corporate communities was forefront of the CAU initiatives.

We assert that implementation of a 360-degree mentoring model - for under-represented minorities in management education is a necessary element for assisting these students (and all students) with navigating their degree programs from successful matriculation through timely graduation. Moreover, the 360 framework provides a multi-point, multi-level environment that cultivates continual feedback, offers involvement in diverse professional activities and guides rigor along the matriculation continuum. This mentoring model undergirding Boice's IRSS

theory will certainly build the student's competencies and self-efficacy which are requisites for a thriving graduate school experience.

Discussion

Jason L. Riley, *Wall Street Journal* writer, in his September 28, 2010 article, *Black Colleges Need a New Mission*, reported that HBCUs have "dwindling enrollments and endowments...and that fewer Blacks believe that these schools, as currently constituted, represent the best available academic choice." His text indicated that HBCUs could be "repurposed as community colleges that focus on developmental courses to compensate for the poor elementary and secondary educations that so many Black children still receive."

One key point that Riley omitted was a significant fact documented by the National Institute of Medicine (NIM). That is, NIM reported that Black students entering PWIs with the same inclination to pursue STEM careers as their white peers, but they (Black students) are often dissuaded by white faculty and administrators. As Taborn and Thompson (2010) offered in their response to Riley, "...that doesn't happen at HBCUs". Hence, we suggest a paradigm shift in how Riley and others may view the role of HBCUs and how they have a strategic position to address the under-representation in STEM disciplines and other fields, including management education. This paradigm shift can invoke a tenor of learning. That is, ask the questions:

- What best practices can PWIs learn from HBCU exemplars and their STEM initiatives that can be applied to management education?
- How can these HBCU best practices educate PWIs to assist in the recruitment, retention and successful matriculation among current and future under-represented populations in management education?

As HBCU alumni and former participants in the CAU programs, we offer an EXPOSURE strategy to address the under-representation dilemma relative to management education.

Exposure means advertising programs targeting students, parents, counselors, teachers and guardians via social media, print, mail and radio attract individuals from underrepresented communities. Key to the advertisement is "how a degree in management education" adds value to the community (first) and individual (second). To this need, business schools are best positioned to offer the value proposition as the corporate community routinely does via yearly and cumulative earnings, return on investment and global impact. In addition, according to the Society of Human Resource Management's *Workplace Diversity Practices* report (2010), organizations gauge their efforts with three common metrics, including: 1) number of diverse employees recruited; 2) number of diverse employees retained; and 3) evidence of diversity at each work level (e.g., rank-and-file to senior management). Business schools and others can apply these indicators, and we contend the need for a critical scrutiny of the face at the front of the Technology classroom and its impact on incoming students (Payton, et al., 2005).

Moreover, the EXPOSURE strategy must be inclusive of community messaging. Research has provided evidence that underrepresented groups see education as not merely an individual endeavor but as a means for having longstanding impacts on communities and families (Griffin, 2005). Establishing the community approach should mirror what CAU implemented as cornerstones to the Rowland Scholar and PRISM-D Programs and include: 1) regular meetings with the students, 2) mentoring (not limited to academic topics and planning, but often included life skills) from faculty, 3) counseling and encouragement from program directors and professors, 4) cohort classes with tutoring, and 5) discussions on educational impacts, perceptions, research and corporate careers. One of PRISM-D's best practices was the mandatory

requirement for its student participants to sit for the GRE and apply for Ph.D. programs. In addition, PRISM-D offered graduate application assistance, letters of recommendation, and placement assistance for its students, many of who earned doctorates in STEM-related disciplines and doctors of medicine.

