

## **A Systematic Evaluation of Implications of Admission GPA for Transfer Students**

**Dr. Chris Gordon, Southern Illinois University, Edwardsville**

Chris Gordon is an Associate Professor at Southern Illinois University, Edwardsville, where he serves as Chair of the Department of Construction, Interim Associate Dean of the School of Engineering, and co-director of the Construction Leadership Institute. In his research, Gordon investigates engineering education and innovation in the construction industry. Gordon earned a Ph.D. in Civil and Environmental Engineering at Carnegie Mellon University and both a B.S. and an M.S. in Civil and Environmental Engineering at Stanford University. Prior to his doctorate, Gordon's professional experience included construction management on projects ranging from \$25 million to \$2.5 billion and project management and product development for an early-stage start-up software company.

**Dr. Hasan Sevim, Southern Illinois University, Edwardsville**

Dr. Hasan Sevim obtained his B.S. degree in mining engineering in 1974 from Istanbul Technical University, Turkey, as the valedictorian of his class. He obtained his M.S. and Ph.D. degrees in 1978 and 1984, respectively, from Columbia University, New York. In 1984, he joined the College of Engineering at Southern Illinois University, Carbondale as an assistant professor in the Department of Mining Engineering. He served as the Associate Dean of the College of Engineering from 1998 to 2006. He was appointed the Dean of School of Engineering at SIU Edwardsville in August 2006.

Until 2000, most of Dr. Sevim's publications were in mine systems optimization and open pit mine production planning. After 2000, in parallel with his administrative appointments, he published in engineering education.

**Mr. Phillip M Brown, Southern Illinois University Edwardsville**

Director of Institutional Research & Studies

# **A systematic approach to determine admission GPA for transfer students**

## **Introduction**

At Southern Illinois University Edwardsville (SIUE), transfer students who want to declare a major in the School of Engineering must meet eligibility criteria, including a minimum 2.0 GPA in prior coursework. The effectiveness of this selected minimum GPA has been questioned for some time as the School does not want to admit students who are not prepared for the rigors of engineering courses. Therefore, the School's administration has committed to developing data-driven admission standards based upon leading indicators for student performance.

A few years ago, a similar question was raised for admission of freshmen to the School's programs. Based upon subsequent investigation, the School set the admission standards for freshmen at an ACT Math sub-score of at least 26 and an ACT English sub-score of at least 21. These scores correlate with successful placement in pre-calculus and introductory English classes, respectively, and therefore correspond to the School's admission criteria. Admission of transfer students, however, is not as straightforward. Most transfer students do not include ACT scores as part of their admission applications, and therefore, the main admission criterion used is transfer GPA. Prior to this investigation, there has been limited information about the retention and graduation of students who entered the School with a low transfer GPA. This paper reports results from an investigation of the most effective use of transfer GPA for decisions primarily regarding admission but also for retention of incoming transfer students.

In recent years, many studies have been published regarding the performance of transfer students. These studies focused mostly on advising, retention, and graduation<sup>1,2,3,4</sup>; and some studies explored the hypothesis that transfer students experience lower retention and graduation rates than non-transfer students<sup>5,6,7</sup>. However, the authors could not find literature on past studies related to the determination of critical admission criteria for transfer students to engineering programs.

## **School profile**

A short description of the School's demographics is useful here to highlight the share of transfer students in the overall enrollment. The School has seven B.S. programs, five M.S. programs, and a doctoral program in engineering science in collaboration with a sister institution. As of Fall 2015, there were 1,451 undergraduate students and 259 graduate students, of which 17 were doctoral students. The School experienced approximately 8% per year increase in undergraduate enrollment during the last six consecutive years. The average freshman and transfer student enrollments per year during those last six years were approximately equal at 160 students each. Therefore, issues related to admission, advising, retention, and graduation of transfer students must be handled with the same attention and care as for native students.

## **Approach**

To support the investigation of a reliable and reasonable admission transfer GPA, the authors developed and analyzed a database composed of student GPA and retention data for cohorts of

transfer students from the 2007-2008 academic year to the 2013-2014 academic year. The database includes student transfer GPA, first and second term GPA upon transfer, and retention status at the end of each academic year. In many cases, students transfer coursework from more than one institution. For a given student, transfer GPA is calculated as the weighted average of grade point averages for all transferred coursework from all prior institutions.

The database contains a total of 1,128 total records. Of these, 128 students transferred in with fewer than 30 credit hours; 312 transferred between 30 and 60 credit hours; and 688 transferred more than 60 credit hours. A total of 451 students transferred in with previous degrees. Of these, 57 students transferred with a previous baccalaureate degree and 394 students transferred with a previous associate degree. These statistics are shown in Figure 1.

