

# **Academic Summer Enhancement (ASE) Program**

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**Abstract-** *Academic Summer Enhancement (ASE) Program* is an intensive residential four-week orientation and math review of pre-calculus concepts. It is designed for those African American, native and Hispanic students who have chosen Engineering as a major, but are not prepared for first-year college calculus. Typically, those students assigned to any of Penn State's 17 campus colleges fit this description as well as some who attend Penn State's main campus at University Park. The program accommodates a maximum of 24 students and is offered in the month of July, prior to the fall of the students' first semester. These students review pre-calculus, entry level Chemistry, and English to ensure success in first year courses they will take in the fall. Students also receive professional development training with a field trip to a corporate location.

This research compilation was collected over three student cohorts including:

ASE 2002, a one-week pilot program

ASE 2003, a four week full program as described above

ASE 2004, a four week full program.

Data includes retention information for each cohort and the average fall grade point average (GPA) of each cohort immediately after the summer bridge program. In all cases, the retention rate and fall GPA higher for ASE participants than for underrepresented non-participants assigned to campus colleges. To date this is the only Penn State program that provides summer bridge services to campus college students which annually includes over 50% of each incoming underrepresented first-year class. In 2001, the retention rate for this group in the third year was at 13% in the College of Engineering. The overall retention rate for *all* underrepresented engineering students starting their third year at University Park was 37% and 53% for majority students. Currently, underrepresented students compose 5.1% of all undergraduate engineering students at all campuses. Our goal is to increase this figure by affecting the retention rate of campus college students.

## **Introduction and History**

Each year, The Pennsylvania State University (Penn State) College of Engineering assigns over half of its incoming freshman class to one of the 17 campus colleges across the Commonwealth. The campus college students are expected to be reassigned to the

main campus at University Park (U. P.) two years from the date they begin at their initial campus colleges. In 2001, 87% of Underrepresented students either choose to transfer to other campus colleges (exiting the engineering program), other universities altogether, or they decide not to pursue their bachelor degrees. Approximately 13% of underrepresented engineering campus college students continue at U. P. in their third year. The overall retention rate for all underrepresented engineering students starting the third year (U.P. and campus colleges) is 37% and 53% for majority students. Underrepresented students compose only 5.1 of all undergraduate engineering students at all campuses.

*Academic Summer Enhancement (ASE)* is a month-long summer bridge program designed to ease the transition experience for racially underrepresented (African American, native and Hispanic) engineering students assigned to The Pennsylvania State University (Penn State) campus colleges. ASE was designed to address the following challenges and observations that are presented when working with this group of students:

1. First-year students at remote campuses are unfamiliar with U. P. and have few contacts there. Most do not qualify for the existing engineering bridge programs because of math level and campus college assignment.
2. Campus college students have little access to MEP services typically provided for U. P. students.
3. Campus college students are retained at a lower rate than those who began at U. P.

The purpose of ASE is to create a welcoming and supportive environment allowing these students to make a smooth transition to U. P. after completing the first two years at the campus colleges, and continue on to graduation. This report covers the evolution of the ASE program, the experimental ASE 2002 pilot program, supporting research, program description of the refined ASE program, data collection and conclusions about the effectiveness of the ASE program as a long term retention program.

## **Pilot Program**

In Summer of 2002, the College of Engineering and the MEP sponsored a week long pilot of the ASE program at U.P. for the incoming campus college first-year students. The pilot enabled MEP to create and modify a model for this particular group and its unique challenges prior to beginning a larger, longer program. Topics covered in this week were study skills, a research project, and “college survival” or an introduction to the expectations of the college culture. Students were selected from a list of students who had:

- accepted the Penn State offer of admission
- typical SAT math scores of 450 to 550
- been assigned to a campus college (most students)
- identified engineering as the desired major
- an assigned science predictor of less than 2.75 (This figure is a university “prediction” of the student’s anticipated college GPA. It is based on a formula that considers high school GPA, class rank, SAT scores and other factors.)

Students were invited to apply via mail (U.S. Post), electronic mail, and phone. Twenty students participated in summer 2002, 18 were assigned to campus colleges for the fall, and 2 to University Park. Students and parents were greeted at University Park with lunch and an orientation addressing the concerns of both. Students lived on campus with 4 engineering student program assistants in the residence halls. Students lived on the same floor, divided by gender, and had the same curriculum that ran from 8:00 a.m. to 9:00 p.m. Morning and early afternoons included study skills topics. Engineering and Penn State tours were done in the afternoon. Evenings were spent at the library and in the computer lab completing the research paper, and PowerPoint presentation due at the end of the week.

