

Quest: A Program to Reach Academically Talented Students

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Abstract

Students who score high on standardized tests, have excellent high school grades, and have exhibited qualities of leadership are recruited by some of the best programs in the nation and are presented with many career options. Reaching out to these students and getting or keeping them interested in engineering is critical for the long-term benefit of the engineering profession. Mississippi State University has designed a program to reach these top-quality students and interest them in a career in engineering. An additional benefit is that the students have an opportunity to see what Mississippi State has to offer and hopefully will result in these students enrolling in our program.

Quest is a highly competitive, five-week long, in-residence, summer program for rising high school seniors. These students are brought to campus and enrolled in a special section of engineering graphics. Each student is also required to enroll on one additional course offered in the regular university schedule. Students live in campus housing and are treated like regular college students. A mentor is assigned to work with the students and help them adjust to college life.

In addition to the two courses each student takes, a series of enrichment seminars and tours are scheduled to enable the students to see various engineering disciplines and to improve some of their life skills. Enrichment seminars include topics such as personality types and teamwork, college finances, and stress management. Tours include on-campus research facilities and other engineering facilities in the general geographic area.

Response to the program and feedback from the initial participants has been excellent. Quest participants now have a better understanding of engineering and are far ahead of their fellow high school students in being prepared for the adjustment to the rigors of college life.

Introduction

Recruiting and retaining high caliber engineering students is a challenge all schools face. Many students who are well prepared to enter an engineering field are often steered to a science or math field, primarily because they lack a thorough understanding of engineering. While high school teachers are often capable of providing excellent advice on science and math careers,

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because that tends to be their backgrounds, they are not always comfortable with providing advice and insight on engineering careers. While the College of Engineering at Mississippi State University does have programs under way to educate high school teachers about careers in engineering, a decision was made to go directly to the students with a program that would introduce them to both engineering and to college.

Also of interest was making students more aware of the quality of the program at our university while encouraging them to pursue engineering careers. This program was conceived as both a recruiting tool as well as an outreach and education program.

Development of the Program

Many summer camps for high school exist but it was decided that the Quest program was to be more than a summer camp. Our goal was to create a program that would provide high-caliber high school students an opportunity to spend a summer term on campus, taking college-level courses for college credit, while also being exposed to engineering career opportunities and emphasizing some of the non-technical aspects of engineering such as interpersonal and communication skills.

Quest students are admitted to the university as regular college students who meet early admission requirements. It was decided that eligible students should have excellent high school grades, have scored a minimum of 26 on the ACT, and have several favorable recommendations from high school faculty members and administrators. These students are then allowed to enroll in two college level courses; one is an Engineering Graphics course, the other course is anything the student chooses to take.

Once the decision was made to proceed with the program, materials were prepared and mailed to high schools and to students who had the requisite ACT score and had expressed an interest in Mississippi State University. The Quest program was seen as an experiment for the students as well as for the College of Engineering. To facilitate the application process, the College of Continuing Education was used to prepare the mailings and assist with registration of the students.

Application Process

Applications and program information were mailed to students who met the entrance requirements and had expressed an interest in Mississippi State University. Each student was required to supply ACT or SAT scores certified by their high counselor, a 300 to 400 word essay on *Why I Want to Participate in Quest*, two letters of recommendation from either a science or mathematics teacher or a principal, and an application form.

The application form and letters of recommendation comprised the most valuable part of the application. These were carefully evaluated by the selection committee as they looked for signs of maturity, responsibility, and indications that the student would be successful in a college setting. The application form itself requested information on the student's hobbies, interests, extracurricular activities, employment and similar responsibilities, and their most significant achievement.

Student's essays were also important in evaluating the applicants. Members of the selection committee looked for signs of maturity and sincerity to participate in the program in the essays that were written. A student's ability to communicate was also evaluated.

Providing a College Experience

All students taking part in Quest are required to live on campus and take two college level courses. Scholarships are provided to each student such that their costs are approximately one-half of the total cost of tuition and fees. Quest is not a summer camp and the supervision provided to the students is minimal. A primary goal of the program is to give students a true feeling for what it is like to be a college student so that they can learn to handle the independence, manage their time and money, and have an advantage when they enter the university as a first semester freshmen. Quest administrators are however, always cognizant of the fact that these are still high school students, under the age of 18, and may need a little more attention than college freshmen.

Quest students are treated as college freshmen in every way possible and are given opportunities to interact with college students at levels ranging from study groups to intramural sports. All Quest students are required to live on campus in a residence hall. The decision was made that the Quest students would room together in suites. Each suite consists of four rooms and there are two Quest students per room. One counselor, an engineering senior, is assigned a room nearby the Quest suites to provide monitoring and mentoring. Students are free to come and go from their rooms as they please however, they are asked to let their counselor know if they are going to be off campus for an extended period of time and where they will be in case we need to contact with them.