Conclusion

The number of underrepresented minorities within the computing sciences over the past several decades has increased at a very sluggish pace, despite the various efforts of educational institutions/organizations, professional and scientific associations along with the corporate and scientific workforce. In this paper, we present Boice's four-part IRSS model supplemented by Collins' 360-degree mentoring model as a plausible framework for addressing the longstanding issues surrounding minorities being under-represented in management education at the undergraduate level. Our work shows the lack of underrepresentation is pronounced in management education (particularly computer information systems) and mirrors that of other STEM disciplines. Traditionally, the IRSS model has been utilized to strengthen new faculty, and the 360-degree model has been utilized to maximize management effectiveness. We contend that adaptation of these two approaches for undergraduate students is the foundation necessary to recruit, retain, and train these underrepresented groups in management education. We support this claim by discussing the impact of these approaches on the successful execution of two STEM-related scholarship programs – PRISM-D and Rowland Scholars Programs – at CAU. At the cornerstone of these two programs is the EXPOSURE strategy, which merges the ideas of multi-faceted advertising of graduate education to underrepresented groups in a format that is inclusive of community messaging.

The framework and strategies discussed in this paper offer an opportunity for shared learning among HBCUs and PWIs, as institutions seek to implement best (“working”) practices that result in effective recruitment, retention, and training of under-represented minorities in management disciplines. Future studies should examine empirical and statistical data collected from the two CAU programs and similar programs at PWIs. Lessons learned from this type of comparative analysis would better inform institutions on how to structure, execute, and sustain programs primarily focused on increasing representation of minorities at the graduate level in management disciplines.

References

- American Speech-Language-Hearing Association. (2009). Minority Student Recruitment, Retention and Career Transition Practices: A Review of the Literature. Retrieved from <http://www.asha.org/practice/multicultural/recruit/litreview.htm>.
- Aspray, W. and Bernat, A. (2000). Recruitment and Retention of Underrepresented Minority Graduate Students in Computer Science, Report of a Workshop. Retrieved from <http://www.cra.org/reports/r&rminorities.pdf>.
- Astin, A. W. (1985). *Achieving academic excellence*. San Francisco: Jossey-Bass.
- Boice, R. (1992). *The new faculty member*. San Francisco: Jossey-Bass.
- Boice, R. (1993). Writing blocks and tacit knowledge. *The Journal of Higher Education* 64 (1).
- Burge, J. D., and Suarez, T. L. (2005). Preliminary Analysis of Factors Affecting Women and African Americans in the Computing Sciences. *Proceedings of Richard Tapia Celebration of Diversity in Computing, (TAPIA 2005)*, Albuquerque, NM.
- Cajun (2010). Lack of Diversity in Science and Engineering Graduate Enrollments. Retrieved from http://community.elearners.com/all_blogs/archived_blogs/b/bellevue_university/archive/2010/11/21/lack-of-diversity-in-science-and-engineering-graduate-enrollments.aspx (current as of 10 Jan 2011).
- Catalyst. (2004). The Bottom Line: Connecting Corporate Performance and Gender Diversity A Research Report. Retrieved from http://www.diversityinc.com/content/1757/article/103/?Diversity_Return_on_Investment.
- Clarke, R. L. (1995). Making INROADS into cultural diversity. *Healthcare Financial Management*, 45 , 26-28.
- Clark Atlanta University Fact Sheet – The Leading Edge of Greatness. (2009). Retrieved from <http://www.cau.edu/CMFiles/Docs/CAUfactD1b.071410.pdf>.
- Collins, E. (2008, March). 360 mentoring. *Harvard Management Update*, 13(3), Retrieved from <http://www.exed.hbs.edu/assets/Documents/360mentoring.pdf>.
- Computing Research Association (2009). Taulbee Survey. Retrieved from <http://www.cra.org/taulbee/tables/0809/Tables9-16.html> (current 10 Jan 2011).
- United States Commission on Civil Rights. (2010). *The Educational Effectiveness of Historically Black Colleges and Universities. A Briefing before the United States Commission on Civil Rights held in Washington, D.C. 2010*. Washington, DC: U.S. Government Printing Office. Retrieved from http://www.usccr.gov/pubs/HBCU_webversion2.pdf.

