

Impact of Peer Mentoring on Freshmen Engineering Students

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Introduction

Numerous studies document the importance of educating new students about their new academic environment and accompanying new academic, social, and personal expectations [1 - 5]. Indeed, helping students anticipate and understand life changes can help the university realize a significantly higher first-year student persistence rate [6]. For many years, university programs have addressed these student transition issues via the implementation of pre-college orientation programs that include:

- Raising the knowledge level of first-year undergraduate students regarding lifestyle changes that can occur while moving to a campus environment [7]
- Developing an awareness of those services offered by the university that are crucial to a productive adjustment process [8].
- Expanding new students' perception and understanding of changes in status, residence, relationships, authority, success, and failure through interactive discussions and through written materials that clarify success strategies [9].
- Providing "hands-on" opportunities for students to develop and reinforce a positive attitude toward their first year at the university.

At the University of Pittsburgh, we use our School of Engineering summer orientation programs to illuminate and address such transitional issues. Crucial to students' successful transition is our immediate emphasis on ensuring students are familiar with advisors and counselors, who will be important to their first year experience. During the summer registration process, students meet with counselors and advisors who provide them with interaction and information well beyond signing up for first-semester classes. This student-advisor introduction and interaction initiates the establishment of a student's new "family group," easing the transition away from the immediate family. This initial expansion, during orientation, of a student's "family" is continued in the fall semester in ENGR 0081 as peer mentors take on essential roles in guiding students through the academic and personal challenges of the

freshmen year. In this paper, we provide an overview of our freshmen student transition and retention program; we then concentrate on the procedures and functions of an essential aspect of successful transition and retention—our peer mentoring classes.

ENGR 0081– Freshmen Seminar

A required course for all freshmen engineers, ENGR 0081 explains university policies and procedures to students [11]. While ENGR 0081 is a zero credit class, freshmen do receive a pass/fail grade based on attendance and participation.

In the past, ENGR 0081 was a typical set of "introduction to engineering" lectures. Once a week, the entire freshmen class would gather in the School of Engineering auditorium and hear a lecture on a particular field of engineering. There would then be lectures on study skills, co-op, and study abroad opportunities, and on the Spring registration process.

By student accounts, the program was "very cold" and the students' lack of respect for the course resulted in them ignoring most of the material presented in the sessions. Clearly, the course needed to be made more "active"; while the information traditionally presented on ENGR 0081 was and is important to the students, a way of making that information more high-impact and a way of making the course seem more immediately useful and relevant to students was needed. In the Fall semester of 2001, a new ENGR 0081 was enacted and linked to the first semester Engineering Analysis course ENGR 0011[10]. ENGR 0011 is a required three credit course that teaches the basic analytical, programming design, problem solving, teamwork and communication skills that are used by all engineers. By linking the academic and advising courses, ENGR 0081 would now be a course in which students attended lectures on university procedures, on the various engineering fields, on study strategies, and on co-op and travel abroad opportunities, but it would also be a course that reinforced the supportive "extended family" introduced during fall registration and orientation.

Abstract

The transition from high school to college can be very difficult for many students. At the University of Pittsburgh School of Engineering, we have developed a freshmen seminar and concurrent system of mentoring that addresses the changes and difficulties students experience during this transitional time. All first-year University of Pittsburgh School of Engineering students are required to register for and attend a large group lecture course, Engineering 0081 Freshmen Seminar, that addresses various aspects and issues of first-year academic and social life. Each first-year student is also required to select and attend a small-group class that is directed by a sophomore, junior, or senior peer-mentor. This paper details how the small-group, peer-mentored classes are an essential aspect of the success of the large 0081 Freshmen Seminar. The paper will discuss what the peer-mentoring classes involve, what these classes facilitate, and how they contribute to successful transitions from high school life to the first year of university life, and how this successful transition, in turn, contributes to a student's ongoing engineering school success.

Index Terms – Freshmen advising, peer mentoring, transition issues.

Via required weekly small-group mentoring sessions, students would have an experienced engineering student—their group mentor—to help them navigate and understand the expectations, problems, and possibilities of their first year at the university. Students would also have the other freshmen in their mentoring groups as an immediate social and support network.

From Fall 2001 to the present, University of Pittsburgh freshmen engineering students have experienced their freshmen seminar as a once-a-week large group lecture presented by engineering faculty, advisors, and program directors, and as a once-a-week, small-group class led by a sophomore, junior, or senior peer mentor. With this design, ENGR 0081 has established and maintained two main goals:

- Provide immediate and ongoing peer mentor support to assist students in a smooth transition from high school to college
- Aid students in successfully continuing their engineering education beyond the freshmen year, including facilitating a well-considered identification of their engineering major

ENGR 0081: Lecture component

The syllabus of the ENGR 0081 lecture sessions looks basically the same under both the new design and the old design. The major change is the integration of the curriculum where we link assignments from ENGR 0011 into ENGR 0081 (see Figure 1). The ENGR 0011 assignments are a new, extensive, writing and communication across the curriculum component, where students are required to

research their field of engineering. Thus, the lecture component of ENGR 0081 now has an academic component, and the students have a reason to listen to the various presentations given throughout the seminar. Sessions that students previously claimed were “boring” have been reoriented to contribute to mentoring group activities and to the “hands-on” research and writing assignments that comprise a significant, essential and graded element of the ENGR0011 Engineering Analysis course.

