

Extended Abstract-Attrition and University Retention

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Abstract - Engineering attrition is a concern for first year engineering programs and engineering colleges. Many first year engineering programs provide extensive academic and social support to help students make the transition and succeed academically. While necessary, are these programs sufficient to keep students in an engineering program? Are students who leave engineering academically successful in their non-engineering field of study? This study was designed not only to address why students transfer out of engineering, but to determine if those students who leave engineering are able to succeed in their new discipline and graduate from the university.

In this study, the authors examined 527 students who transferred out of engineering while enrolled in a first year engineering program. The students were mostly men who changed majors between January 2007 and December 2010. An exit questionnaire administered at the time of the transfer was utilized to determine their exit grade point average (GPA) and the reason for the switch. Furthermore, university databases were utilized to determine if those students were able to graduate from, or are still pursuing a degree at, the university. The number of students who withdrew from the university, were suspended, or never returned to the university was also assessed, as was the percent of students who left engineering, but were later readmitted into the program.

Analysis of exit surveys provided insight into the academic characteristics of those first year students who transferred out of engineering, reasons why they left, and the degree to which these students persisted to degree completion in another major at the university. Results indicate that factors different from academic difficulty are leading to the change of discipline among general engineering students. Students who are in good standing academically are leaving engineering because they lack interest. Additional explanations are considered and presented, as well as the implications for potential intervention programs to address increasing student interest as well as academic success in engineering.

Index Terms – Attrition, First-Year, Freshman, Retention.

INTRODUCTION

Student retention is a concern in engineering education [1]-[15]. Several studies have reported that less than half of the freshman who starts in engineering graduate in engineering, with 50 % of this attrition occurring at the freshman level [1]-[9]. For instance, Ohland and colleagues found that 60% of students matriculated in engineering are still enrolled in engineering in their eighth semester[3]-[4]. The authors reported that 40% of students who enroll in engineering programs as first-year students do leave[3]-[4]. According to Astin, only 47 % of students that began in engineering graduate with an engineering degree[5]-[7]. Seymour and Hewitt investigated retention issues in science, technology, engineering and mathematics (STEM) at seven, four-year institutions[8]-[9]. These authors reported 4-year persistence rates of 40 % in STEM, versus 70% in arts, humanities, and social sciences[8]-[9].

Many first year engineering programs provide extensive academic and social support to help students make the transition and succeed academically. While necessary, are these programs sufficient to keep students in an engineering program? Are students who leave engineering academically successful in their non-engineering field of study? This study was designed not only to address why students transfer out of engineering, but to determine if those students who leave engineering are able to succeed in their new discipline and graduate from the university.

This information is essential to determine if an intervention is necessary to assist students leaving engineering in the successful completion of a degree.

METHODOLOGY

The authors studied 527 students that switched to a non-engineering discipline while enrolled in a first year engineering program at West Virginia University (WVU). The students were mostly men who switched majors between January 2007 and December 2010. An exit questionnaire administered at the time of the transfer was utilized to determine their exit grade point average (GPA) and the reason for the switch. Furthermore, university

databases were utilized to determine if those students were able to graduate from, or are still pursuing a degree (referred as active), at the university. The number of students who withdrew from the university, were suspended, or never returned to the university was also assessed, as was the percent of students who left engineering, but were later readmitted into the program.

PRELIMINARY RESULTS

First Year Engineering Program: All engineering students at West Virginia University, both calculus-ready and not calculus-ready, must complete a common 'first year experience' before moving to an engineering major. Prior to enrollment, a mathematics placement test is utilized to assess Calculus readiness. Students who are not calculus-ready at entry usually take 1.5 to 2 years to complete the required courses, depending on their initial math placement. This study only includes students that are enrolled in the first year engineering program and therefore, have not declared an engineering major.

GPA of 'non-persisters' and selection of a non-engineering major: The distribution of cumulative GPA at the time of the transfer is shown in Figure 1. At the time of the switch, 39.5% of the students had a GPA below 2.0. The average GPA for all students is 2.70.

