

# **An Empirical Analysis of a Model for Student Success using a Case Study Approach**

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## **Abstract**

*Historically black colleges and universities (HBCUs) play a critical role in the national college completion agenda within the United States of America (U.S.). With high enrolments of minority, first-generation, and economically disadvantaged students, HBCUs serve as essential access points to higher education and the American dream. Given the high needs student population of HBCUs, these institutions can serve as national and international models for improving college completion and demonstrating efficacy in promoting access to higher education among students from diverse backgrounds.*

## **Introduction**

Over the last decade, government and education leaders have called for greater accountability in the United States (U.S.) higher education [1-3]. Citing achievement gaps in U.S. higher education and a declines in college completion, advocates for change have noted a “gathering storm” that has the potential to impact future U.S. economic strength [4]. The College Board’s Commission on Access, Admissions and Success in Higher Education called greater attention to this issue in 2008 through its report, *Coming to Our Senses: Education and the American Future* [5]. Herein, the College Board promoted an action agenda for increasing the proportion of Americans, especially those ages 25 to 34, who hold a two- or four-year college degrees. This spurred a number of entities including the National Governors Association (NGA) [3], the Association of Public Land-Grant Universities (APLU) [6], and others to urge U.S. institutions of higher learning to target efforts toward increasing student success and college completion rates. Together, these calls for reform in U.S. higher education constitute a national college completion agenda that has support at both the federal and state levels.

Historically Black Colleges and Universities (HBCUs) play a critical role in the national college completion agenda. HBCUs continue to educate nearly 20% of all African American baccalaureates though they comprise only 3% of American colleges and universities [7]. Further, these institutions large numbers of first-generation and economically disadvantaged students, serving as an essential access point to the American dream through higher education. Notably, HBCUs educate high-risk college despite tremendous stressors including declining state and federal support, changes in institutional missions that impact tenure and promotion decisions for faculty, and very fluid administrative leadership. Herein, these colleges and universities are grappling with increased pressures to grow college completion even as higher education is changing. Given that HBCUs have large populations of underrepresented minority, first generation, and economically disadvantaged students, successful models that increase student success and college completion within these universities can inform best practices addressing the national college completion agenda. Accordingly, these colleges and universities, by serving high-risk populations, can demonstrate efficacy in promoting access to higher education while increasing degree completion.

### **Research Method**

This research study investigates a teleological model of organizational change that was employed at an HBCU in the south-eastern U.S. to increase student persistence at the undergraduate level. Herein, a case-based observational analysis provides an empirical lens for examining both the campus leadership structure, and initiatives that lead to increased success among the students attending the HBCU under analysis. This case study approach was selected as the primary investigative strategy because of the efficacy of cases studies in advancing understanding about an important phenomenon, in this case the education of a student population with high numbers of first-generation, and/or low socioeconomic backgrounds [8, 9]. By definition, a case study is “an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context” [8]. Herein, case studies are a form of empirical inquiry that allow for descriptive, exploratory, or explanatory analysis to deepen understandings about real-life phenomena. These studies can include qualitative, quantitative, or mixed-method approaches that collect and analyse empirical data that can be based on observation, experience, or experiment.

For this study, the empirical evidence includes (a) a demographical analysis of student population; (b) an observation analysis of the student success plans developed at the multiple levels within the university; (c) a review of institutional and extramural supports that have supported the teleological model of change; and (d) an analysis of persistence trends including first-year retention rates, six-year graduation rates, and enrolment composition analysis. Key administrative leaders have contributed observations on practices that were employed to promote organizational change. Accordingly, an analysis of the phenomenon of increasing student success is explored within this context.