Each Quest student is required to take two college level courses. Students are free to choose one course on their own but all are required to take the same engineering graphics course. The engineering graphics course is taught by a regular engineering faculty member using the same textbook and syllabus as the regular graphics course. The only difference between this graphics class and any other is that this course is restricted to Quest students. A special section of the graphics course was developed to allow a chance for the students to bond with each other and to have an engineering faculty member available to serve as an additional mentor. Having the students in the same class also provides some flexibility in scheduling field trips and other activities.

During an orientation session, students are advised by College administrators and faculty members on which courses they should take. Students are encouraged to explore their interests while also being mindful of which courses will give credit that can be applied to an engineering degree. During the inaugural Quest program, several students chose to take Calculus I, others chose to take humanities such as history and philosophy. These courses were selected from the listing of University courses offered during the second summer term.

Student Enhancements

Being a successful engineering student requires more than a knowledge of math and science and, the better an engineering student is able to master these non-technical skills, the better student and engineer he or she will be. Four enrichment seminars are included in the Quest program with the goal of making the Quest participants better students and demonstrating the variety of skills required to be a successful engineer. Each seminar is conducted during an afternoon session and is scheduled to last between two and three hours. These seminars are scheduled to immediately follow the afternoon graphics class.

Team work is arguably one of the most important non-technical skills required of engineers today. Being an effective team member and team leader requires an understanding of different personality types and how to work with these different people. During the Orientation session each student is given a Myers-Briggs personality inventory. These inventories are collected and forwarded to a faculty member in the Psychology department for scoring and evaluation. During the Quest program the students are given a seminar on the personality types and how to deal with them. At that time, each student is given the results of his or her inventory and they discuss the meaning of the results.

Our experience has shown that many students, even good students, do not have good study habits. Some excellent students in high school were not challenged and therefore did not develop the study skills needed to be successful in engineering. Once these students enroll in an engineering program, they rise to the challenge and develop the needed study skills but their grades may suffer somewhat during the first few weeks of their college careers. To prevent this from happening with our Quest students, a seminar on study skills is provided by a faculty member from the campus Learning Center. This seminar covers how to study effectively as well as how to prepare for and take tests.

Engineering students frequently get into academic trouble as a result of poor time management. Students who do not realize how long it will take to study and are not able to balance their schedules to provide time for study, rest, play, and socializing, often find themselves in academic difficulty. Quest students are introduced to the topic of time management by a representative from our Student Counseling Services department who also includes some information on stress management. This seminar was particularly well received by the first Quest group and the faculty member talked to a couple of the students after the seminar for quite a while.

The final enhancement seminar covers budgets and scholarships. This session is led by representatives from our Office of Student Financial Aid and covers financial aid available to students, scholarships, the financial aid and scholarships application process, and what should be included in a budget for a college student.

Funding

Quest is made possible in part by a grant from the Tennessee Valley Authority. Students are asked to pay roughly one-half of the total cost of the program which includes tuition, fees, room, and meals. Each student is assigned a room and room mate, and provided with a meal card.

Student meal cards are similar to the MoneyMate cards our regular students use to make purchases on campus. These cards are able to be used in the cafeteria, bakery, food court, library snack bar, and many vending machines across campus. In setting an initial monetary limit on the cards, we used the estimate for food costs given by our housing department. This amount, in excess of four hundred dollars for a five week term, proved to be too much for most students, although some seemed able to spend what was allocated, and will be reduced slightly in future programs.

Exposure to Engineering

Several field trips to engineering facilities were taken during the first Quest program. These trips included visits to a chemical plant, a plant which manufactures heat exchangers, and a company which manufactures specialized computers. At each facility, Quest students were greeted by engineers and given an explanation of the products the company produced. They were given tours of the facilities and shown what types of engineers were needed in the processes and what kind of work they would do.

Students were also given tours of the various facilities on campus. Research centers were visited and the work being performed was explained. Through this process the students were able to gain a better understanding of the various engineering fields and why they might wish to pursue a career in those fields.

In developing the list of facilities to tour, several factors are taken into consideration. First, a broad base of engineering facilities is desired to give students a balanced view the engineering field. Therefore tours of both high-tech, leading edge firms such as a computer designer and manufacturer, and relatively low-tech firms that employ mainly maintenance engineers, are scheduled. Second, the location of the facilities is taken into account. To give the students adequate time to study, the field trips need to be relatively short. Third, an attempt is made to show the students what type of engineering facilities are available in the state and that state-of-the-art work is being done within the state.

Orientation

Detailed orientation sessions are held approximately six to eight weeks prior to the beginning of the Quest program. Schedule conflicts necessitated that two sessions be held for the first Quest program but students and parents only needed to attend one session. The goal of each orientation session is two-fold. First we wish to provide the students and parents with the information they need to be successful in the program. Secondly, we want to make sure the parents are comfortable in placing their children in a program in which they will be given great freedom and responsibility.

To assist with the orientation process we ask our Office of Enrollment Services to provide two student orientation leaders. These students are also engineering upper classmen and are able to provide additional insight into engineering. During Orientation, students are introduced to their counselor, engineering graphics instructor, Dean's Office staff, and other University officials.

