

## **Land Grant Research University Partnerships with HBCUs for Enhanced Undergraduate Research Opportunities**

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### Background

The University of Arkansas (UA) is a Land Grant University with the stated mission of being “a nationally competitive, student-centered research university serving Arkansas and the world”. Because of this mission, it is imperative that the University provides a nurturing environment for students from all portions of our society. Only then will we gain the benefit from the talents that exist throughout our population, including talents hidden in population segments that have not traditionally enrolled at this University (or sometimes in any post-secondary institution).

In the United States there is a tradition of strong Historically Black Colleges and Universities (HBCUs) that provide both a nurturing culture and strong academic preparation to students of color in our society. But many of these institutions do not support a graduate research program, instead developing relationships with graduate research institutions for post-graduate opportunities for their students.

As a research institution, the University of Arkansas has the need for strong graduate students to support its research initiatives. However, most graduate programs have not devoted the same level of attention, energy, time or resources to the recruitment of graduate students that athletic programs or enrollment services have devoted to the recruitment of undergraduate students. The result is that the student side of the search for graduate program/student matches has driven the graduate “recruitment” system.

Potential graduate students today have an advantage in finding good graduate matches because of the extensive search capability and knowledge contained in the World Wide Web. At the same time, these undergraduates also seek guidance from individuals in their home institutions concerning the general reputation of a university, college or department. Without recruitment efforts by graduate programs, undergraduate faculty lack knowledge of graduate programs at other institutions, which can limit prospective students’ confidence in accepting academic opportunities that would well support their academic and career goals.

Even with the difficulties involved, HBCU students have found and enrolled in UA graduate programs. Upon arrival on campus, they found that there existed a lower level of interaction between research faculty and students at the UA as compared to the students’ undergraduate HBCU. This change of academic operational culture, coupled with the change in workload at the graduate versus undergraduate level and the change in social factors from a black majority

institution to a white majority institution, provided increased risk of academic instability to these students as compared to non-minority students facing only one or two of these three factors.

In this paper a system will be described that has evolved over the last five years at the UA to overcome these inherent systemic barriers to success of new HBCU graduate students. We will discuss the method by which institutional linkages between HBCUs and the UA are being used to address this problem of graduate program knowledge transfer. We will also describe the new operational methods that have been introduced in newly created graduate programs to lower the impact of cultural differences between the UA and HBCUs. The system's attributes, successes, and future modifications will be presented in instructional case study format that may be used by both research institutions and HBCUs in establishing similar programs.

### Historic evolution of the system

In 1996 the University of Arkansas created an internally funded program, known as the George Washington Carver Project, for summer undergraduate research opportunities for any student from a partner HBCU institution. Its purpose was to increase the racial diversity of the graduate and professional student body at the University of Arkansas through a method that strongly enhanced the likelihood of graduate school success of the recruited students. The funding was provided from either college or departmental level operational funds.

The Carver Project was chartered to identify, interest, and recruit graduates of HBCUs as graduate and professional students through the establishment of institutional formal relationships (Carver Alliance Partners). The two key elements of the Carver Project were (1) that any academically qualified student on the campus would be eligible for the summer research positions, and (2) that student selection for the summer program would be managed on the HBCU campus by an upper-level faculty member or administrator.

Since 1996, the University of Arkansas has created alliances with several HBCUs. Southern University became the first in 1996, and was followed in 1997 by the University of Arkansas Pine Bluff. During the summer of 1997, two Southern University undergraduate students completed a paid six-week internship under the supervision of University of Arkansas faculty members in the Dale Bumpers College of Agricultural, Food and Life Sciences. The following summer, four undergraduate students from Southern University, and five undergraduate students from UAPB completed summer internships in Bumpers College. In 1999, three undergraduate students from Southern University, and three undergraduate students from UAPB completed internships in Bumpers College. That same year, the Sam M. Walton College of Business Administration and the College of Education and Health Professions agreed to accept Carver interns and three additional HBCUs, Alcorn State University, Tougaloo College, and Jackson State University, sent undergraduate students to participate in the Carver Project. These students completed internships in Bumpers College, Walton College, and the College of Education and Health Professions.