### **The Case Study**

North Carolina Agricultural and Technical State University (NCA&T), a land-grant university created as result of the Second Morrill Act of 1890 [10], was founded on principles that embrace student access and

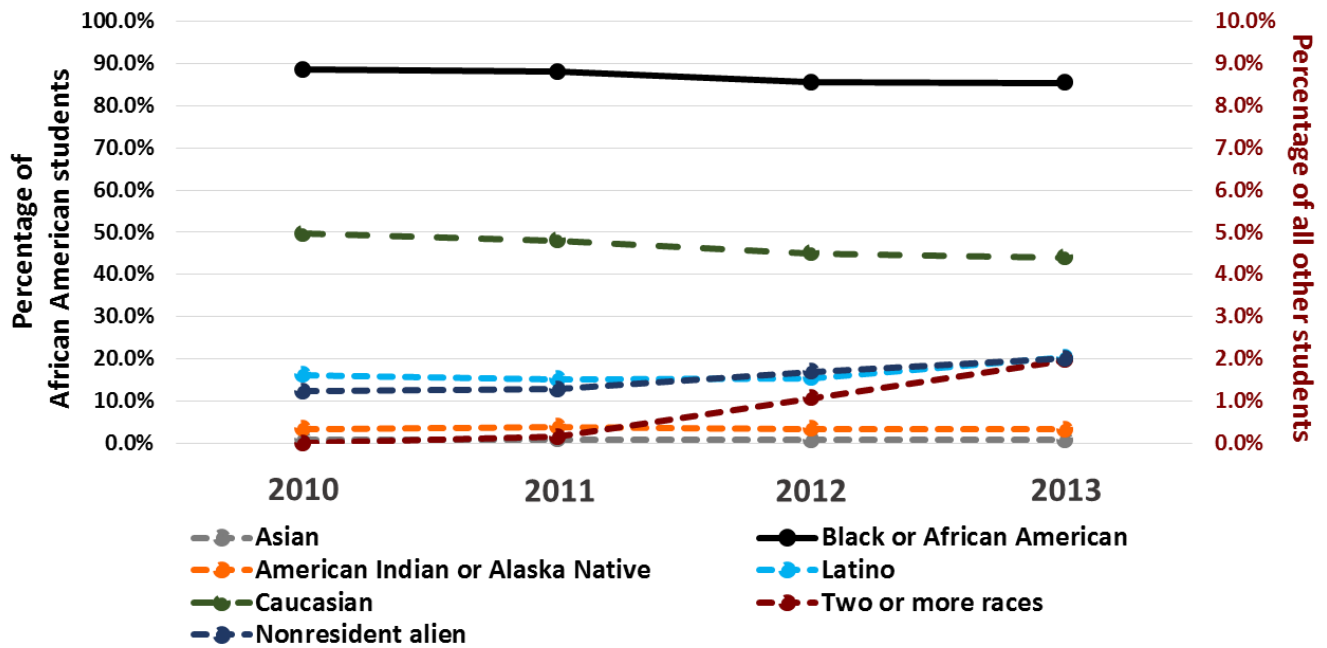


Figure 1. Four-year demographic analysis by race and ethnicity at North Carolina A&T State University.<sup>3</sup>

academic excellence. NCA&T is one of 17 constituent institutions in the University of North Carolina (UNC) System. The UNC System was founded by the North Carolina General Assembly which created first public higher education university in the U.S. in the late 1700s. North Carolina A&T was by the same General Assembly in 1891 under the Second Morrill Act, and the University was designated its inception as a public land-grant university for Blacks, i.e. African Americans, who were the of former slaves. Situated in the south-eastern portion of the U.S., NCA&T has grown from its initial focus as a teaching institution to the largest HBCU in the United States, as of 2013. With \$52.7 million sponsored research in 2014, NCA&T is a doctoral research institution that ranks third in extramural funding within the UNC system behind the University of North Carolina at Chapel Hill and North State University (both of which are top tier U.S. research universities).

North Carolina A&T State University offers degrees at the baccalaureate, master’s, and doctoral levels in comprehensive range of academic disciplines including the arts, humanities, communications, natural sciences and mathematics, agricultural and environmental sciences, engineering, social sciences, nursing, and social work, among many more. The University has a unique legacy and educational philosophy that seeks to provide students with a broad range of experiences that foster transformation and leadership. Accordingly, the University has long been recognized as a leader in the production of science and engineering (S&E) bachelor’s degrees conferred to minorities, proudly ranking 7<sup>th</sup> nationally as the baccalaureate origin of black S&E doctoral recipients from 2002 to 2011 and 7<sup>th</sup> nationally as the baccalaureate origin of black doctoral recipients in the life sciences for the same time period [11]. Among the 70 HBCUs ranked by the *US News and World Report*, NCA&T was listed in the top ten of all HBCUs and was selected as the top public HBCU in the nation in 2013 and 2015 [12].

