

to provide a positive impact on the quality of the student's educational experience, their professional preparedness, and the college's retention of students. The three-pronged approach of faculty-student advising, interactional advising, and peer mentoring provides the individual student with a complete spectrum of resources they can draw upon for support, information, career and personal development and networking. Such a multifaceted approach is needed if higher education is to broaden its horizons and meet the challenge presented by a new breed of student and an ever changing society. At best, academic advising illuminates the many questions confronting students and assists them in discovering directions for growth and development. It is only through a comprehensive advising program — one which includes communication and information exchanges with faculty as well as fellow students on an individual as well as a group basis — that students can realize their maximum educational potential.

Investigating the Motivations of the Pre-Engineering Major

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ABSTRACT

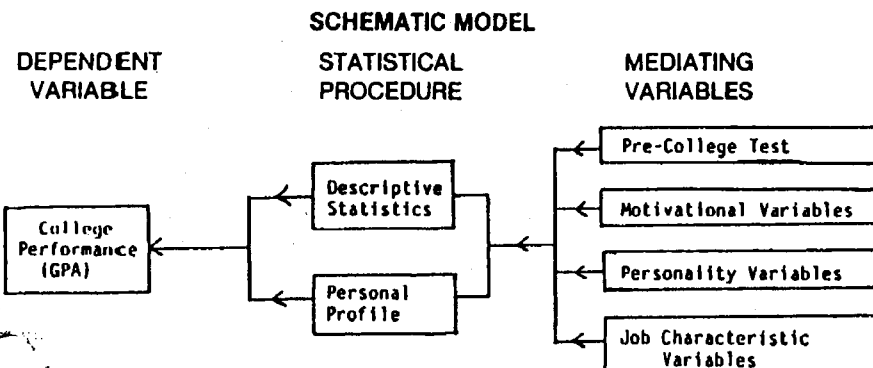
Engineering programs on campuses nationwide continue to attract large numbers of students. As enrollments in these programs soar, many schools which previously had open admission policies have been forced to control enrollment, resulting in a large population of pre-engineering majors — some having limited career aspirations or unrealistic academic expectations. To aid in the understanding and advising of these majors, student profiles reflecting motivation patterns have been presented.

INTRODUCTION

Since Engineering programs nationwide have been noted for high attrition rates, it is important for university officials to encourage or re-direct students into programs in which they can be successful. Effective advising (whether it be coursework or career) cannot be accomplished unless the advisor has pertinent information not only on students' academic background, but also on their aspirations and attitudes as well. It is believed that a realistic assessment of the student's "total profile" can be a valuable tool in predicting student performance at the college level. In addition, students need to be challenged to examine their motivations for declaring engineering as a major — motivations which may be obscured by hidden influencing factors, by misconceptions about the profession and about the academic rigors of the program.

THE MODEL

The model represented in the schematic may be an effective tool in counseling and advising the pre-engineering major. It provides the theoretical basis for the development of student profiles of the pre-engineering major by including variables that either influenced or motivated the student in selecting engineering as a career.



DATA COLLECTION AND ANALYSIS

Youngstown State University (YSU) is a state-supported institution located in the northeast corner of Ohio with an enrollment of approximately 15,000 students primarily drawn from the surrounding Ohio and western Pennsylvania region. The Youngstown, Ohio area has been heavily industrialized with large manufacturing concerns in transportation and basic steel. The availability of employment in the area allows the majority of students to work while matriculating at YSU.

Since 1977, however, approximately 30,000 steel-related jobs have been lost in the area resulting in unemployment rates ranging from 12 to 20 percent. It is within this environment of economic decline that Youngstown State University must survive.

Data was collected from a 75-item questionnaire that utilized a Likert-type scale with values ranging from 1 (not important) to 5 (extremely important) resulting in the construction of profiles. These profiles are the responses most often given to each question as to their degree of importance to the student's decision to study engineering. In addition, the profiles included the average score of each component of the ACT pre-college test. The benefit of developing these profiles is that a quick comparison between two distinct groups is possible.

Dependent Variable (GPA)

The predicting of success at the collegiate level is an important goal, which requires that the term "success" be defined. It could be a high grade point average at the end of a collegiate career; employment immediately upon graduation; or, simply the fact that one graduates.

