2010 Research at Andrews

Andrews University

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Secrets of Success

Enhancing student success through educational transformation

Based on exit scores from the mid-90s through 2002, Andrews University biology graduates scored as a group in the top 10 percent of biology departments whose graduates took the nationally normed Major Field Test in biology. Seventy percent of entering freshmen biology majors graduate, 80–85 percent of biology seniors who apply are accepted into medical school and more than 90 percent of those who apply are accepted into graduate programs in the life sciences.

Usually this high percentage of success is only found at schools with highly selective entrance requirements. More of the students entering the biology program at Andrews are only adequately prepared or underprepared than is the case for colleges and universities whose students are this successful. This makes the high completion rates and high acceptance rates into post-graduate programs even more notable. While the well-prepared biology majors continue to excel, these less well-prepared students are experiencing educational transformation, and as a result improving their success and sharing in the exceptional opportunities that Andrews senior biology majors experience. These outcomes are even more notable since approximately 30–35 percent of biology graduates are black and Hispanic. Nationally, these two groups make up approximately 10 percent of science graduates.

This unusual success of biology graduates has attracted national interest. In 2003, biology professors John Stout and Gordon Atkins developed a proposal to the National Science Foundation (NSF) for a grant to evaluate the reasons for this success with the goal of finding out the causes.

Introduction

Many smaller colleges and universities with a history similar to Andrews University's have had ongoing conversations about the relative importance of creative scholarship/research in their educational mission and goals. In these conversations at Andrews University, research—in its broadest contexts—has focused on creativity and original scholarship. Research has encompassed all of the academic disciplines, from artistic to scientific, widely engaging the University community as a whole.

About a decade ago, University administration chose to enhance the resources used to support faculty and student research collaboration in unexplored areas. This included appointing a dean of research, which is a new leadership position, along with reorganizing the Office of Research & Creative Scholarship and enhancing support for faculty-led research. It also led to the creation of University-funded undergraduate research scholarships. The resulting growth in research led, in many programs, to including it as an essential component of the University's educational mission.

The pervasive spread of research through the Andrews University community has become most visible at the annual Celebration of Research. For the past two years, this event has attracted widespread participation by faculty and students. The increasing role research plays in an Andrews University education has also led to this first of an annual series of reports (sponsored jointly by the Office of Research & Creative Scholarship and the Office of Integrated Marketing & Communication) to both the Andrews University constituencies and the wider higher education communities. In this document, we want you to not only become fascinated by the very creative and interesting research described, but to also experience its wide-ranging nature through diverse, productive disciplines.

With the retirement of John Stout, dean of research, in May of 2010, the University has further enhanced the support for and profile of research by appointing Christon Arthur to a newly defined dual role as dean of the School of Graduate Studies & Research and Gary Burdick to lead the Office of Research & Creative Scholarship as associate dean for research.

John F. Stout, PhD
Research Professor of Biology
August 30, 2010

Processes Promoting Success and Transformation of Biology/BNS Students at Andrews University

- Empowering Students through Small Successes
- Engaging Students in Learning
- Demonstrating Teaching Dispositions
- Nurturing Positive Relationships
- Organizing Structures for Student Success
- Providing a Positive Department Ethos
for the educational transformation Andrews University biology majors were experiencing. An important part of the grant proposal was built around developing a new program in behavioral neuroscience, shared between the Departments of Biology, Behavioral Sciences and Mathematics, that would bring new groups of students into preparing for careers in the sciences and mathematics. This would provide opportunities to use the approaches that had been so successful in biology, attempt to recreate this success with a new group of students, and thereby enhance understanding of why the biology program is so effective in increasing student success. As the grant proposal progressed in these directions, Shandelle Henson, professor of mathematics, and Duane McBride, professor of sociology, joined the team as coinvestigators. NSF quickly funded the proposal that resulted in a six year grant of approximately $500,000. One of the immediately positive outcomes was support by the grant for hiring Karl Bailey to lead out and teach in the new behavioral neuroscience program.

As the grant activities developed, NSF asked for an increased depth of assessment that included a carefully structured evaluation of how individual students felt their success was enhanced. The depth of this study brought a second, $50,000+ grant from NSF and added David Mbungu, associate professor of biology, to handle the study of student outcomes and Larry Burton, professor of teacher education, to develop, oversee and evaluate extensive interviews with alumni and current students of the programs supported by the grants and analyze the results.

Burton and his team of five graduate student assistants have nearly completed evaluating approximately 2,000 pages of interview transcripts that resulted from 115 interviews of both alumni and current students from the Departments of Biology and Behavioral Sciences. For each interview, some as short as 25 minutes and others as long as one and a half hours, subjects were asked an open-ended question: “Tell us about your experience in the department and what is it that you think helped or helps you be successful?”

Prior to each interview, the subjects had received a letter outlining the goals of the research. As a result, many were well prepared. At the same time, Mbungu’s focus on the outcomes of the program in terms of student academic success and high levels of continued access by graduates to postgraduate programs in medicine and the life sciences, documents that the factors that attracted NSF support continue and include the new groups of students brought into the program.

A final report for the first grant was submitted in April 2010, and a more comprehensive report covering the outcomes of both grants is near completion and will be reviewed by the coinvestigators and University President Niels-Erik Andreasen, who has collaborated with the team since the beginning of the study. It will then be submitted to the NSF, but perhaps more importantly, form the basis for additional papers in well-recognized journals and presentations at appropriate national and international venues.

The results already reveal several reasons that stand out conspicuously. These include two very important factors that are clearly conducive to success, which include positive relationships with both teachers and peers referred to as “department ethos,” or the environment created by the confluence of a diverse, supportive, intellectual community within a small, faith-based, teaching university, and very successful teaching methods, referred to as “effective pedagogy.”

All three groups interviewed—current biology students, biology alumni and behavioral neuroscience students and alumni—gave credit to the personal relationships they developed through very close student/mentor-advisor relationships, small class sizes, undergraduate research opportunities, and an intentional focus on student success. Where as introductory science courses at state and public universities often weed out students with weaknesses in those entering classes, courses and student support at Andrews are designed to develop understanding and confidence that leads to educational transformation and unusual academic success as undergraduates.

Stout, Burton and Mbungu attribute the success of the actual research process to two main reasons. The researchers had Elaine Seymour, an outstanding, nationally prominent, professional consultant, advising them on their research processes and the NSF-provided funding gave the opportunity for careful, in depth evaluations of both student outcomes and their responses during extensive interviews. These successful educational processes are now much better understood and can be adapted for improvement of science education programs nationally. Their grants came from a NSF program mandated as an effort to increase the number and ethnic balance of students preparing for careers in science, mathematics and engineering, in order to meet national needs for the future.

The researchers have already made several presentations, “and everywhere we’ve presented, people get excited...and start taking copious notes...because the potential is exciting,” says Burton. Once the final reports are submitted to the NSF, the reports become public information.

However, the researchers face several challenges in adapting the program for larger, secular educational institutions. How successfully can these approaches developed in a small, faith-based institution be applied in much larger public universities? Often the new professors at these universities find their tenure is dependent upon the grants they receive and the publishing they do—and so have little time to spend in the classroom, leaving the job of teaching to their graduate assistants. In addition, at large universities where the average class size can be well above 200 it is impossible for the professor to develop personal relationships with many of the students. The final report must extract general principles and practices that could be applied at other types of higher education institutions.

Toward this goal, Stout and Burton are already working with faculty members and administrators at one large public university to explore ways of implementing the studies’ most important findings.