The student body at North Carolina A&T has grown more diverse over the years. Within a historical mission of educating the descendants of former slaves, NCA&T continues to have a large Black or

American student body (Figure 1).[13] However, enrolment growth has been realized among different populations of students including Caucasian, multi-racial, Latino, and international students. Approximately 59% of all students receive federal Pell Grants, which are need-based grants provided by the U.S. government to economically disadvantaged students to support their educational expenses, and 78% receive federal student loans, which is also a support mechanism available to students and their families to finance a student's college education [13].

### **A University Completion Agenda**

In fall 2010, the University initiated an effort to develop a comprehensive strategic plan for North Carolina Agricultural and Technical State University to position the University for growth. After several months of focus groups, surveys, SWOT (strength, weakness, opportunity and threat) analyses, benchmarking, and other data collection methods, *A&T Preeminence 2020: Embracing Our Past, Creating our Future* emerged as the University's bold, creative, and innovative strategic plan. The plan was designed to position the NCA&T as a premier research institution of higher education, while preserving the core values that underpin its unique heritage. Central to the strategic plan is the University's commitment to enhancing its intellectual climate and ensuring that students are integrated into a stimulating inquiry-based learning environment that promotes their success.

During the summer of 2011, the *Commission for the Review of Student Success (CRSS)*, a "Blue Ribbon Task Force" with university-wide representation, to review student academic success on the campus. The Commission's primary responsibility was to oversee the development of the University's comprehensive plan for enhancing student success and for providing oversight and recommendations to the University to improve student learning, academic success, as well as retention and graduation rates. The Commission investigated impediments that negatively impact student success; evaluated data related to student success; and, examined organizational units responsible for enhancing student success (e.g., Center for Academic Excellence, tutorial programs, math and writing labs).

Guided by the work of the CRSS, the College of Arts and Sciences (CAS) appointed a committee of college-level faculty and administrators who would develop a focused college-level plan to promote student success, particularly for the first two years of matriculation. As the primary provider of general education coursework at NCA&T, campus stakeholders affirmed that CAS had a critical mandate to lead retention and graduation efforts for the entire University. In fact, CAS served as the core of academics for the University, providing instruction during the first two years of undergraduate study for all students as well as upper level instruction for majors in the life and physical sciences, mathematics, liberal arts and the humanities. By focusing on student success, CAS sought to have a significant impact not only on its students but the total undergraduate population of the University.

### **Organizational Change Model**

Following the teleological model of change, the University fostered collaborations between the College Arts and Science, the Academy for Teaching and Learning, the Center for Academic Excellence, the Center of Excellence for Active Learning, and the CAS student success personnel to pursue planned

change. By definition, teleological refers to an intentional or planned design [14]. Accordingly, the teleological model approaches organization change using a scientific approach as evidenced by a cycle of goal formation, implementation, evaluation, and modification of action or goals based on lessons learned [15].

Combining the teleological approach with Kotter model for planned change [16], a sense of urgency was established through the University's strategic plan, *A&T Preeminence 2020*, and the CRSS report. The college established a coalition to work on the challenges posed by both the strategic plan and report on campus student success. Key stakeholders were engaged throughout the process and a new vision, e.g. the CAS Student Success Plan, was shared throughout the College. New faculty and administrators were to support and lead the new vision. Faculty members were incentivized through peer-interactions and supports through the Innovation Ventures Fund. Department chairs have willingly come together to conceptualize projects like the STEM Center that promote active learning and pedagogical across disciplines. The Dean has promoted scholarly teaching as a method for advancing through the academy to the rank of full professor, advocated for extramural funds dedicated to faculty development, and negotiated with the business and finance office to support needed classroom renovations and supports for teaching assistants to make these new models succeed.