To provide parents with the level of comfort they need to leave their children with us, we have representatives from the campus police department and the student health center make presentations. The police department representative discusses campus crime statistics and gives general safety tips for the students. A Student Health Center administrator describes the facilities and staff on campus we have should a medical emergency develop. Feedback on these two areas was very positive from the parents in the initial Quest program.

During Orientation, students are given an opportunity to get immunizations they may not have had and to have any admissions holds on their records cleared. The highlights of the session include having student ID cards made and registering for classes. We are able to automatically add each student to the engineering graphics class they are required to take and we assist them in registering for the other class they want.

Outcomes

At the conclusion of the initial Quest program, an information exit interview was held with the students as a group. This proved to be very beneficial and informative. Each student thought highly of the program and said they would recommend it to a friend. Several students who were certain of an engineering career prior to entering the program were more confident of their decision. One student who was uncertain of a career in engineering at the beginning of Quest was still not sure he wanted to major in engineering at the end of the program but he did say he was now more comfortable with his knowledge of engineering and would be able to make a better decision.

Approximately four months after the conclusion of the Quest program, survey forms were sent to both parents and students. Our interest was in the opinions of Quest after some time had passed and the students had returned to high school. One concern that developed during the program was that the students may have trouble adjusting to high school when they returned home after having been given such a large degree of freedom during Quest. Students were asked whether they Strongly Agreed, Agreed, Disagreed, or Strongly Disagreed with the statement *I had no trouble adjusting to high school after Quest*. Parents were asked for a similar response to the question *My child had no trouble adjusting to high school after Quest*. With a value of 4 assigned to Strongly Agree and a value of 1 assigned to Strongly Disagree, the average response by students was 2.4 while the parent's response averaged 3.4. This seems to indicate that the students had a little more trouble adjusting to high school than the parents were aware of.

Our general goals were achieved with the Quest program. Students and parents both report a general increase in study skills and time management skills as a result of Quest. When asked if their opinions of Mississippi State University Engineering had improved as a result of Quest, the student's responses averaged 3.8 out of 4 and the parents averaged 3.7 when asked if their children's opinion of MSU Engineering had improved. Results for a similar question regarding the engineering profession brought an average response of 3.4 from the students and 3.9 from the parents.

The exit interview with students uncovered several concerns. Although they enjoyed the freedom they had, some admitted to having difficulty getting up for class and spending the time needed on studying. Several students suggested a mandatory study period a few times a week. Some

room mate problems also were discussed, primarily regarding the level of noise with some of the students. A few students tended to keep late hours and made enough noise to keep others awake. The counselor was not always aware of this because of the layout of the suites. The counselor suggested that future rooms be in a conventional residence hall where each room opens onto a common hall. This would permit the counselor to easily determine who is responsible for the noise and deal with them individually as needed.

Conclusions

As a result of the Quest program, Mississippi State University College of Engineering was successful in bringing in highly qualified high school juniors and allowing them to experience college life. As a result of this program their opinion of the University and the engineering profession has improved. Information learned from student and parent surveys as well as from exit interviews, will yield even more effective programs in the future. The true success of the program will be measured over the next several years as Quest students are tracked through their college careers.

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Robert Green is the Undergraduate Coordinator for the College of Engineering at Mississippi State. He works with undergraduate students throughout their college careers and manages the college's Computer Initiative which mandates all students have a computer. Prior to this position Mr. Green was a research engineer with the Diagnostic Instrumentation and Analysis Laboratory at MSU. He is currently President of the Mississippi Engineering Society.

ROBERT P. TAYLOR

Bob Taylor is the Associate Dean for Academics and Administration in the College of Engineering at Mississippi State. He is also a professor of Mechanical Engineering and has many years of experience as both a teacher and researcher. Dr. Taylor is responsible for the undergraduate and graduate academic programs and works directly with the graduate students on college level academic matters.

TERESA B. SAPPINGTON

Teresa Sappington is the Outreach Coordinator for the College of Engineering at Mississippi State University where she develops and manages numerous programs to encourage interest in engineering, science, and math in K-12 students and teachers. As a former secondary school science teacher, Ms Sappington understands the difficulty of keeping students interested in these fields and is able to directly relate to the teachers.

LESIA L. CRUMPTON-YOUNG

Lesia L. Crumpton-Young is the Associate Dean of Engineering for Research and Outreach at Mississippi State University. She is an Associate Professor of Industrial Engineering and is active in ergonomic and human factors research. Dr. Young is responsible for the development of research and outreach programs for the college and has also helped develop a mentoring program for new faculty members.

A. WAYNE BENNETT

Wayne Bennett is the Dean of the College of Engineering at Mississippi State. Dr. Bennett has placed a strong emphasis on the education of the total engineering student including the development of communication and teamwork skills. He was instrumental in starting a technical communications program in the college and in placing an even stronger emphasis on outreach to the community, engineering research, and the recruitment of high quality students.