This one-week (non-credit) program consisted of an intensive review of study skills as related to mathematics, writing, reading, college survival skills, learning assessments and group work exercises. There was an orientation to campus living and transitioning to off-campus housing. Students were encouraged to work in teams/groups on learning activities. Time was allotted for library research and a group presentation on an engineer or engineering structure of their choosing. Research projects were formally presented on the last day of the program. By the end of the week, students left with a complete and updated resume, interviewing skills and techniques, contacts with numerous U. P. minority engineering students, valuable learning strategies, information relating to their engineering majors, and a strong connection with the MEP staff who taught and presented some workshops and events in collaboration with other staff and faculty.

At the end of the program, students presented group research projects, received certificates and completed surveys about the program. All students acknowledged having no idea that college was so much work and did not resemble high school at all. The program changed their expectations of college requirements. Student recommendations for a better program included more intensive math coursework and a longer stay to get acclimated to college living and being away from home.

### **Supporting Research**

Findings in the pilot mirrored the research regarding the elements to be emphasized in a successful program as well as the challenges observed in bridge programs. Retention rates of African American, Hispanic and native students are nationally problematic. This is true at historically black colleges and universities (HBCU's) as well as at majority universities. African Americans are only half as likely to graduate as their white counterparts (Georges, 1999). Lang (2001) lists summer bridges as one of the four most successful retention program types in use, the other three being partnerships, financial aid and enhancement of the multicultural environment. Even armed with this information, the MEP staff found it more difficult than anticipated to convince students to take advantage of the ASE pilot opportunity. This response is also observed in Robert's (1994) examination of summer bridge programs, noting the difficulty students have in overcoming resistance to seeking help or not recognizing that help is needed. There must be special effort to address stigma associated with being in remedial programming.

Robert suggests this stigma and resistance can be countered by building a peer community and small group collaboration.

Those factors which render a program effective are viewed in multiple ways. According to Kezar (2000), the most successful summer bridge programs address self confidence, college expectations, the connection of college and community, validation within the college, family understanding of the process. In addition, research shows that the better the academic high school preparation, the more likely the student is to be enrolled in and prepared for College. Underrepresented students are less likely to receive coursework that academically prepares them for college than their white or Asian counterparts. This is lack of preparation is especially pronounced as it regards math and science (Thomas, 2000). This would suggest that a summer bridge program that enhances or reviews Math and Science concepts will render better prepared students entering those majors. Taylor's (2002) study of the persistence of African Americans on predominantly white campuses suggests that persistence is associated with four specific factors: leadership opportunities, social integration, worth and competence, and ethnic peer attachment. All of these elements should be emphasized heavily within the program and its design. Research also shows that the earlier and longer the orientation program, the more effective (Kleupfel, 1994). Orientation should enforce high expectations of the college experience with follow up after the program. At the end of the program, even a well run program, financial aid is still a critical factor in the retention of underrepresented students (Georges, 1999).

In light of several recent legal cases revolving around the selection processes targeting members of underrepresented groups to receive services, admissions, or funding, Somers (2000) suggests that student selection and program design should be based on those non-racial factors that affect specific racial groups in specific ways. For example, the elements affecting persistence in African Americans are not the same as those factors affecting white students. A few of these elements include student motivation, aspirations, class level, on-campus living, full time attendance. The purpose is to enable the program to withstand potential legal scrutiny should discriminatory accusations arise as they did in the cases of *Bakke*, *Hopwood*, *Taxman* and *Boston Latin School*, who took their challenges to the judicial system affecting affirmative action policies at local and state levels. Similarly, Fisher (2000) focuses on a selection process involving those non-racial elements shown to predict high achievement in African American students which may not apply to majority students. These would include the student's own self concept of personal academic ability, the student's perception of the opportunity of success in college, and social support from parents, teachers and peers.

Per York (1994), typical data collected for measuring retention effectiveness includes the categories: reaction, learning, behavior changes, results (costs vs. benefits). York suggests that retention effectiveness could be more accurately measured if it also included a comparison of first quarter grades with those of non participants, and tracking students to see if survey information is predictive of retention.

In addition to the research, MEP evaluated an existing Penn State summer bridge for underrepresented students, PRE-First year in Engineering and Science (PREF) Program.