### **Understanding the Dynamics Impacting Student Success at NCA&T**

Many of the CRSS findings of the Blue Ribbon Task Force were integrated into the *CAS College Plan for Student Success*. Through careful analysis of the CRSS findings and institutional research on patterns of student progression, the CAS Student Success Planning Committee found four primary barriers to student success. These barriers include the following:

- (a) *academic under-preparedness of several large at-risk groups*, e.g. first-generation college students, low-income students, students from single parent homes, students without a declared major, and African American males;
- (b) *limited financial resources* for economically-disadvantaged students;
- (c) *limited professional development for faculty* and an inadequate system for rewarding excellence in teaching, research innovation and entrepreneurship in student success; and
- (d) *poor infrastructure* for supporting students within the academic unit

The Student Success Planning Committee found that the challenges that students were facing were multi-dimensional. While the University and the College had a number of excellent programs and pilot projects, these had not been scaled to reach a larger number of incoming students. There was a strong need for scaling effective programs to increase impact on larger numbers of students. Accordingly, the Committee developed the CAS Student Success Plan, which was designed to be comprehensive in its approach. Noting the privileged mandate for meeting the general education needs of the University, the Plan provided intentional supports for the first two years of undergraduate education. Further, the Plan promoted excellence in teaching and student learning outcomes. In alignment with the University's use of retention and graduation rates as primary measures of student success, the CAS Student Success Plan also uses these measures.



Using an *evidence-based* approach that identified and integrated well-assessed national retention and persistence models, the CAS Student Success Planning Committee designed a **comprehensive** plan to promote University-wide student success with *seven primary goals*.

*Goal 1:* Transition students into college

*Goal 2:* Create an intellectual climate that assures student success in the freshman and sophomore years

*Goal 3:* Commit to excellence in teaching, research, public service and engagement

*Goal 4:* Assure second-year success

*Goal 5:* Improve quality of life for students

*Goal 6:* Engage parents and other external stakeholders in student success efforts

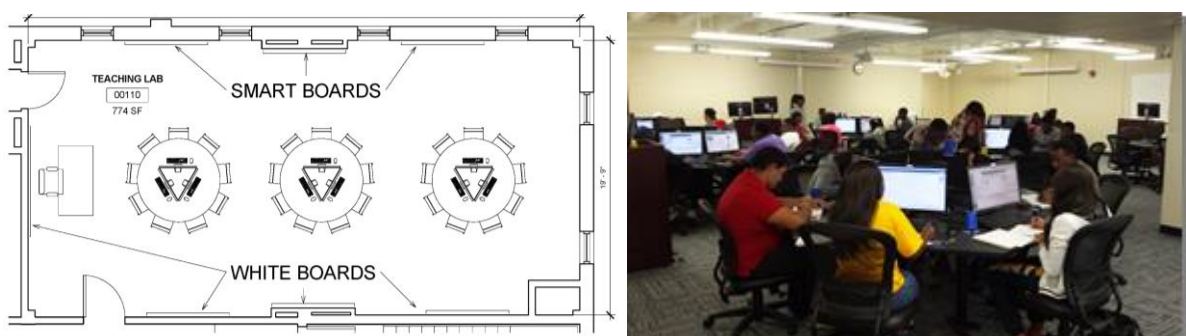
*Goal 7:* Create an organizational and reporting structure that assures accountability and student achievement

The primary motivators for the overarching design were the barriers and challenges that NCA&T students were facing in transitioning into college, often with poor academic preparation in conjunction with noted high-risk factors. This was accompanied by a clear imperative to empower and reward faculty to change the way in which they teach and engage students. In light of these factors, the CAS Student Success Planning Committee found that *four strategies* were particularly germane to achieving the goals of its plan. These included:

- (a) building an infrastructure for student success at the college-level;
- (b) faculty development targeted toward pedagogical innovations and the scholarship of teaching and learning;
- (c) early engagement of students in active and experiential learning environments;
- and
- (d) development of academic pathways that promoted degree completion.

(Success Plan Goal 5)

### ***The Infrastructure for Student Success.***



**Figure 2. Layout of the Inquiry-Based SCALE-UP Classroom.**

To build an intentional infrastructure for student success, the College has invested in *new personnel*, i.e. one senior-level administrator (Associate Dean for Student Success) and four student success faculty, to

lead the academic and cross-cutting elements of the University's student success initiative. The "student success" faculty members, housed in the departments with high failure rates in general education courses (biology, mathematics, chemistry and English), work to bridge activities between academic and student life. They support formative evaluation processes that direct the refinement of student success activities seek external funding, alongside existing faculty members in order to expand student success opportunities. The student success faculty are led and supported by their Department Chairs and an Associate Dean for Faculty and Student Success. The Associate Dean assures accountability at the departmental and college levels, seeks external relationships and pursues ongoing support for faculty student success that assures sustainability, accountability and university intentionality to achieve the CAS student success goals.