For example, students are required to write (and, by and large, seem to very much enjoy writing) a paper on the field of engineering in which they plan to specialize. A significant part of the information students must obtain for this paper comes from ENGR 0081 talks given by representatives from our various engineering departments, as well as talks given by Career Services. This information is combined with library research towards each student’s submission of a paper that details what engineers in that student’s prospective field actually do. Each student must also investigate and comment on how and why this particular department and field is a good “match” with the student’s interests and goals. Thus, midway through the freshmen year, the active integration of ENGR 0081 and ENGR 0011 allows students to explore and assess their prospective majors. By the time a student meets with her advisors to declare her major, she has listened to talks by instructors and other professionals in that field, has heard the preparation-for-employment views and strategies presented by Career Services, has researched a variety of publications

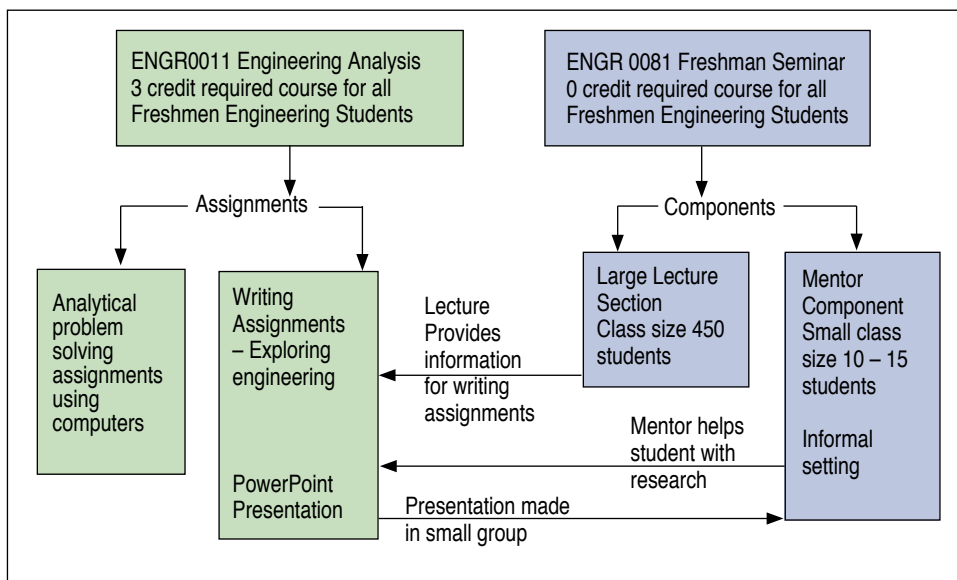


Figure 1 Connection Between ENGR0011 and ENGR 0081

about and from the field, and has incorporated all of these into a paper that also involves her own assessment of how her interests and goals meet the requirements and realities of that field.

In these ways, the talks presented in ENGR 0081 have become more immediately relevant to students, by explaining other academic requirements, such that the connection between the lectures and students' actual academic and career goals has been reinforced. However, even with the improved dynamics of ENGR 0081, as a meeting of 400+ students and one or two speakers a week, there was still a gap between the important information presented and the student understanding and appreciation of the usefulness of all the topics covered. Thus, the small-group mentor sessions are designed to address this problem by providing an upper class mentor to explain the significance of the material presented.

ENGR 0081: Mentor component

The concept behind the mentor component of ENGR 0081 is to create a "friendly environment" in which students can feel free to express their feelings and concerns while receiving academic and extracurricular support and information, all in an informal setting. To accomplish this we have designed small classes (10-15 students per mentor) that initiate a close bond between the freshmen students and their mentors. We did discover a similar program that use faculty instead of students as the leaders of the small groups [12]; however, we felt that building a student/student relationship would be more valuable in anticipating and addressing various transition issues, and in helping a student pursue his/her academic career. The small group setting provides the opportunity for a personal relationship to develop between the students and their mentors; students also have the opportunity to quickly get to know a small number of their classmates in a supportive, relatively informal setting.

From billiards to football to Italian American culture, each mentoring group has its own non-academic theme. While discussing and planning activities around these themes, mentors are simultaneously addressing such topics as university resources, wellness, diversity, time management, teamwork, test preparation, stress management, co-op opportunities, and choosing a major. In the small group mentor meetings, such topics are seen by first-year students not as lectures that may or may not be relevant, but as an integral part of the first-year

(and, ultimately, beyond) academic and social experience. Having peer mentors, just a year or two older than the freshmen, regularly talking about such topics in a relaxed setting that also incorporated topics such as: sports, movies, card games or music, allows students to experience and reflect on ENGR 0081 topics as an actual part of freshmen life.

Each mentor is free to plan their own seminar and what additional information they wish to add to their sections. However, to maintain a minimum similarity between all the sections, we require that each mentor address the following topics at some point in the semester: Getting Familiar with Pitt; Managing Your Time; Diversity Seminar; Study Skills and Your First Tests; Spring Course Registration and Using PeopleSoft; Working Effectively with Professors and Advisors; The Party Scene; Students' Choices; Reviewing Your Goals; and A Look Forward. As a final requirement, each student delivers an ENGR 0011 PowerPoint Presentation.

The small groups also have a role in the integration between advising and academics. As part of the ENGR 0011 writing assignments, the students must use the library to collect data for their papers. Thus, the mentors use one class period to take the students on a tour of the library and help the students use the library for their writing project. Since each mentor had to complete this same writing assignment when they were freshmen, they can relate their own career path choices, and provide additional assistance to the freshmen as they choose their major. A final academic requirement of the ENGR 0011 course is to introduce each student to public speaking. Thus, the writing assignment includes a requirement for each student to give an oral presentation and poster of their research findings. This presentation is done in the small group ENGR 0081 class, see Figure 1.

Small Group Classes: Themes and Goals

During the summer registration period, incoming students are given a booklet with a list of the various themed mentor classes. Each class description includes information on the mentor and a short description of the activities planned for the class. With a freshmen class of 450 students and a limit of fifteen students, we offer over thirty mentor sections each fall semester. Listed below are samples of the peer-mentored, ENGR 0081 small-group class themes offered over the past several years.

- **Adventure Group/ Discover Pittsburgh**

The adventure group explores the campus and surrounding neighborhoods in a way that allows students to learn about their new “home away from home.” Students visit local neighborhoods and restaurants and attend cultural and sporting events.

- **All In**

A “no money bet” opportunity for students to sharpen their poker skills and strategies and learn new games.

- **Basketball**

This group meets in Trees Gym to play pick-up games of basketball, and also sets up 3 on 3 tournaments.

- **Billiards**

Participants sharpen their billiards skills through weekly games and tournament play.

- **College Life**

College isn’t all about studying and going to class. In this seminar, mentors discuss and visit some of the better places to “hang out,” eat, shop, meet people, and even party, responsibly, of course.

- **Exercise and Fitness**

This class provides a basic understanding of various fitness techniques and teaches students weight training, basic nutrition, yoga, and meditation.