It is the author's contention that graduation from college is a measure of success; therefore, grade point average has been established as the dependent variable in the model. For additional clarification, the dependent variable (GPA) has been separated into two categories:

Group 1 = good/excellent students (those with 2.50 to 4.00 GPAs)

Group 2 = average students (those with 2.00 to 2.49 GPAs)

The information for the categories was obtained from YSU's Career Services Office. It was reported that the likelihood of employment upon graduation increases when the grade point average is above 2.50.

Mediating Variables

Pre-college testing by American College Testing Program (ACT) is a method used for predicting collegiate academic performance. It can be argued that performance on the ACT test has a direct relationship to students' academic performance (not their innate abilities), thereby aiding the prediction of success in college.¹ The ACT variables are included in the model because performance at a given level is required for admission to the Engineering School at YSU.

FIGURE 1
Profiles of ACT Performance

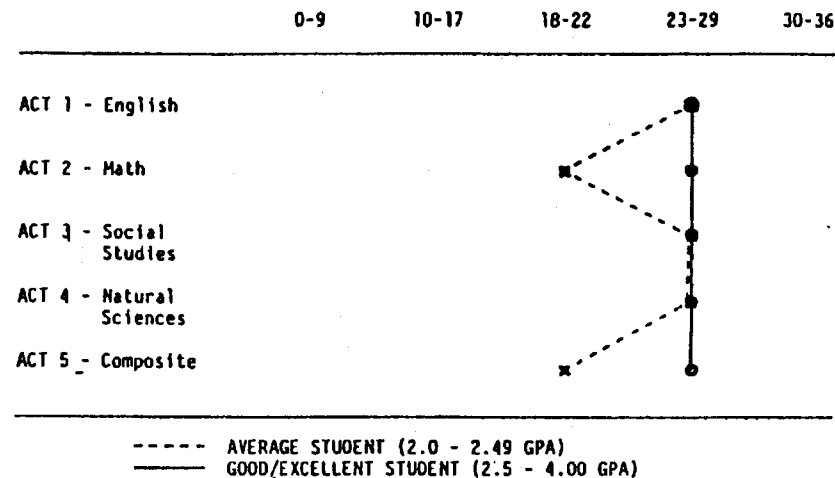


Figure 1 represents the profiles of the average score for each component of the ACT exam for the two classifications of students based on their grade point averages. Performance on the math component of the test provides the greatest disparity between the average student and the good/excellent student. Since an engineering program is heavily concentrated in mathematics, these results reinforce the belief that a strong mathematical background is essential for success in engineering.

¹ American College Testing Program, *Using the ACT Assessment on Campus*, 1982, 1.

TABLE I

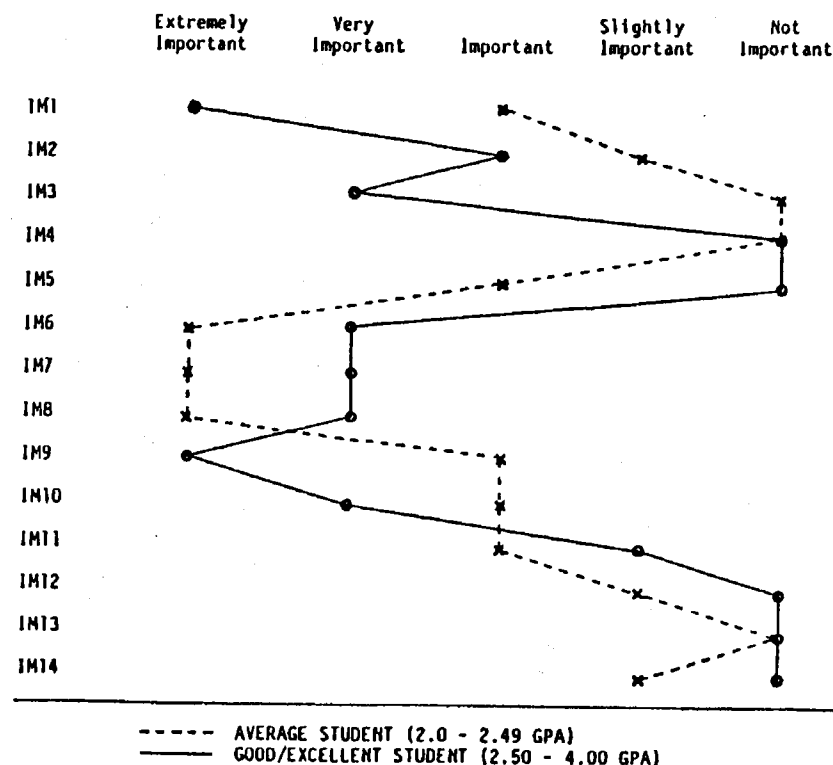
Factors Important in Decision to Study Engineering