The University has supported the College infrastructure by providing funding for *redesigned learning environments*. Through a generous \$1.76 million gift from the NC GSK Foundation, and a \$1 million renovation project from the University, the NCA&T College of Arts and Sciences created a STEM Center for Active Learning. Through the Center, the CAS is developing student-centered learning models focused on STEM education in the first two years of college. Herein, two large classrooms have been transformed for Emporium-style instruction in Mathematics and Chemistry and implementation of the SCALE-UP model in Physics and Mathematics. This has allowed for a myriad of course redesigns based on student-centered cyber-learning.

The College supports *innovations in classroom instruction* through its Innovations Ventures Fund competition. This program awards up to \$40,000 to support collaborative intra- or inter-departmental projects aimed at increasing student success. These competitive and peer-reviewed projects must involve at least two faculty members and must significantly enhance student success and /or research. To date, 13 awards have been made to faculty teams annually since the 2011-12 academic year with a total investment of \$270,000.

The College offers *financial support to students* through endowed scholarships. In addition, students are able to obtain assistance through a variety of federally supported programs such as the National Science Foundation (NSF) sponsored Historically Black Colleges and Universities - Undergraduate Program (HBCU-UP), Innovation through Institutional Integration (I<sup>3</sup>) Interactive Biomathematics Learning and Engaged Network for Diversity (iBLEND), Scholarships in Science, Technology, Engineering and Mathematics (S-STEM), and Louis Stokes Alliance for Minority Participation (LS-AMP) programs; and the National Institutes of Health (NIH) sponsored Maximizing Access to Research Careers (MARC) and Research Initiative for Scientific Enhancement (RISE) programs that are available on the campus.

The College engages *external stakeholders* through the CAS Advisory Board. Comprised of alumni and leaders in industry, government, and academia, the Board has grown impact since its inception in 2006. These advocates have cultivated gifts realized through 78 endowed scholarships and 4 endowed professorships. The endowed scholarships are used to augment students' financial aid packages to support their academic studies at NCA&T. The endowed professorships are being used to attract high-caliber faculty to NCA&T, thereby enriching the intellectual climate of the college and university.

**Faculty development as the key to unlocking student potential.** Numerous studies have directly linked faculty development to improvements in undergraduate education [17, 18]. The College has embraced significance of an empowered faculty as primary change agents for achieving *Preemience 2020* and its student success goals. Through collaboration with the University’s Academy for Teaching and Learning [19], faculty are able to participate in campus-based symposia to learn from external leaders in the scholarship of teaching and learning and share their own lessons learned from innovations they are in the classroom. The STEM Center of Excellence for Active Learning cultivates a faculty community of scholars that advances course redesign in the gateway courses for all majors, and supports faculty to their work at national conferences. In addition to allocating 15% of its operating budget to faculty development, in 2012, CAS created a \$1 million endowment for Faculty and Student Success that also supports faculty development in perpetuity.

**Early engagement in active and experiential learning.** Faculty in Biology and Chemistry have five laboratory courses (BIO 200; CHEM 116, 117, 432, 452, 610) to provide early research experiences students at the freshman and sophomore levels. Using the Guided Inquiry model, students learning to formulate research questions and design research protocols [20, 21]. This high-impact educational practice advocated by Kuh and the Association of American Colleges and Universities has been demonstrated to support the persistence of all students, particularly African Americans and Latinos [22, 23].

**Development of academic pathways that promote degree completion.** The Department of Liberal Studies was created in 2005 to help improve the University’s retention and graduation rates. A significant number of its majors have been internal transfers from Nursing Education, Engineering, and Business who graduate with an interdisciplinary degree, usually within two to three semesters after transfer. Twenty (20) Liberal Studies Degrees were conferred in 2005 (when the department was first organized) and 96 were awarded in 2013 indicating that the demand of the program is vigorous. Very recently, the Department of Liberal Studies was approved to offer a new online degree pathway to expand its capacity to support students’ completion of their undergraduate studies.