The slow but steady growth of the Carver Project had increased its size from two students in 1996 in a single college to over twenty students in multiple departments and colleges in summer

2000. However, the lack of participation from the College of Engineering and the Fulbright College of Arts and Sciences was preventing the Carver Partners from placing all the students on their campuses at the University. These factors combined to trigger a review of the program with the goal of finding the key to harnessing its successes for the entire campus.

Under the leadership of Dr. Willyerd Collier (originator of the Carver Project) and Dr. Collis Geren (Dean of the Graduate School), the Carver Project was moved from its base as a special program in the Office of Affirmative Action to become a permanent program in the Recruitment Office of the Graduate School. As part of the Graduate Recruitment Office, the program received wider visibility on campus in all colleges and departments. This in turn led to individual conversations between key departmental faculty and the new Carver Project manager, Ms. Benita Douglas, which in turn led to three significant expansions of the Carver Project scope.

The first of these expansions occurred early in 2001, when the Carver Project began a partnership with the University's Microelectronics-Photonics (microEP) graduate program<sup>1</sup>, a partnership that resulted in a two-day on-campus meeting of administrators from the Carver Project partner institutions under the financial sponsorship of a NSF IGERT grant<sup>2</sup> supporting the microEP PhD program. This meeting allowed the Carver Project Administrators to learn the full scope and boundaries of the research activities at the University of Arkansas, which allowed them to accurately match their students' interests to research opportunities.

At the same time, the Carver Project expanded its scope in a second direction through partnerships with three NSF Research Experience for Undergraduate (REU) sites on campus. This partnership, with the Physics, Chemistry, and microEP program REU sites, resulted in one fourth of the REU student positions being assigned to the Carver Project for student selection. This did not limit the number of students that could be selected from the Carver Project partner institutions, but rather gave the Carver Partners the ability to select students themselves that they felt would be a good match to the REU programs.

As two of the three REU programs were housed in science departments in the Fulbright College of Arts and Sciences, and the third microEP REU was interdisciplinary between Fulbright and Engineering Colleges, this resulted in the Carver Project managing nine positions suitable for students from science undergraduate programs. An additional benefit from the Carver/REU partnerships was a plan to more tightly coordinate the Carver Project students' social activities with the social activities of the REU programs.

The third expansion of scope of the Carver Project came from the endorsement of the program by the Dean of the College of Engineering to the engineering departments. With that endorsement, the engineering departments agreed to use their departmental operational funds to create two Carver positions per department. In total, these three expansions almost doubled the number of students participating in the Carver Project from the summer of 2000 to the summer of 2001.

### Carver Project attributes

The fallacy of many programs dedicated to increased diversity is their focus on a goal of an increase in numbers of a given population group, rather than the success of the individuals that join that program. The Carver Project focuses on student success using methods to specifically address several barriers to success of HBCU students entering a white majority research institution. The barriers targeted are poor research institution selection by students for their career interests, poor understanding by the student of differences in academic operational methods in white majority research institutions, poor understanding of the increased level of effort expected in graduate courses, and differences in the social cultures between black majority institutions and white majority institutions.

The first barrier addressed is the proper selection of a research institution by a student as they approach their graduation. The selection criteria used by students often involve such things as academic reputation of the institution, amount of financial support available, and recommendations of trusted faculty at their home institution. What is not immediately obvious to many students is the critical need to select a research institution that will provide a means to achieve their own career and personal goals.

The Carver Project attempts to provide its Partner Institution Administrators a full exposure to the strengths and limitations of the research programs active at the University of Arkansas. In doing so, the UA recognizes that some students' career success would be better served by their attending other institutions whose strongest research fields more closely match the students' career interests. At the same time, the students at the HBCU institutions told of a strong research field at the University of Arkansas will be more likely to select the UA program because of the trust in developed by the process of full disclosure. The result is that students are more successful in whatever institution's well-matched graduate program they select, which is of benefit to the student, the research institutions, and society as a whole.