Variable	Description
IM1	My aptitude for mathematics and science
IM2	I like to read about science and technology
IM3	I like to solve problems "not easily solved" where solutions are not obvious
IM4	I like to solve practical problems
IM5	I'm Interested In working with things and not people
IM6	Opportunities for employment after college graduation
IM7	Job security
IM8	High potential salary
IM9	The prestige of an engineering career
IM10	The Influence of my parents or other relatives
IM11	The Influence of my high school counselor(s) or teacher(s)
IM12	The Influence of friends
IM13	The influence of my present or former employer
IM14	Don't really know what career I want, but I am exploring engineering

Another category of mediating variables (independent variables) deemed important in the student's decision to study engineering was titled Motivational Variables. The motivational variables analyzed fall into three groups: Educational Variables (the student's interest/abilities in math, science, technology), Job-related Variables (prestige, job opportunities, salary perceptions), and Influence Variables (did anyone influence the student's decision to study engineering?). Table I summarizes the motivational variables used in the research design. The conclusion drawn is that freshmen engineering students with GPAs between 2.00 and 2.49 felt that the following variables were extremely important in their decision to study engineering: Opportunities for Employment, Job Security, and High Potential Salary. The profile for those students with GPA's of 2.50 or better felt that the most important reasons to study engineering were their aptitude for math and science and the prestige of engineering as a career. In addition, the students' response indicated important variables; they like to solve problems "not easily solved"; opportunities for employment; job security; high potential salary; and, influence by their fathers to study engineering. Figure 2 compares the profiles for the two categories of students and the differences in motivation for pursuing engineering for them becomes obvious.

FIGURE 2

Profiles of Importance Motivational Variables



These motivational variables usually are the result of external forces. It is also necessary to look at internal forces which may motivate a student's career decision. These are termed personality motivators and include such characteristics as ego, congeniality, and introversion. Other facets of this group of motivators are internal aptitudes or abilities. Table II summarizes the personality variables used in the survey. Variables rated as important to the average student (2.00 to 2.49 GPA) were good work habits, a strong motivation to succeed, an ability to get along with people, and lots of hard work and effort. Highly motivating variables for the good/excellent student (2.50 to 4.0) were an inquisitive nature, logical thought, and organizing and administrative ability. Figure 3 shows the profiles of the two groups which may aid in discerning differences regarding the personality variables each feels are necessary for success in engineering.