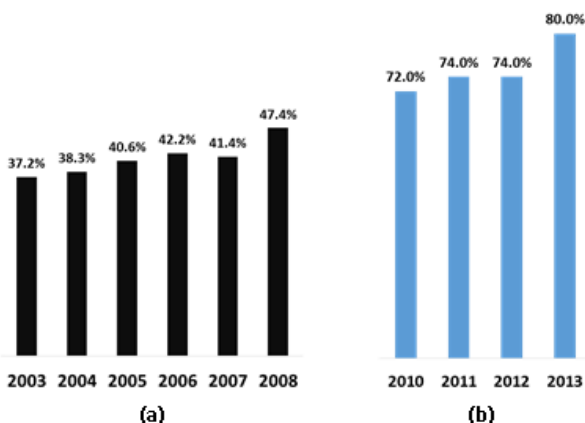
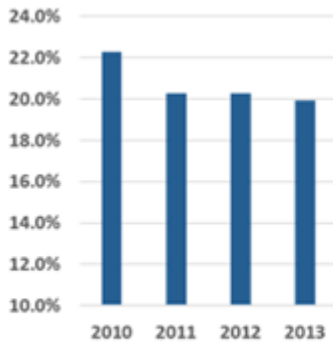


Figure 3. Six-Year Graduation Rates (Left, a) and Full Time Retention Rates (Right, b) for North Carolina A&T State. Data represents cohorts entering the University during the fall semesters. Source: IPEDS





**Figure 4. Percent of Freshmen Comprising Undergraduate Enrollment at North Carolina A&T State University. Data represents cohorts entering the University during the fall semesters.**

Source: IPEDS

## Results

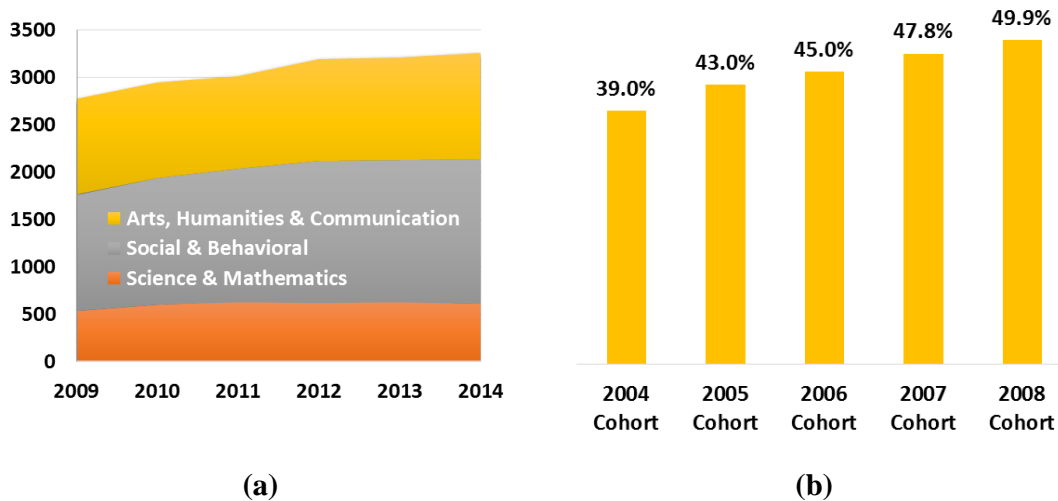
North Carolina A&T State University through the leadership of the College of Arts and Science Student Success Plan has realized growth in its student success metrics, specifically with its six-graduation rate and the full-time retention rate (Figure 3). Although enrollment has been fairly steady over the last five years (Figure 1), the number of incoming freshmen has decreased (Figure 4). The steady-state in enrollment that the University has experienced is a direct result of increased undergraduate persistence, particularly after the freshmen and sophomore years. This *trend in retaining students is leading to higher college completion rates*, providing strong evidence that the teleological approach employed by the University through efforts led by the College of Arts and Sciences is working!

The College of Arts and Sciences has experienced growth in its enrollment and significant growth in its six-year graduation rates (Figure 5). We attribute this growth to the shifts in pedagogy, increased experiential learning, enhanced student aid packages that are augmented by College endowment funds, and clear pathways for degree completion.