Although this program is designed for a different student audience, it has been successful in that its program is 6-weeks in duration, participants are full-time summer college students and receive 6 credits for coursework that includes intensive reviews of calculus, English, physics and chemistry. Most of the students are substantially funded as university scholars. All will begin at University Park campus. Instructors are carefully selected and professional development includes a trip to a corporate site. Success is measured by 14 years of higher academic performances and retention rates than non-participants.

As the final ASE program was sculpted, the research, the pilot and the PREF model were taken into consideration. The program and the resulting data that ensued is described in the next section of this report. The goals of the ASE program are as follows:

- to establish transitional support designed for underrepresented engineering students assigned to campus colleges
- to address academic, social/cultural and professional development of the students
- to provide a formal orientation program to introduce them to University Park and the College of Engineering
- to prevent students' intentions to come to U.P. from getting lost or forgotten
- to increase the retention rate of minority engineering students coming from campus colleges to U. P.
- to increase the academic performance of minority Engineering students at campus colleges.

### **Program Description**

ASE is an intensive four-week orientation and math review of pre-calculus concepts. It is designed for those students who have chosen Engineering as a major, but are not prepared for first-year college calculus. Typically, those students assigned to Penn State campus college colleges fit this description as well as some who attend U. P. The selection process takes place during the spring. Paid admitted students are targeted for advertising this program. The program accommodates a maximum of 24 students. The program is offered in the month of July, prior to the fall of the students' first semester. The goal is for 67% to 75% (or 16 to 18) of the 24 participants to be incoming first-year students assigned to campus colleges, while the remaining students may be those assigned to U. P. This mixture will influence friendships and camaraderie between all campuses during the year. Students scheduled to change assignments from campus colleges to U. P. will have established a reference point upon which to focus for the next two years. Modeled after the PREF program, the ASE program also addresses the academic, social/cultural and professional development of the students.

Academic development begins prior to the students arrival as they take a proficiency exam administered by the Freshman Testing, Counseling & Advising Program (FTCAP). FTCAP placement tests identify the performance level and course placement for math, chemistry and English. The students' first semester schedules are determined by placement test results. After the ASE program, students can choose to retake some FTCAP tests and improve their placement level.

These students review advanced algebra and trigonometry concepts to ensure success in pre-calculus courses they will take in the fall. They also review introductory chemistry and English. It is clear that high school coursework is not uniform across the nation. As a result, the knowledge base of each student varies widely even though students appear to have taken identical math courses. Students have no way to measure this phenomenon prior to taking a college math course and sometimes arrive believing they are ready for college level work. Because the students have the freedom to change or alter their schedules based on their own beliefs about their past academic abilities, regardless of advising, these courses assist in confirming to the student the actual personal performance level that can be expected in the fall. English and chemistry follow a similar format. Students attend courses daily with most time committed to Math. Students are also required to attend evening study sessions to complete homework and assignments. They are encouraged to work in groups where appropriate and assist each other. This ensures that study groups will form easily in the fall. Students receive an indicator of their performance within each subject area. The program includes room, board, course instruction, and materials. Calculators are provided to students on loan from MEP. Students also receive engineering scheduling information, study skills workshops and information regarding the 13 undergraduate engineering majors.

Social and cultural development begins as students arrive with their families to an orientation that reviews the expectations of the students. This is a way to leverage early support of the family. ASE students have four program assistants (engineering upperclassmen) who live with them and provide specialized information to assist them successfully through the program. The program assistant attends some courses with the students, assists in arranging field trips and is available to answer questions students may be uncomfortable asking in a public forum.

Professional development is emphasized throughout the program. Students are expected to complete a resume. Students receive information on business etiquette and are taken to visit their corporate sponsor in business attire. Students are coached on questions to ask and must research the corporation prior to visiting. The corporate visit includes a tour of various industrial venues, an overview of the corporation's products and activities, and opportunities to meet corporate engineering interns.

It is expected that participants will become ambassadors and reminders to others that a four year engineering degree from Penn State is a final destination worth pursuing. To date, there has never been a program, which has provided the proposed services to campus college students within the College of Engineering. MEP provides a variety of additional support to all first year underrepresented students at campus colleges in the following academic year. This would include mentoring, book scholarships, campus college visits and invitations to Engineering Open House events.

## **Data Collection**

Data from ASE 2002, 2003 and 2004 showing retention and academic performance in the first fall semester are shown in the following tables.