FIGURE 3
Profile for Personality Variables

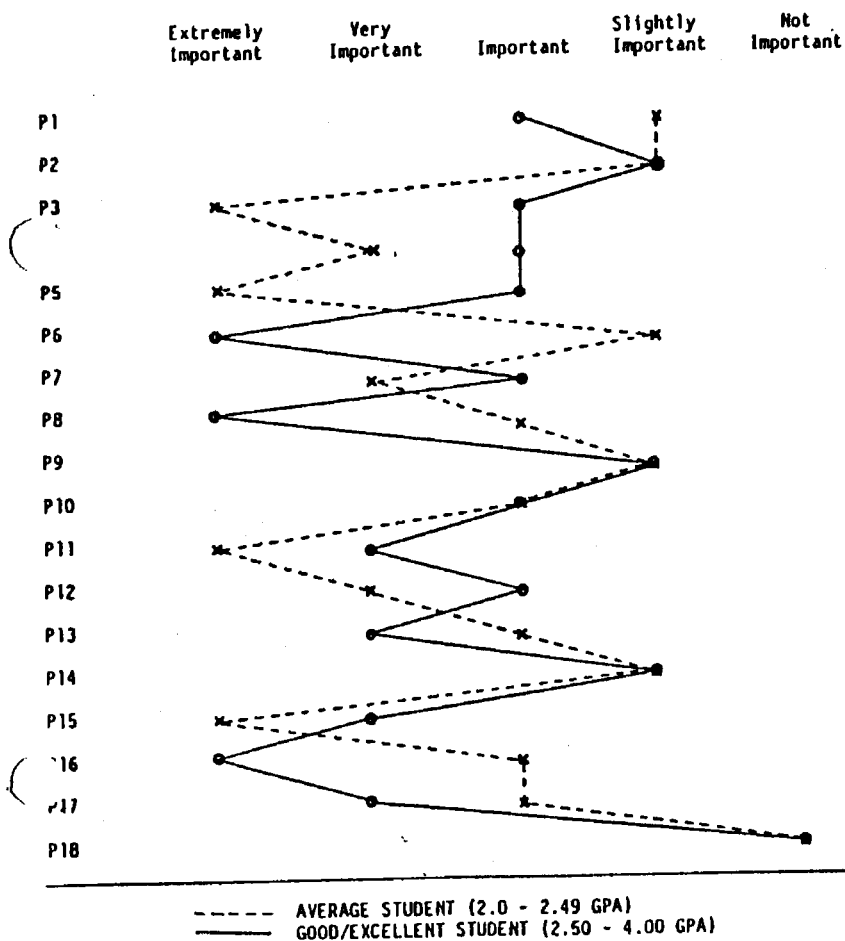
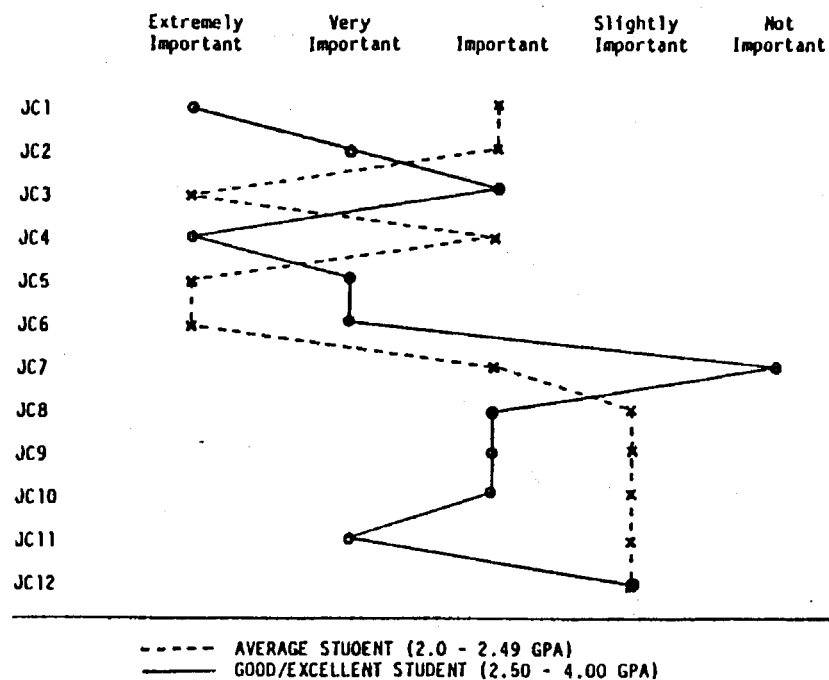


FIGURE 4
Profiles for Job Characteristic Motivators



The last category of mediating variables in the model is entitled the "Job Characteristic Motivators," as summarized in Table III. Figure 4 presents the profiles for the two categories of students as they perceive the importance of these job characteristics as motivators in their decision to study engineering. For the average student, extremely important motivators were opportunities for advancement, job security, and high income potential. For the good/excellent student, important motivators were the glamour, prestige, and dignity perceived to be affiliated with the engineering profession. It is interesting to note from the profiles that Group 2 students were not as concerned with job security as much as they were with financial security.