- **For Commuters Only**

This class is tailored to commuting freshmen dealing with traveling back and forth and balancing home life with on-campus life. Information and activities are geared towards minimizing the stress and maximizing the fun of commuting.

- **Freshmen Student Council / Freshmen Engineering Student Council**

Freshmen Student Council (FSC) is an organization that is run entirely by freshmen, with some help from previous officers. This class sets up and supports freshmen involvement with the Engineering Student Council (ESC).

- **Getting Involved**

This class is devoted to helping freshmen

find activities that suit their academic and personal needs and interests. The class helps students interested in extracurricular activities to participate fully without compromising their coursework.

- **Italian American Culture in the United States**

In this class, students research and learn about how Italian American culture is portrayed in movies, books, and on television.

- **Investigating Study Abroad Options**

This class helps students explore study abroad options, including what programs and services the university and the School of Engineering provide, and when and how to begin applying for Study Abroad programs.

- **Music and Culture**

Students who enroll in this class enjoy an opportunity to share the music they love and to experience music they may not be familiar with. Discussions of music history and the place of music in culture are also part of this class.

- **Pitt Arts**

This class is designed for those freshmen that are looking for art and culture in Pittsburgh. Through campus programs like PITT ARTS students can experience, at no cost, a wide variety of city-wide cultural offerings.

- **Playing Sports**

This sports and activities class is a mixture of attending sporting events, watching televised sports, and playing a variety of sports.

- **Returning to Childhood**

In this class, students play the board games of their childhoods, including Sorry, Mouse-trap, Clue, and Trouble.

- **Volunteer Pittsburg**

In this class, the mentor and students volunteer their time and service as they participate in projects to improve the Pittsburgh community.

As noted earlier, a peer-mentored small group addresses more than its stated theme. The class themes are a way for freshmen to come to know their mentors and to get to know other students who share similar interests. The

classes also provide mentors with a small-group, informal setting in which to reintroduce and reinforce the significance of the topics covered in the large lectures of ENGR 0081. Mentors know that they are responsible not only for planning an evening of playing Mousetrap or watching Monday Night Football but for assisting the freshmen in their transition to college. Mentors make and take opportunities during group meeting times, activities, and office hours to talk with students about diversity, about physical and emotional wellness, about responsible choices, about study skills and time management, about career choices and opportunities. A small-group class of playing Texas Hold 'Em or of making mixed CDs is not all about poker or music; with the mentor's guidance, small group classes are always also about having the best academic and overall experience during the freshmen year and beyond.

What is a Mentor?

The mentors are a very diverse group of undergraduate upper class students. They cover a broad range of engineering majors and are involved in various activities the university has to offer. Many of the mentors have co-op experience, have studied abroad, participate in intramural sports, and are officers in the engineering student council and/or the student chapters of professional engineering societies. All mentors have successfully walked the path of a first year University of Pittsburgh engineering student. These individuals have "been-there-and-done-that," and have a strong desire to share the valuable lessons they have learned along the way.

Mentor Job Requirements

Obviously, the main requirement of each mentor is to plan, facilitate and lead his or her class. However, there are also a number of responsibilities, requirements, and standards each mentor must fulfill. Table 1 gives a list of responsibilities for each mentor. Prospective mentors are required to familiarize themselves with these responsibilities before even applying for a mentoring position. The time requirement for the job is five hours per week per class. This includes one hour of class, one hour of preparation time, one hour weekly meeting with faculty/staff, and two hours of office hours. Students selected to be mentors are paid the basic university rate of between \$7.00 – \$8.00/hour based on their experience. Mentors are allowed to teach up to two sections (10 hours per week).

In addition to the stated job responsibilities, there are a number of personal traits and academic standards that each mentor must meet. These are given in Tables 2 and 3.

Mentoring and The Transition Process

Mentoring is often compared to coaching. In fact, many mentors do find that their role as mentor takes on the task of coaching the students through the various difficult transitions from high school to college. Making transitions is an integral part of life. It is important that all participants in the student's life, including parents, faculty, and university staff, understand that during the transition from high school to college, students often experience a sense of loss for what has changed in their life or despair over relationships that have changed or have been replaced [13]. The first year college

- Design, plan, and lead all group activities in and outside of class
- Ensure all ENGR 0081 topics continue to be an integral part of the class
- Work closely with freshmen advisors in disseminating registration and scheduling information to all first year students
- Hold at least two office hours weekly in the Engineering Student Services Center
- Meet once a week with the ENGR 0081 faculty coordinator
- Work with the faculty for ENGR 0011; keep students on task for the ENGR 0011 projects, papers, and presentations
- Keep all necessary records—attendance, budget, class plans, etc.

Table 1. Responsibilities of a Mentor

- Mentors should be outgoing and be empathetic in their approach to others.
- Mentors must have the ability to listen.
- Mentors must be especially respectful of and responsive to issues of diversity.
- Mentors must be adroit at working with a variety of personalities.
- Mentors should be willing and able to exchange constructive feedback with students, staff, and faculty.

Table 2. Mentor Job Requirements

- A minimum 2.5 Cumulative Grade Point average must be maintained by each mentor.
- A mentor must have completed the first year at the University of Pittsburgh.
- A mentor must be confident in his or her decision to pursue engineering as an undergraduate degree.

Table 3. Mentor Academic Standards

adjustment embodies both a loss experience as well as an exciting set of new opportunities [14]. These changes can profoundly affect the students' first year experience, including their performance in the classroom and their desire to stay in school. Major changes are generally recognized within three major areas: academic, family, and personal.

Mentors and Academic Transitions

The first transition that many engineering students encounter is within the academic environment. As a student moves from high school to college he/she is channeled through the high school's highly structured daily schedule of planned activities. Upon entering college, the same student is now largely in charge of creating and implementing his/her own schedule, a schedule that is typically different each day, and that leaves significant "free time" between classes.

Classes themselves may not adhere to a typical high school 8:00-4:00 schedule. Students are faced with new time management challenges as they find themselves having one class on a given day ending at 10:00 a.m., with the next class that day not beginning until 6:00 p.m. "Free time" suddenly looms large, appealingly so, but problematically, too, as students

must figure out how to schedule studying, socializing, and extracurricular activities.