**Retention Rates for  
the Academic Summer Enhancement (ASE)  
Summer Bridge Program**

| <b>Campus College First-Year Cohort</b>     | <b>Fall 2002*</b> |     | <b>Fall 2003</b> |      | <b>Fall 2004</b> |      |
|---|-------------------|-----|------------------|------|------------------|------|
|   | #                 | %   | #                | %    | #                | %    |
| <b>2002</b> ASE Pilot* Program Participants | 20                | 100 | 15               | 75   | 11               | 55   |
| <b>2002</b> Non-Participants                | 39                | 100 | 29               | 74.3 | 22               | 56.4 |
| <b>2003</b> ASE Program Participants        |                   |     | 19               | 100  | 19               | 100  |
| <b>2003</b> Non-Participants                |                   |     | 50               | 100  | 41               | 82   |
| <b>2004</b> ASE Program Participants        |                   |     |                  |      | 20               | 100  |
| <b>2004</b> Non-Participants                |                   |     |                  |      | 48               | 100  |

**Group Average First Semester GPA's for  
the Academic Summer Enhancement (ASE)  
Summer Bridge Program**

| <b>Campus College First-Year Cohort</b> | <b>Fall 2002*</b> | <b>Fall 2003</b> | <b>Fall 2004</b> |
|---|-------------------|------------------|------------------|
| ASE Program Participants                | 2.33              | 2.80             | 2.61             |
| Non-Participants                        | 2.27              | 2.35             | 2.43             |

*\* In summer 2002, as a precursor to this proposal, the College of Engineering sponsored a 1-week residential pilot program for freshmen assigned to campus colleges. The students spent the week reviewing study skills and learning what is expected of them in college (as opposed to high school). The ASE 2002 pilot was not math intensive as was the month-long programs of 2003 and 2004.*

Participants are defined as underrepresented engineering first-year students who complete the ASE program and enroll in the following fall as a full time first year student. These students meet the criteria outlined in the pilot program selection process and are assigned a science predictor GPA of less than 2.75. Non-participants are defined as underrepresented first-year engineering students assigned to campus colleges with a

science predictor GPA of less than 2.75. (The science predictor is described in the pilot program selection process.) Data from the ASE 2002 pilot shows that academically the pilot participants' performance was comparable to underrepresented non-participants. Though students spent a week in orientation programming, several of the elements shown to be beneficial in the research and PREF model were missing. (There was little math emphasis. The students had one week to bond with each other or the MEP staff.) The ASE 2002 pilot participants had an average GPA of 2.33. This was only .06 higher than underrepresented non-participating engineering students assigned to campus colleges that year. However, five of these students did achieve a fall 2004 GPA of 3.0 or higher. The ASE 2002 retention rate was at 55% as of the fall of the third year, however, the non-participant rate for the same cohort was similarly at 56.4% over the same time period.

ASE 2003 and 2004 performed well academically compared to non-participants and the pilot group. ASE 2003 had a group average GPA that was .45 higher than non participants. Six students achieved a GPA of 3.0 or higher. In fall 2004, one year later, the retention rate for ASE 2003 remained at 100%, compared to 82% for their non-participating counterpart. ASE 2004 also performed academically better than non-participating first year students in the Fall. The group average was 2.61 with 9 students achieving a 3.0 or higher. The inclusion of math, English and chemistry review is evident when comparing the ASE 2003 and 2004 groups with the pilot group. There was a marked difference in the academic performance.

## **Conclusion**

It remains to be seen how effective the ASE program in its final design will be in retaining students through the third year. It also remains to be seen how many participants continue in the engineering major to graduation. The 2002 pilot foreshadows a positive outcome. Of the 20 participants of the ASE 2002 pilot program, 11 remain enrolled as of fall 2004. Of these, 5 continue in engineering at University Park, and 6 in other majors. Within this group, that is a 55% retention rate overall and a 25% retention rate for engineering students in that group compared to 13% for all underrepresented engineering students entering University Park from assigned campus colleges in 2001 before the ASE pilot program evolved.

Overall, the ASE Program has proven to be effective in improving first semester grades and retention over a two year period. It is expected that the math-intensive version of ASE 2003 and 2004 will render even stronger results than the pilot in Fall of 2005. Fall 2005 data will confirm whether or not ASE is effective as a long-term retention tool for underrepresented at-risk students in the Penn State College of Engineering.

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