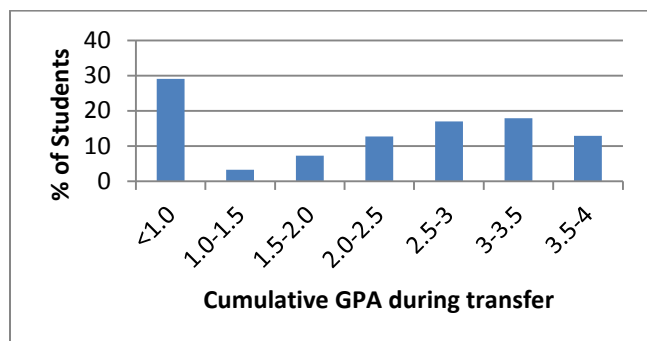


FIGURE 1.
CUMULATIVE GPA DISTRIBUTION AT THE TIME OF THE SWITCH.

At the time of the switch, 22% of the students requested a transfer to general studies, which is a non-degree program designed to assist students in the selection of a major. 13% of the students requested a transfer to business administration, and 5% to accounting. 57% of all students requesting a transfer into general studies had a GPA below 2.0.

Main reason to leave engineering: According to the results from the questionnaire (Table 1), the main reason to transfer out of engineering was that the engineering majors offered do not match student's interest; the second and third most popular answers were that they perceive an inability to

succeed in engineering and that the student was in academic difficulty. For those students in academic difficulty, 34% of them reported having difficulty in calculus I, whereas 17% reported difficulty with general chemistry.

TABLE I
TOP 5 REASONS FOR CHANGING TO A NON-ENGINEERING MAJOR

Reason for the Switch	% Total Responses
Engineering majors offered do not match my interests.	22.5
I do not think I can succeed in Engineering.	18.2
I am in academic difficult.	18.0
Other (Not interested in engineering, etc)	15.4
Too much effort required when I am uncertain about what I want to do.	13.6

Graduation rate after switching majors: Graduation rate was found to be related to the year of transfer. For instance, only 30% of the students that switched majors in 2007 have completed a bachelor degree. For years 2008, 2009, and 2010, the graduation rate was 16%, 3%, and 0%, respectively (refer to Figure 2).

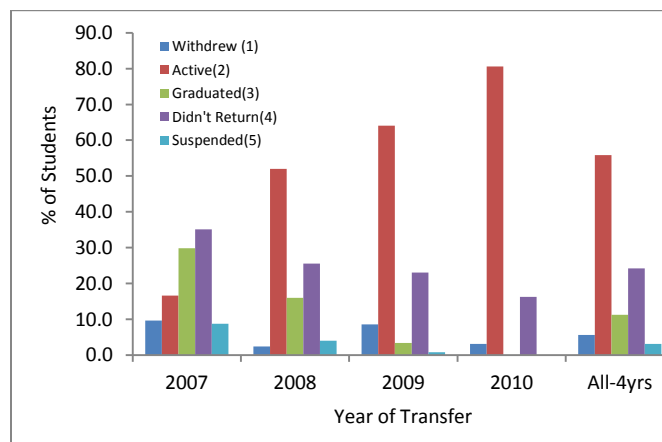


FIGURE 2.
PERCENT OF STUDENTS WHO WITHDREW, GRADUATED, NEVER RETURNED TO COLLEGE, WERE SUSPENDED, OR ARE STILL PURSUING A DEGREE (ACTIVE), IDENTIFIED BY YEAR OF TRANSFER.

Readmission into engineering was low; only 25 of the 527 students (4.6%) in the study returned to engineering. This study also found that 36% of the switchers spent less than a semester in the program before deciding to switch, whereas another 28% of them switched during their second semester in the first year program. Another finding from this study was that transferring out of engineering did not contribute to an improvement in student's GPA (data not shown).

ONGOING WORK

As Figure 2 illustrates, 11.2% of all 'non-persisters' were able to complete all requirements for graduation. Furthermore, for those students that switched to a non-engineering discipline in 2007 (the oldest group in this study), a 30% graduation rate was observed. We are currently investigating which characteristics (such as exit GPA, selection of a major, among others) differentiate those switchers that are able to graduate versus those unable to succeed. This will help us predict which students are in need of further assistance once they move out of the first year program.

This study will provide valuable insights into the educational pathway followed by students once they transfer out of a first year engineering program. This information will be used to devise strategies to assist 'non-persisters' and help them succeed in college.

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