**Assessment of Redesigned Courses and Learning Environments** Extensive assessments have been conducted on redesigned gateway courses that historically have had very high DFW rates. The initially piloted models have been scaled up in use such that students enrolled in gateway math courses, e.g. College Algebra and Trigonometry and Calculus I, are almost exclusively enrolled in student-centered cyber-learning environments. Through collaborative discussions with Mathematics faculty about the efficacy of the Emporium model for promoting active learning, Chemistry faculty have piloted a Chemistry Emporium model using ALEKS. Using preliminary data from this pilot, they recently received an award through the NSF Improving Undergraduate Science Education (IUSE) program to develop and test a chemistry emporium model with larger numbers of students at NCA&T and North Carolina Central University (a nearby HBCU).

**Assessment of the Innovation Ventures Fund Program**

The College has conducted an impact analysis of the Innovation Ventures Fund program that included a survey of faculty throughout the college to gauge perceptions of success of the program and an analysis



**Figure 5. Enrollment (Left, a) and Six-Year Graduation Rates (Right, b) for the College of Arts and Sciences. Data represents cohorts during the fall semesters. Source: NCA&T Fact Book.**

new collaborations formed as a result of participation in the program. Forty-nine faculty members (representing 24.3% of this group) responded to the survey. Respondents indicated the following:

- 70% of recipients reported that the Fund had a positive impact on their ability to collaborate within the College of Arts and Sciences.
- 74% reported an increase in inter-departmental collaborations.
- 60% stated that the Fund allowed them to increase their collaboration across the University.
- 45% of recipients utilized feedback to improve their proposal submissions extramurally.
- 48% of recipients presented locally and nationally on the research performed through their funded projects.

Thus far, 12 out of 13 departments have participated in awards made through the Innovation Ventures fund. 75% of grant recipients stated that the Innovation Ventures Fund had a positive impact on their scholarly activity. We believe that the competitive incentives available through the Innovation Ventures Fund are creating deep collaborations that will have long-term impacts on the scholarly productivity of faculty, increased dialogue among departments that have traditionally operated as siloes, and most importantly offer a strong foundation for developing and integrating student success initiatives into the culture of the college.

**Conclusions and Sustainability**

Sustainability has been an intentional outcome of efforts to increase student success at North Carolina State University. Adopting a teleological approach using Kotter model for planned change, the has been very intentional about the design of its student success initiatives. Integrating key stakeholders into the design and using them as leaders has provided a strong foundation for long-term organizational change.

Central to the approach has been an empowerment of the faculty. To change the culture of a university, faculty must play a central role in the change that is desired. Better trained faculty, who are connected through an engaged community, have the skills and support to promote sustained efforts to increase success in the University. The hiring of faculty and administrators focused on leading student success initiatives provided a necessary infrastructure for sustaining efforts. To date an Associate Dean for and Student Success and four student success faculty members have been hired in the College of Arts and Sciences. Additional personnel, to include a Director for the STEM Center of Excellence for Active Learning and a Director of Research and Assessment, will be hired in the upcoming year. All of these individuals are leading and support the student success agenda; and this represents an incredible commitment to advancing student success. Combing this infrastructure with an empowered faculty a snowball effect, wherein exponential impacts are realized as the campus community collectively works toward its goals.

The investment in facilities designed to provide learner-centered cyber instruction is also an incredibly important component of the sustainability plan. NCA&T has provided \$1 million in support to the to provide a stimulated learning environment for students in critical gateway courses. These new environments promote active learning and facilitate mentored, hands-on engagement in rigorous coursework.

Engaged external stakeholders are also supporting the sustainability of student success initiatives at NCA&T. The CAS External Advisory Board has led the expansion of the number of endowment scholarships that support high-achieving students; thereby answering a critical need identified through institutional assessment of the barriers to student success at A&T. These endowed funds will provide support for students for many years to come.

While a comprehensive set of activities have been pursued, these have not been disjointed. Targeted initiatives, such as the Innovation Ventures Fund, have been intentionally designed to encourage collaboration between colleagues within their home departments and beyond. In summary, the comprehensive multi-level plan has led to increased graduation and retention rates for North Carolina State University that are sustainable and the impacts will be long-lasting.

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