The second barrier addressed by the Carver Project is the difference in academic operational methods between the HBCU Partner Institutions and the UA graduate programs. Different aspects of these operational methods are easily observed by entering HBCU graduates, and can result in student discouragement if the observed behaviors are perceived to be specifically related to the student instead of an aspect of institutional culture. The Carver Project has special topics meetings with its students to discuss these kinds of observations during the summer, a time when there is no danger of false conclusions affecting the early graduate academic performance of the student.

An illustrative example of this phenomenon would be the sharply reduced time a student spends in personal interactions with departmental faculty, causing a perception by the student that the faculty member feels they student is not valuable. In the Carver Project seminars, the different types of time demands on research institution faculty are discussed. Research institution faculty members do not necessarily interface with more students than their HBCU counterparts, but they are faced with the prospect of mentoring undergraduate, MS, and PhD students (as well as directing Post Doctoral associates). When research institution faculty members are faced with these increased types of interactions, a common response is to depend on the advanced (graduate) students to be more self-directing in their educational endeavors.

In a very real sense, the more confidence a research faculty member has in a graduate student the less time is spent in direct supervision of the student's activities. Students must learn to adjust their assessment of personal interactions to this new type of academic reality, learning that is best accomplished during the summer Carver Project program. This allows students entering this research environment after graduation the ability to focus on their academic goals without distraction from the significantly altered academic operational methods.

The third barrier to success addressed by the Carver Project is the increased level of effort required by graduate level courses as compared to undergraduate level courses at any institution. It is often said that experience is the best teacher, and the Carver Project provides a method for students to experience a graduate level course without it appearing on their permanent graduate record.

While each department that participates as a Carver Project student host location addresses this need differently, the Carver Project does encourage the departments to make rigorous graduate level academic demands on their students and does coordinate the summer program time period to coincide with the first academic summer session. This allows the Carver Project students to fully participate in graduate level classes taught during that session, and to even enroll for graduate credit if the student wishes to include their work on their academic record.

Once again, the Carver Project seminar series allows the students a discussion forum to compare different types of graduate level course expectations across multiple departments. Through both direct experience and through learning of their colleagues' experiences in other departments, the students become prepared for the level of effort that will be expected of them as they enter their graduate schools.

It should not be forgotten that the Carver Project is at its heart a summer undergraduate research program, with each student being fully involved with active research being performed by different research faculty members. Each student experiences the amount of work that is required to make progress on advanced research projects, including the creation of a detailed summary report and technical presentation at the end of the program. While this part of the program is not unique or innovative, it is a key necessary component for any program that is designed to better prepare undergraduates for later success in a graduate research program.

One of the most discussed, but most difficult to define and measure, barriers to success faced by HBCU students is the change in social culture between black majority institutions and white majority institutions. The Carver Project does not attempt to determine what the level of that barrier might be in its students, but rather defines activities that allow its students to fully experience the UA campus atmosphere from the base of a familiar environment. In doing so, it gives the students the opportunity to directly test their own preconceptions of what a graduate education would be in a white majority research institution.

This is accomplished through program design in several ways. For example, the Carver Project students are housed in a single dormitory on campus in order to encourage after class interactions and discussions among the students. But this same dormitory also houses the REU students from

all three REU partner programs, and has intermixed program roommates when it is considered that some REU students are also part of the Carver Project.

This provides all the students with an interesting social dynamic. The HBCU students experience being the minority culture within the university as a whole, but the non-black REU students experience being the minority culture within the dormitory. This dynamic is deliberately discussed in the students' first day on campus as part of a full day of team building activities shared by REU and Carver Project students. This team building day is modeled after an annual two-day "summer camp" that is part of the microEP graduate student training, a concept that is now being implemented by the UA Physics<sup>3</sup> graduate program under a grant by the Department of Education FIPSE<sup>4</sup> program.

The expected outcome of these "cultural immersion" activities is not to encourage an abandonment of any student's current lifestyle. It is rather to demonstrate that an individual's behaviors may be modified to merge successfully with the majority culture in which they exist, while bringing an increased degree of richness to the majority culture from the diversity of its members' individual backgrounds.