In addition to taking responsibility for the productive use of class time and "free" time, first year students are experiencing academic and personal situations that may be very different from what they were familiar with in high school; freshmen must negotiate the planes of academic and administrative hierarchies, must locate buildings, classrooms, labs, and offices; must realize that the primary responsibility for keeping up with deadlines is theirs; and must realize that instead of being the top student in their senior class, they are now studying and living among many top students.

Previous studies indicate that a student's first semester success can lay the groundwork for engineering program completion and/or degree attainment [15 & 16]. Given that this first semester is also a time of such change for students, it becomes essential that appropriate support systems be activated during the very first interaction students and their families have with the university. Several positive outcomes have been realized when students and parents, from the very first, have ample time with members of the university community who will be offering support through the transitional first semester. Studies show that the positive outcomes facilitated by immediate and ongoing sup-

port of first-semester freshmen include:

- Students developing more realistic expectations for their upcoming year; thus the potential for high levels of frustration is minimized as students envision realistic challenges and accomplish realistic goals that translates into lower frustration for ideals unrealized [17].
- Productive student/parent exchanges: the level and nature of support allows first-year students to feel they are on a more equal footing with adults (and adult behaviors), facilitating mature, productive communication between students and their parents' perceptions as relative equals by the university, and are therefore more likely to become engaged in ongoing open communications [18].
- Maximum focus and productivity through a student's academic career; early awareness of campus resources strengthens and develops a student's potential for multifaceted success through a four-year college program [19].

Given the three outcomes listed above, it can be hypothesized that a mentoring program that attends to these needs of the students will assist in creating a more successful academic transition experience, which, in turn, contributes to academic success throughout a student's academic career.

Mentoring and Student-Family Transitions

From the 1st week of classes on, students must figure out how and when to do laundry, when and where to eat; how to negotiate shared living space, study space, lounge space, and bathrooms; how and where to relax; how and where to get exercise; how to manage time; how to manage money; and how to manage freedom from parents and guardians. Being away from home for the first time is also a period when students typically test their new-found freedom, and begin apprehensively enjoying their challenging new environment. Simultaneously, parents may be either celebrating the departure of their child or trying to convince the student to come home every weekend. Additionally, parents might encourage the student to make new friends, or, afraid of losing their child, parents might interfere with the student's making strong university-related connections.

In our small-group mentor-led classes, mentors discuss with students how the entire family is going through a change and is experiencing

both excitement and sadness. Mentors emphasize that it is okay and natural for the student to feel homesick and have doubts and questions about living away from home. An important aspect of mentoring first-year students is encouraging them to communicate on a regular basis with their families, contacting their families with questions and concerns or with news of achievement and success.

Our mentoring program helps students regularly hear from and talk with a "transitional adult"—the mentor who has some of the authority and wisdom of a parent, but who is also a student who has just a year or two ago negotiated the new demands and freedoms of college life. With mentors facilitating communication between themselves and students and with mentors facilitating a student's sense of her place among other students and within the university, a first-year student can feel confident in expressing herself and asking questions "from one adult to another" when she communicates with her family. The family, in turn, is likely to reciprocate by seeing and treating the student as an adult. Via the mentoring program's attention to communication, parents' confidence in their son's or daughter's maturity is reinforced, and the likelihood of the student thinking and acting with confidence and maturity is reinforced as well.

Our mentors can help the students discover they are able to confidently share relevant university information and new college experiences with their parents. To help assist the parents to become an active part of this transition process, we also have a separate parent component to the department web site where we post important information and post a monthly newsletter to help connect the parents with campus and their students' life. Since parents are important to a student's perception formation, it seems likely that open communications can lead to realistic expectation formation between students and their parents [22]. The assumption is that a satisfied student equals a happy family, which translates directly into the efficacy of the family's transitional success.

Mentors and Personal Transitions

Being at a university for the first time often means being a newcomer in a strange and possibly lonely environment. Some days a student may want to get "back home" just as fast as she can fly, run, walk, or drive. There are likely to be days when a freshman feels he cannot stand one more day in the residence hall, one more hour with his roommate, one more

class with this professor or with that teaching assistant, or one more night of homework especially. Students must deal with issues of alcohol consumption, drug use, and sexual activity, without a parent or guardian imposing immediate controls. In the first months of university life, students may struggle to keep up ties with friends “from home,” while establishing new friendships, romantic relationships, and social groups. Such social and personal issues can consume most of a first-year student’s physical and mental energy, seriously threatening his focus on academic expectations and career goals.

As students face personal transitional challenges such as these, a mentor’s role as an advisor and as a link between students and appropriate support resources is crucial. Since mentors interact with a small group of students and get to know those students from the very first days of their campus experience, a small-group mentor can be alert to and can alert students to situations that seem confusing or difficult to control. Mentors have a knowledge of the resources that are available and the training to recognize when a student might need a particular resource. As a “transitional adult,” a mentor has both the authority, knowledge, and credibility to provide initial advice, and to steer a student to the Learning Resources Center, to the Counseling Center, or to advisors and faculty who might best support a student through a particular first-year personal, social, or academic challenge. A mentor’s own experience with first-year transitions provides students with valuable perspective on what may seem to be insurmountable personal transitional issues. A mentor’s knowledge of appropriate university resources facilitates an important link between students and those resources. Freshmen who can gain perspective on personal issues and who have experienced the usefulness of university support resources are that much more likely to continue to keep a healthy, productive perspective, and to seek help when needed throughout their academic career. Thus, a mentoring program that provides such attention to personal transitional issues is a program that has benefits long past the first semester of the freshmen year.

Mentor Selection Process

The selection process begins with a posting of the job in the previous spring semester to all engineering student organizations and on announcement boards within each department in the school. With the class size limit of fifteen

students, we typically will offer thirty mentoring sections each fall. Some mentors will facilitate two sections, while others will only want one section. Thus, each year we hire approximately twenty students to act as mentors.