- Enhancing Diversity in Science: A Leadership Retreat on the Role of Professional Associations and Scientific Societies, A Summary Report. (2008). Retrieved from http://www.cossa.org/communication/diversity_workshop/diversity.html (current 10 Jan 2011).
- Gasam, Marybeth. (2011). Black Colleges' Success in STEM. *The Chronicle of Higher Education*. Retrieved from <http://chronicle.com/blogs/innovations/black-colleges-success-in-stem/28818>.
- Griffin, A. H. (2005). A Strategic Action Plan for the Education of African-American Students in the State of Washington. Office Superintendent of Public Instruction Higher Education, Certification, and Community Outreach.
- Klassen, M., Stockard, R., and Akbari, A. (2004). Stimulating Information Technology Education among Underrepresented Minorities. *Proceedings of the 5th Conference on Information Technology in Education (CITC5 2004)*, New York, NY.
- Knefelkamp, L., & David-Lang, T. (2000). Encountering diversity on campus and in the classroom: Advancing intellectual and ethical development. *Diversity Digest*. Available online <http://www.diversityweb.org/Digest/Sp.Sm00/development.html>
- Minority Report. *BizEd* March/April 2003, Retrieved from <http://www.aacsb.edu/publications/archives/mar-apr03/p30-35.pdf>.
- National Science Board, Science and Engineering Indicators (2010). Arlington, VA: National Science Foundation (NSB 10-01).
- National Science Foundation, Division of Science Resources Statistics (2008). Scientists and engineers and managers in business or industry who are underrepresented minorities, Retrieved from <http://www.nsf.gov/statistics/wmpd/figh-7.htm>.
- Navy Awards \$14 Million to Foster Math and Science Degrees at Universities. *Jet Magazine*. October 16, 1989. Johnson Publication. Retrieved from http://books.google.com/books?id=NJsDAAAAMBAJ&pg=PA18&dq=Office+of+Naval+Research+Clark+Atlanta+University&hl=en&ei=e9hfTbusDMSgtwfr5vC3DA&sa=X&oi=book_result&ct=result&resnum=4&sqi=2&ved=0CE4Q6AEwAw#v=onepage&q=Office%20of%20Naval%20Research%20Clark%20Atlanta%20University&f=false.
- Payton, F. C., White, S., and Mbarika, V. (2005). A Re-Examination of Racioethnic Imbalance of IS Doctorates: Changing the Face of the IS Classroom. *Journal of the Association for Information Systems* 6(1), pp.37-51.
- Payton, F., White, S., and Mbarika, W. (2006). IRSS Psychology Theory: Telling Experiences Among Underrepresented IS Doctorates. *Decision Sciences Journal of Innovative Education*, 4(2).

- Schmidt, P. (2010). Graduate Programs Grow Less Diverse Without Racial Preferences, Research Suggests. *The Chronicle of Higher Education*. – Retrieved from <http://chronicle.com/article/Graduate-Programs-Become-Much/125459/>
- Smith, D. G. (1991). The challenge of diversity: Alienation in the academy and its implications for faculty. *Journal on Excellence in College Teaching*, 2 , 129-137.
- STEM Overview at Clark Atlanta University. (2008). Retrieved from <http://www.cau.edu/CMFiles/Docs/HBCU%20Up%20Brochure%20Final%20Revised%20Jan%202009.pdf> (current 19 Jan 2011).
- United States Census Bureau. (2009). State and County Quick Facts. Retrieved from <http://quickfacts.census.gov/qfd/states/00000.html> (current 10 Jan 2011).
- Walsh, B. (2010). The Recent Uproar over HBCUs. Retrieved from <http://www.metro.us/boston/life/article/658963--the-recent-uproar-over-hbcus>.
- Wenglinsky, H. (1999). Historically Black Colleges and Universities: Their Aspirations and Accomplishments. Educational Testing Service, Retrieved from <http://www.aypf.org/publications/rmaa/pdfs/HistBlackCollege.pdf>.
- Yates, E. L. (2001, November 22). Providing a road map to the MBA. *Black Issues In Higher Education*, 18 (20), 40-42.