It is through the combination of all of these activities that the Carver Project is preparing students from its HBCU partner institutions for graduate success at any research institution, while the UA is receiving the direct benefit of better matches between student applications from those schools and the research efforts in its different departments.

## Results

Ten of the twelve interns who have graduated from participating Historical Black Colleges and Universities have decided to pursue graduate degrees at the University of Arkansas. Early indications from the summer 2001 participants from engineering and science departments show a significant level of interest in attending graduate school at the UA. A even more positive sign is that the summer REU programs are receiving applications from Carver Partner Institutions as the result of personal recommendations of Carver/REU alumni.

While the hard data on Carver Project alumni success in graduate programs is just becoming available, the anecdotal reports from the program alumni are uniformly positive and generated the interest in sharing this program with others in the educational community.

## Future directions

The Carver Project is expected to continue at the current level for at least two years, allowing the program to stabilize at the larger student population achieved in summer of 2001. Discussions are ongoing between the different departments on whether the current six-week Carver Project positions should be lengthened to match the ten-week positions for Carver Project students associated with REU programs.

The University of Arkansas is currently operating two experimental graduate program methodologies that are designed to develop a more supportive student culture, a culture modeled after industrial technical work-groups. The microEP graduate program and the Physics graduate program have been referenced in this paper, and details of the experimental nature of the programs may be found at these web sites. The Carver Project will provide an opportunity to evaluate if these experimental graduate programs prove more beneficial to students from HBCU undergraduate environments than technical graduate programs based on traditional operational methods.

As a result of the Carver Project partnerships with HBCUs, the UA Physics FIPSE program has received supplemental funding to visit the Partner institutions to receive input in the development process of its graduate programs. The emphasis of that effort will be to incorporate elements of the HBCU academic environment that would increase the likelihood of success of new graduate students from those institutions.

Long-term continuation of this type of program (one funded from many different internal and external funding sources) is always of concern to the program directors. One method that has been proposed to assure a continuing level of summer research opportunities is through the addition of Carver Project positions to every major research proposal that is generated by researchers at the University. In return for funding these summer research opportunities, the researchers would gain the benefit of participating in the student-matching network leading to more productive research output.

## Conclusion

The University of Arkansas has created an internally funded partnership with HBCUs in geographical proximity to the UA. This partnership network is known as the George Washington Carver Project, and has demonstrated benefit for the HBCU student participants and the University of Arkansas graduate level research programs. The method by which this program has evolved, the program elements that have proven to be beneficial, and the current results of this program have been presented as a case study for the benefit of the educational community.

1. <http://www.uark.edu/depts/microep>
2. <http://www.nsf.gov/igert>
3. <http://www.uark.edu/depts/physics>
4. <http://www.ed.gov/offices/OPE/FIPSE/>

## KEN VICKERS

Ken Vickers is a Research Professor in Physics at the University of Arkansas, and has served as Director of the interdisciplinary Microelectronics-Photonics Graduate Program since April 1998. He worked for Texas Instruments from 1977 through March 1998 in integrated circuit fabrication engineering, the last seven years as Engineering Manager of the TI Sherman IC Wafer Fab. Professor Vickers' technical accomplishments before leaving TI

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Willyerd R. Collier Sr. is the Director of the Office of Affirmative Action at the University of Arkansas. He is the former Director and current Senior Program Consultant to the George Washington Carver Project— an innovative recruitment initiative to identify, interest and recruit students of color by developing institutional linkages with historically black colleges and universities. He received his BA from Wabash College and JD from the University of Iowa in 1975 and 1978 respectively.

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Greg Salamo is a University Professor of Physics at the University of Arkansas. He leads several interdisciplinary research efforts between universities and industry in photonic materials and semiconductor nanoscience, and has been the leader at the University of Arkansas in promoting interdisciplinary research and education. Dr. Salamo received a BS degree in Physics from Brooklyn College in 1966, an MS degree in Solid State from Purdue University in 1968, and his Ph.D. in Optics from CUNY/Bell Labs in 1973. After a Post-Doc position at the University of Rochester, he joined the faculty of the University of Arkansas in 1975.