From the 40 – 50 applications each year, the Freshmen Program must select mentors who demonstrate, from the start, an ability to assist others through transitional challenges. An important element in the application process, then, is an article each mentor applicant must write, discussing a time when the applicant mentored or coached someone through a difficult situation. The article must detail the following:

- Explain the situation in which the applicant acted as mentor
- Explain the approaches the applicant used within the situation
- Detail the outcomes of the situation
- List the qualities a successful mentor possesses and enacts
- Detail the transferable skills already developed that would make the applicant a great choice to mentor first year engineering students

Each applicant must also provide two character references, a description of the topic of their mentoring class, and a list of activities they might include in the class. Once all these elements are submitted, each applicant is interviewed by members of the Freshmen Program staff. All interviews include questions and points similar to the following:

- Describe the leadership experiences you have had.
- How do you feel about standing up and speaking in front of a group of freshmen?
- How do you imagine facilitating conversation, when a group of freshmen seems reticent or skeptical?
- How would you approach a student who makes it a point to give you a difficult time in class?
- Expand upon your essay. How might you transfer what you did and what you learned in that situation to your particular proposed mentoring class?
- If a student in your seminar were having a difficult time choosing a department, how would you assist that student?
- If a student came to you saying he wanted to transfer out of engineering, how might you guide that student?
- If a student came to you with concerns that another student in the group was having

serious emotional problems, how might you respond ?

- You experienced the mentoring program your freshmen year. Do you have suggestions for increasing the impact and results of the program?

Once the interview is complete, the applicant is judged on the following abilities:

- What are the applicant's abilities to relate to other students?
- What were the applicant's reactions to the responsibilities as a freshmen mentor?
- What are the applicant's overall apparent motivation and enthusiasm?
- What was the quality and creativity of the applicant's ideas and plans?

We do not use gender, race or any other variable like this in the selection process, yet each year the final distribution of mentors on average tends to reflect the general student population. We have also found that each year we will have more than one mentor from each of the different engineering departments.

The final step in the process is a training workshop held the week before classes start. This training is run by the Engineering Student Services Center advisors who fully engage the mentor trainees in such topics as:

- How to be a great engineering student and have an enjoyable social life.
- How to facilitate student involvement in university and community organizations.
- How to direct students to appropriate university resources.
- How to model and facilitate successful interaction among students in a diverse student body.
- How to develop a manageable course schedule.
- How to keep up with procedural details and requirements, such as add/drop and registration and credits.

The application and training process for mentors, then, takes a considerable investment of time and energy—time and energy from students who are simultaneously carrying or preparing for a full academic and often co-op or work schedule. We have found that students who are willing to complete all steps in the application and all steps of the training are students who make strong mentors. One fact that supports this conclusion is that we have never had a mentor quit during the fall semester.

Mentoring Program Assessments GPA, Retention, and the Mentoring Program

The mentor program has had a significant impact on the retention and performance of the freshmen. Table 4 lists the academic results for the end of the first semester for the past twelve years. The listed year corresponds to the fall semester, e.g., the year 2000 is for students starting in August 2000. The table lists the percent of students who achieved honors or who were placed on probation. The table also lists student GPAs. The data shows that the performance of the freshmen has improved since the mentor program was created. The percentage of students achieving first semester honors (above 3.5) has increased, the number of students on first semester probation (below 2.0) has decreased, the number of students with a GPA below 1.5 has decreased, and the overall GPA has increased by almost a half a point (C+ to a B-).

The study has also provided valuable information regarding the transfer population. The 12.8% transfer out value consists of two parts: 1) transfer to another program within the university and 2) students who leave the university. Information easily available to students through the mentoring discussions that reinforce ENGR 0081 topics allow students to learn about a variety of engineering-related sciences. Thus, students who do decide to transfer out of engineering have a better sense of where they want to go, and why they want to transfer to that field. Over the past few years, fewer than 2% of students transferring out of engineering leave the university; most students transfer out to other University of Pittsburgh schools and programs. While the transfer rate before and after the implementing of the mentor program may appear to be the same, looking at why these students are transferring out of engineering shows that it is not because they are failing within the engineering program. Rather, over the freshmen year, these students have more clearly realized just what academic and career paths they want to pursue. We do not have data prior to 2000 so an exact delta change is not possible, but based on experience from the advisors the percentage of students leaving the university prior to 2000 was larger than 2%. Retention and transfer data, then, strongly indicate that the mentoring program may increase student retention within the University and contribute to retention of students who transfer out of our School of Engineering.

| | 1997 | 1998 | 1999 | 2000 | Before Average |
|-------------------------|--------|--------|--------|--------|-------------------|
| # Fall Term Starts | 329 | 366 | 390 | 407 | |
| Transfers Out | 7.60% | 8.74% | 9.74% | 14.99% | 10.3% |
| Term Honors | 19.76% | 19.40% | 20.26% | 24.32% | 20.9% |
| Term Probation | 20.36% | 16.94% | 20.00% | 21.62% | 19.7% |
| Total GPA, 1.5 or below | 8.21% | 8.74% | 12.82% | 10.07% | 10.0% |
| Average GPA | 2.44 | 2.70 | 2.58 | 2.65 | 2.59 |

| | 2001 | 2002 | 2003 | 2004 | 2005 | 2006 | 2007 | 2008 | After Average |
|-------------------------|--------|--------|--------|--------|--------|--------|--------|--------|------------------|
| # Fall Term Starts | 382 | 378 | 394 | 428 | 429 | 403 | 453 | 475 | |
| Transfers Out | 9.95% | 7.14% | 10.15% | 10.75% | 7.93% | 12.70% | 15.67% | 9.89% | 12.76% |
| Term Honors | 22.77% | 34.66% | 27.41% | 33.64% | 27.51% | 31.82% | 39.295 | 33.05% | 34.72% |
| Term Probation | 12.83% | 8.99% | 12.94% | 15.89% | 20.28% | 12.80% | 12.365 | 8.845 | 11.33% |
| Total GPA, 1.5 or below | 6.02% | 4.50% | 7.61% | 7.94% | 12.82% | 9.10% | 2.215 | 2.535 | 4.61% |
| Average GPA | 2.85 | 2.98 | 2.87 | 2.73 | 2.67 | 2.83 | 2.99 | 2.98 | 2.93 |

Table 4. Comparison of Student Performances

To further assess the impact the mentors are having on freshmen, we asked the students to rate how confident they were about making their selection-of-major decision. On a scale of 1 to 5 (1 = not confident and 5 = very confident), the average score for the past three years has been a 4.5. We also asked the students if the mentors had an impact on helping them select a major or provided insight to help them make a decision about their major. Over the past three years, 50% of the students stated the mentors helped them in making their decision about which major to pursue.