TABLE II

Personality Motivation Variables

Variable	Description
P1	A special talent or aptitude
P2	High degree of intelligence
P3	Good work habits
P4	An ability to express yourself
P5	Strong motivation to succeed
P6	An inquisitive nature
P7	Wanting to "know how things work"
P8	Logical thought
P9	A strong ego, not sensitive to comments and/or criticism
P10	Not having to depend on other people
P11	An ability to get along with people in group activities
P12	Acceptance of instruction(s) from superiors
P13	Congeniality
P14	Having social poise
P15	Lots of hard work and effort
P16	Organizing and administrative ability
P17	Leadership qualities
P18	Introversion (being an introvert as opposed to an extrovert)

TABLE III

Job Characteristic Variables

Variable	Description
JC1	Glamour, Prestige, and Dignity
JC2	High Social Status
JC3	Job Security
JC4	Financial Security
JC5	High Income Potential
JC6	Opportunities for Advancement
JC7	Primarily a Desk Job
JC8	Opportunity to be Creative
JC9	Lots of Hard Work and Effort
JC10	Variety of Work Related Experiences
JC11	Opportunity to Express Your Opinion
JC12	Opportunity to Work Alone

IMPLICATIONS

One implication of the results is that the majority of the good/excellent students were highly influenced by their parents (especially the father) to pursue an engineering degree, as opposed to those in the average group. This would indicate that parents are more instrumental in encouraging these students to perform well in engineering. A possible strategy that campus administrators may want to pursue would be to get parents more involved and perhaps conduct activities that would invite parents to the campus on a more regular basis. This may help the parents to be more aware of programs and services available as well as to allow them to experience the collegiate atmosphere to which their son/daughter will be exposed. Researchers have revealed that the role of parents in collegiate program selection must not be underestimated.² Hopefully, by encouraging parental involvement, the number of students in these professional programs may increase as a result of increased parental support.

The conclusions from the data also confirm results from other researchers. Perceived status of a school and of a particular program can be a powerful motivating force. Also, students may attend colleges and enroll in programs that they believe will lead to high-paying jobs.³

Results from the survey indicated that a majority of students in the good/excellent group stated that prestige was an important motivator for selecting engineering, while those in the average group believed that employment opportunity was the highest motivational factor. Another conclusion may be that the present economic environment in the Youngstown area

² J. Krukowski, *What Do Students Want? Status, Change*, May/June, 1985, 21-28.

³ Krukowski, 1985.

influenced the responses of the average group. These students are looking for programs that result in a high probability of employment upon graduation, job security, financial security and a high potential salary.

Finally, it has been found that the students' assessments of their own capabilities, and the confidence they have in their abilities to succeed in the employment world, often direct their curricular preferences. Results of the study indicate that the good/excellent students in engineering are aware of their academic ability and are generally not worried about whether or not they will survive the engineering training — they know they will. Having confidence in their own academic abilities, they can direct their attention to other facets of the profession. It was also indicated that this group of students has the realistic belief that an inquisitive nature is required for success in engineering. The students in the average group, however, find that having a strong motivation to succeed is the most important quality that guarantees success, and it appears that they have kept alive in the engineering program because of that strong motivation.

Hopefully, by continuing to analyze student attitudes and aspirations as they relate to academic performance, it will be possible to identify characteristics that may predict success in an engineering program. It is important for university officials to look at these attitudes and aspirations in order to have a better understanding of student motivations and needs as well as their likes and dislikes for reasons of attrition and retention.

Promoting Advising and Course Articulation Between a University and Community Colleges

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For several years, including the 1985-86 academic year, the Dean of the Smith College of General Studies at Houston Baptist University (HBU) has developed course correlation or articulation tables between HBU and twelve area community colleges. The objectives of these annually updated articulation tables include the following:

1. To enhance the transferability of basic required courses from community colleges to HBU's General Studies College.
2. To educate HBU faculty on appropriate courses completed at community colleges that may substitute for HBU general studies required courses.
3. To assist currently enrolled HBU students who plan to enroll in courses at one of the twelve community colleges.
4. To inform appropriate community college personnel of specific, general studies requirements for various HBU bachelor's degrees.
5. To build rapport between HBU and the community colleges' counseling/advising centers.
6. To better serve community college students planning to attend HBU after they complete general requirements at the respective community colleges.
7. To help HBU become an upper-level university in local area recruiting of community college students.
8. To foster academic advising at HBU and community colleges.

Each of the twelve community colleges for which correlation tables have been developed resides within a 75-mile radius of HBU campus.

Procedures for developing correlation tables have been routine, yet tedious. The first step was to obtain the latest catalogues of each college. When the catalogues were received, the Smith College Dean proceeded to evaluate the courses in each catalogue in terms of each course's application to HBU general studies requirements. Evaluation involved examining each course throughout each catalogue to determine each course's applicability.