Based on data from exit surveys, a major contributing factor to lower retention rates is students' difficulties with the workload increase from high school to college. For example, every year we ask the students to give us the number of hours they spent on homework in high school as compared to the number of hours in college. The median number of hours spent in high school was two hours (35% - 50% of the students each year said they spent zero hours in high school) as compared to 15 - 20 hours in college. The exit surveys also included the following questions:

- Compared to my high school experience, the amount of work I was required to do for the freshmen program was greater.
- I spent the appropriate/necessary amount of time studying for exams.

On a scale of 1 to 5 (1=strongly disagree and 5=strongly agree), the average response to these questions was 4.6 and 3.5 respectively.

Thus, basically everyone thought the amount of work was much greater, but they did not feel the amount of time required to do that work was out of line. In fact when asked, "Based on the total hours, do you feel that the amount of time required of you academically as a freshmen engineer was too great, too little, or just right?", 70% of the students responded that the amount of time was "just right."

To test whether or not the mentors are helping the students make this adjustment to a heavier workload, we asked the students if their mentors had been helpful in navigating through this new workload. For the past three years, 70% of the students responded that their mentors had indeed been helpful in managing the workload of the freshmen year. Student responses thus strongly indicate that the input and support of mentors can be a significant factor in the GPA increase and in students' successfully dealing with the workload demands of the freshmen year.

Assessing Impact on Academic Transitions

To test the impact the mentors are having on the transition process, we asked the students if they experienced stress or difficulty with one or more of the three major transitions—academic, family, and personal—and, if so, did their mentors help with the transition. Table 5 shows the results for the past three years. The first column titled "Had Issues" is the percent of students who stated they experienced transition issues

| Year | Academic | | Family | | Personal | |
|------|------------|----------------|------------|----------------|------------|----------------|
| | Had Issues | Mentors Helped | Had Issues | Mentors Helped | Had Issues | Mentors Helped |
| 2004 | 96% | 88% | 70% | 42% | 89% | 66% |
| 2005 | 96% | 79% | 66% | 31% | 86% | 51% |
| 2006 | 96% | 80% | 58% | 35% | 87% | 60% |

TABLE 5. Students That Experienced Transition Problems and the Mentors Helped With the Solution

in one of the three different areas. The second column titled “Mentors Helped” is the percent of students that stated their mentors helped them with these issues.

The results show that almost all the first-year students report experiencing problems adjusting to either an academic, family or personal change, and the mentors are having a measurable impact on helping students with these transitions. It is especially notable that 96% of the freshmen report having issues with their academic transitions. To get a better understanding of what type of issues they were experiencing, we asked the freshmen to give a description of what was particularly stressful or difficult. Over the last three years, 90% of the freshmen class stated that they were experiencing failure in at least one class.

Because this number was so high, and did not correlate with actual grade data for freshmen courses, we took a closer look at how the students themselves were defining “failure.” Some students, of course, define failure as a grade of “F,” but many have a much different concept of failure. Many students in our freshmen class have always received very high grades; for some of these students, a “B” grade means to them that they are failures. Such students also tend to define themselves as “failing” if they have received less than an A on just one quiz, one assignment, or one test. Thus, a high percentage of students who may, in fact, be doing quite well, who may have a solid “B” average, or who may have received one “C” on an early quiz, immediately define themselves as “failing.”

The survey results show that 80% of the students reporting that they are experiencing failure are using the mentors to help them get through this experience; this demonstrates that the mentors can make a significant impact on students’ academic transitional issues. Our data and experience indicate THAT, MANY TIMES, ALL THE MENTORS need to do is share their experi-

ences and explain that college uses a different grading scale than high school, or that a low grade on one quiz does not destroy the opportunity for overall success. The advice that mentors supply calms the students’ fears, helps them come to a understanding of the difference between grades in high school and grades in college, and allows them proceed with improved understanding, perspective, and confidence.

Assessing Impact on Family and Personal Transitions

As Table 5 shows, most students also report experiencing issues with family and personal transitions as well as with academic transitions. Table 5 shows that the same basic results exist for these two transitions and that at least two thirds of the class are having family transition issues and 90 % of the class is having personal issues. Thus, approximately 90% of the freshmen class over the past 3 years also stated they had a problem with a Personal and/or Family issue that they had to deal with that impacted their college experience. So, not only are the students experiencing classroom performance failures, they are also using the peer mentors to help deal with emotional issues that are impacting their first semester.

This data supports the findings of researchers studying other college majors, in that students’ emotions play a major part in their first year retention, and that mentoring can have a big impact of helping the students through these issues. As a final piece of supporting data that reinforces this concept, we changed the type of mentoring in 2005. In every other year, the mentoring was very structured and the mentors took a proactive role in talking to the students before the students had any issues. In 2005 the mentors took more of a “wait and see” approach, more reactive than proactive. The data in Table 4 shows that the students’ performance in “Term Honors,” “Term Probation,”

“Total GPA,” “1.5 or below,” and “Average GPA” is poorer in 2005. The conclusion we made from this one year of data is the students need a very active approach to mentoring; mentors should not wait until students say they need it; instead, mentors must be proactive and provide the help before students think they need it. We did not want to risk the success of the students so we changed back to the pro-active system the next year. However, even if the data is limited to one year, the fact that there was a noticeable change shows that the type of mentoring can also have an impact on the students.

When the data in Table 5 is sorted by gender and the responses compared for the 6 items listed for each year, no major difference is indicated between the males and females for 5 of the 6 transition issues listed. However, for the Family transition issues the males’ response was twice that of the females when asked if the mentors had an impact. Thus, the males stated that mentoring had more impact on helping them adjust to Family transition issues than the females. When this data was shared with faculty members, they stated that this was the opposite of what the faculty expected. The conclusion we make from this, is, when discussing issues of transitions we must be careful not to stereotype the students.

What Do the Students Think?

To see if the mentors had an impact on

students’ attitudes about college, the survey in Table 6 was given to students at the end of each semester. Responses could range from 1 = Unsatisfactory to 5 = Takes initiative and surpasses basic competencies of freshmen mentor.

The student evaluations of the mentors range from 4.5 - 4.7 on a 5.0 scale, and the comments are all basically very positive. Survey responses show that students initially thought the small group mentor class would be a waste of time, but by the end of the semester their view of the class has changed, and they are glad to have had the experience. As one student said in his course evaluation, “It is the little things that my mentor did that had such a large impact on my first semester success,” or “Not only did I learn a lot of information, but I believed I learned a lot of life lessons as well,” and “The freshmen program gives students a fast but manageable transition from a high school workload to a college level engineering workload, while the mentors provide a good deal of support.”

With the retention success we are having as a result of addressing transitional issues via our mentoring program, we decided to take this study a step further. During the 4th week of classes, we asked students what they thought about their college experience so far. In the ENGR 0011 course, we grouped the students into teams of two and had them conduct a survey among their fellow students as a homework

- 1) Mentor relates well to group.
- 2) Mentor effectively facilitates group discussion.
- 3) Mentor communicates clearly and effectively.
- 4) Mentor listens and guides students to make informed decisions.
- 5) Mentor uses small group class time effectively.
- 6) Mentor provides activities and information to help me be a better student.
- 7) Mentor identifies appropriate options based on my interests and needs.
- 8) Mentor has prepared me for registration.
- 9) Mentor shows concern for the needs of individual students.
- 10) Mentor displays cultural sensitivity.

Additional Questions:

- 11) How would you rate your mentor, overall?
- 12) What’s the overall quality of your mentoring experience?
- 13) Provide comments or suggestions relating to your mentor and/ or the seminar experience.

Table 6. Mentor Evaluation

assignment. They could ask any question they wanted, as long as they questioned a first term student and it addressed an issue they thought was important to success in the first semester. They had to survey at least thirty students with 50% being male and 50% being female. They then had to compile the survey and present it in a graph using Excel. Thus, the assignment was a spreadsheet application for the ENGR 0011 course, but, in addition to assessing how they presented the data, we were looking at what the students were asking each other and at what the responses to these student-generated questions were. We collected over 170 surveys.

We sorted the 170 survey questions into common topic areas and came up with the top 10 issues that were of most interest to the incoming freshmen during the first 4 weeks of the semester. These top ten questions/issues asked by the students were:

1. Do you feel as though you get enough sleep?
2. Has high school prepared you well for college?
3. Do you feel safe on campus?
4. Have you entered into any new romantic relationships since you've been here?
5. Do you feel as though partying gets in the way of schoolwork?
6. Do you exercise more or less than you did while in high school?
7. Are you homesick?
8. Do you like your campus food options?
9. Do you feel more susceptible to doing drugs/alcohol now that you're in college?
10. How confident are you in your time management skills?

Then, in another homework assignment for the ENGR 0011 course we asked the entire freshmen class these top 10 questions. The results are presented below:

1. 70% of students stated they were not getting enough sleep.
2. 66% of students felt high school prepared them for college.
3. 94% of students felt safe on campus.
4. 24% of students have had new romantic relationships
5. 22% of students believed partying is getting in the way of classes.
6. 46% of students reported they exercised the same amount as they did in high school.
7. 19% of students said they were homesick.
8. 57% of the students were happy with campus food options.
9. 41% of the students felt pressure to do

drugs and/or alcohol.

10. 47% of the students were confident with their time management.

Finally, during the eighth week of the semester, after the first round of tests for the semester, we asked the students another set of questions (generated by freshmen program faculty, advisors and mentors). Students responded with "agree," "disagree," or "neither agree nor disagree." The question and notable response summaries appear below:

- Do you think you will need tutoring as the semester goes on?
46% of students now agreed that they will need tutoring this term.
- Do you think a romantic relationship will have an effect on your academic performance?
65% of students agreed that having a romantic interest will impact their academic performance.
- Has help with academic and personal questions and concerns been readily available to you?
51% of students agreed that academic & personal help has been readily available to them.
- Do you prefer studying by yourself or studying with a group?
47% of students did not express a preference for either studying with a group or studying alone.
- Did high school prepare you well for college?
35% of students neither agreed nor disagreed that high school prepared them well for college.
- Are the classes you've had thus far tailored for everyone, regardless of race or gender?
53% of students agreed that classes are tailored for everyone, regardless of race or gender.

This data is significant because it demonstrates how quickly the attitudes of freshmen change. After four weeks two thirds of the class thought high school prepared them for college. After the first round of tests this dropped by almost 50%. After 4 weeks only about 25% freshmen class had the vision to see the connection between parties and romantic relationships and the impact it had on their academic performance. Four weeks later that jumped to 65%. Also look at the top ten questions and review the type of issues the students feel is important. At the start of the semester only 20% of the student issues deal with academics. In a

few short weeks this will change dramatically.

This data supports why it is important to have a mentoring program that is continuous throughout the semester. You can talk to the students in the beginning of the semester and explain all the issues they will experience, but the students likely will not listen because they do not believe you are talking to them. The advice you are giving is for the other person sitting next to them. This all changes within a short eight weeks, and the fact that we have the mentors in the position to provide assistance at the instant it is needed by the freshmen is one of the powerful aids that the mentors provide.

The above data also supports the belief that if you have someone there to help them at the instant they need it, the students will respond, by agreeing they need tutoring, finding the available resources the university has, and realizing that their courses must be tailored for all the different students in the classroom and not just for them. This type of proactive advising is not possible with the traditional 8:00 am – 5:00 pm advisor sitting in an office.

Conclusion

As we have considered how to make the freshmen experience as successful as possible, and how to prepare students for the next years of their academic careers, it has become clear that there are common, significant transitional issues that should be addressed. This study shows that immediate and ongoing mentoring during the first semester of the freshmen year can address these issues and create a positive addition to the freshmen experience. Our research and experience over the past eight years shows that providing maximum support for freshmen requires, in particular:

- Proactive mentoring
- Carefully prepared and trained peer mentors
- Mentor-led small group classes with non-academic themes
- A large variety of themes for the seminar groups
- Weekly assessment of the freshmen by the mentors
- Continuous input and support supplied by the mentors
- Reinforcement, via these small group classes, of information and issues presented in a large-group freshmen seminar
- Ongoing assessment of mentoring initiatives by the staff

Response about the support received dur-

ing the often tumultuous freshmen year continues to be positive. Students find that mentors provide insight, information and advice that they knew they might need and that they didn't think they needed, but are grateful to have had. Mentors provide "eyes and ears" for faculty and advisors, identifying issues and problems that are difficult for faculty members and advising centers dealing with hundreds of students to notice. The mentoring program helps students and parents communicate in ways that ease everyone's home-to-college transitions. A once-a-week opportunity to shoot hoops or talk about a movie or play a game of Clue or go to the ballet with a mentor and a small group of fellow freshmen engineers is, as our program shows, an essential curricular element for a successful freshmen year.

References

- [1] Boyer, E. L. (1987). *College: The Undergraduate Experience in America*. New York, NY: Harper & Row Publishers.
- [2] Chickering, A. W. and Associates. (1981). *The Modern American College*. San Francisco, CA: Jossey-Bass Publishers.
- [3] Coburn, L.C. & Treeger, M.L. *Letting Go: A Parents Guide to Today's College Experience*, HarperCollins Publishers, Fifth Edition, 2009.
- [4] National Research Council. (1996). *National Science Education Standards*. Washington, DC: National Academy Press.
- [5] Tomlinson, C. A. (1999). *The Differentiated Classroom: Responding to the Needs of All Learners*. Alexandria, VA: Association for Supervision and Curriculum Development.
- [6] Shuman, L., Delaney, C., Wolfe, H., Scalise, A. & Besterfield-Sacre, M. (1999). *Engineering Attrition: Student Characteristics and Educational Initiatives*, Proceedings of American Society of Engineering Educators Annual Conference, Charlotte, NC.
- [7] Tinto, Vincent, (1993) *Leaving College: Rethinking the Causes and Cures of Student Attrition*. (2nd. ed.). Chicago: University of Chicago Press.

- [8] Levitz, R., & Noel, L. (1989). Connecting students to institutions: Keys to retention and success. In M. L. Upcraft, J. N. Gardner, & Associates (Eds.), *The Freshman Year Experience: Helping Students Survive and Succeed in College* (pp. 65-81). San Francisco: Jossey-Bass.
- [9] Kenny, M.E., K.G. Rice, (1995) Attachment to Parents and Adjustment in Late Adolescent College Students: Current Status, Applications, and Future Considerations. *The Counseling Psychologist*, Vol. 23, pp. 433-456.
- [10] Dan Budny, "Integrating the Freshman Seminar and Freshman Problem Solving Courses", 2001 IEEE/ASEE Frontiers in Education Conference, Oct. 2001, Reno, NV, pp. F4B-21 - F4B-26.
- [11] Dan D. Budny. "The Freshman Seminar Assisting the Freshman Engineering student's Transition from High School to College". June 2001, American Society for Engineering Education 2001 Annual Conference, Albuquerque, New Mexico, pp. 1-7.
- [12] Dan Budny, "Working with Students and Parents to Improve the Freshman Retention", 2001 IEEE/ASEE Frontiers in Education Conference
- [13] Paul, Elizabeth L., Sigal Brier, (2001) Friendsickness in the Transition to College: Precollege Predictors and College Adjustment Correlates. *Journal of Counseling & Development*, Vol. 79 Issue 1, pp 77-90.
- [14] Weidman, J., (1989) Undergraduate Socialization: A Conceptual Approach. *Higher Education: Handbook of Theory and Research*, Vol. 5, pp. 289-332.
- [15] Shuman, et al, op. cit.
- [16] Budny, Dan D., William LeBold, & G. Bjedov, (1998) Assessment of the Impact of Engineering Courses. *Journal of Engineering Education*, Vol. 87, No. 4.
- [17] Stern, G.G., (1966) Myth and Reality in the American College. *AAUP Bulletin*, 52, 408-414.
- [18] Kafka, R.R. & P. London, (1991) Communication in Relationships and Adolescent Substance Abuse: The Influence of Parents and Friends. *Adolescence*, Vol. 103, pp.587-598.
- [19] Gerdes, Hilary, Brent Mallinckodt, (1994) Emotional, Social, and Academic Adjustment of College Students: A Longitudinal Study of Retention, *Journal of Counseling and Development*, Vol. 73, Issue 3, pp. 281-289.
- [20] Sullivan A., & K. Sullivan, (1980) Adolescent-Parent Separation. *Developmental Psychology*, Vol. 16, pp. 93-99.
- [21] Wintre, Maxine Galander, Mordechal Yaffe, (2000) First Year Students' Adjustment to University as a Function of Relationships with Parents. *Journal of Adolescents Research*, Vol. 15 Issue 1, pp.29-38.
- [22] Pancer, S. Marl, Bruce Hunsberger, (2000) Cognitive Complexity of Expectations and Adjustment to University in the First Year, *Journal of Adolescent Research*, Vol. 15, Issue 1, pp. 38-58.
- [23] Greenberger, E., (1982) The Measurement and Structure of Psychosocial Maturity. In D. McClelland (Ed.), *The Development of Social Maturity*, (pp. 155-189). New York: Irvington.
- [24] Chickering, Arthur and Schlossberg, N.K., *How to Get the Most Out of College*, Allyn and Bacon.
- [25] Hanson, Jennifer, *The Real Freshman Handbook : An Irreverent & Totally Honest Guide to Life*, Houghton Mifflin Co, April 1996
- [26] Tyler, Suzette, *Been There Should've Done That : 505 Tips for Making the Most of College*, Front Porch Press, May 1997
- [27] Marian Edelman Borden, Mary Anne Burlinson, Elsie R. Kearns, *In Addition to Tuition : The Parents' Survival Guide to Freshman Year of College*, Checkmark Books, April 1996.



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