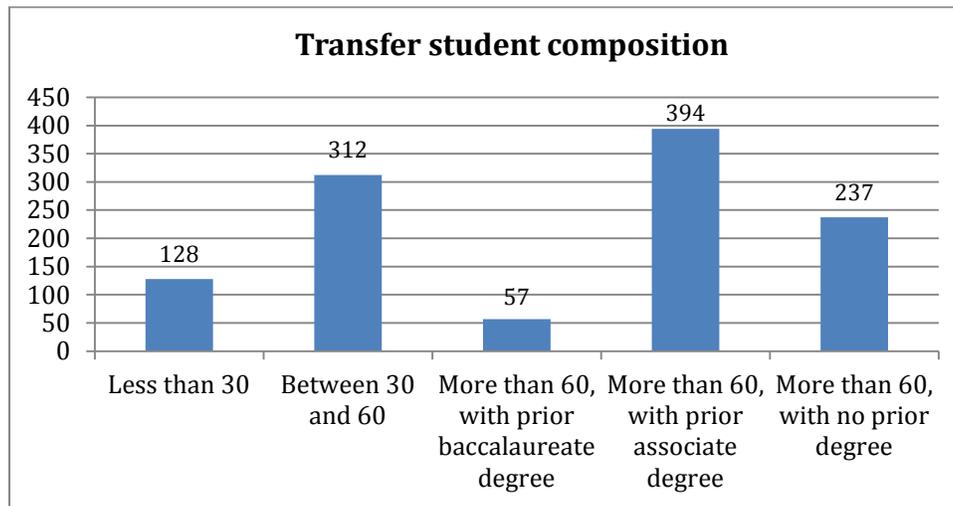


Figure 1: Composition of transfer students based on previous degrees and credit hours

Once the database was developed, it provided the opportunity to investigate other issues related to transfer admission standards. These opportunities included: 1) examining the retention and graduation rates of students with low and high transfer credit hours; and 2) examining the retention and graduation rates of female and under-represented minority (URM) students within the entire transfer student population and within sub-populations of low and high GPAs.

**Hypotheses:** to guide our investigation, two hypotheses were posed:

- 1) *There is a critically low transfer GPA, below which the student should consider majors outside of engineering.*  
As part of this study, first and second term grade point averages of incoming transfer students are tracked to see whether there is a significant “transfer shock,” and if there is, whether the degree of this shock differs among the five groups depicted in Figure 1.
- 2) *Transfer student performance differs according to the credit hours they transfer and previous degrees earned.*

## Analyses

It is noted that in all analyses that follow, an increment of 0.2 grade points is considered, first for better precision in the determination of critical transfer GPA, and second for the accuracy of various statistical and graphical comparisons.

### Transfer shock analysis

Figure 2 shows a comparison of students' transfer grade point averages to their institutional grade point averages in their first two terms. It is noted that 47 students transferred with a grade point average of less than 2.0. These students were not eligible to declare a major in the School initially, and were only able to do so after some time in the University as they improved their grade point average. These students were therefore excluded from this analysis, leaving altogether 1,081 students for this comparison study. Both data sets exhibit strong linear trends. The R-squared value for the Term 1 GPA trend line is 0.973; the R-squared value for the Term 2 GPA trend line is 0.877.

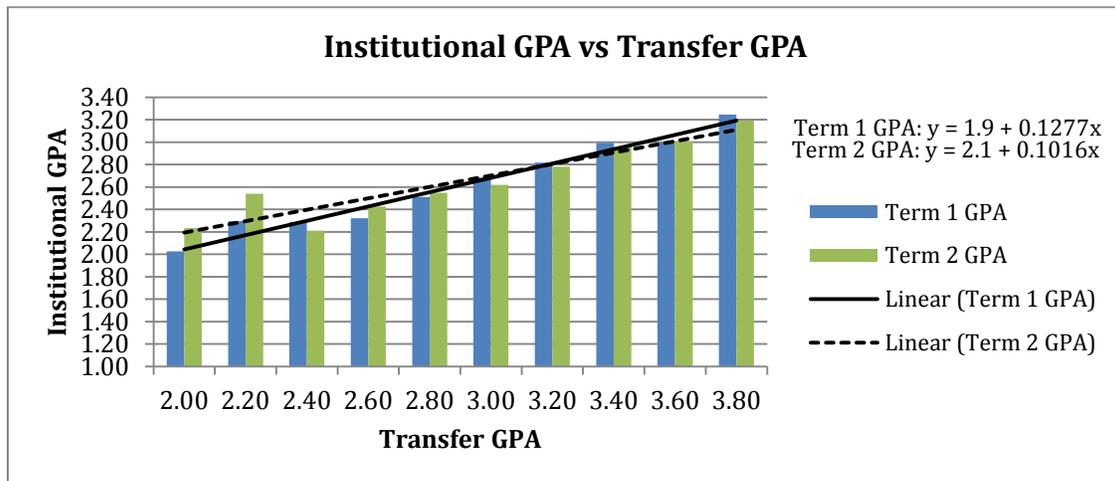


Figure 2: Institutional GPA in comparison to transfer GPA

Based upon these trend lines, the expected institutional GPA can be derived for a given transfer GPA. For example, a student who enters the program with a 3.0 transfer GPA would expect to achieve a 2.62 and 2.65 GPA in the first two terms, respectively (first term expected GPA =  $1.9 + 0.1277 \times 3.0 = 2.62$ ). The implication of these trend lines is that they may constitute baselines for any performance improvement programs to be implemented in the future. Statistically significant increases in the slopes of these lines would indicate program success.

The average transfer GPA of transfer students in this data set is 2.97; the average first term GPA is 2.64, and the average second term GPA is 2.65. This indicates a slight degree of “transfer shock” as students acclimate to their new academic environment. This phenomenon of “transfer shock” is evident in all five transfer groups. As shown in Figures 3 to 6, on the average, transfer students score approximately one half grade point lower than the transfer GPA in the first term and one quarter point lower in the second term in all five transfer groups. This degree of

difference between institutions is consistent with the magnitude of grade point difference reported by Diaz <sup>8</sup>.

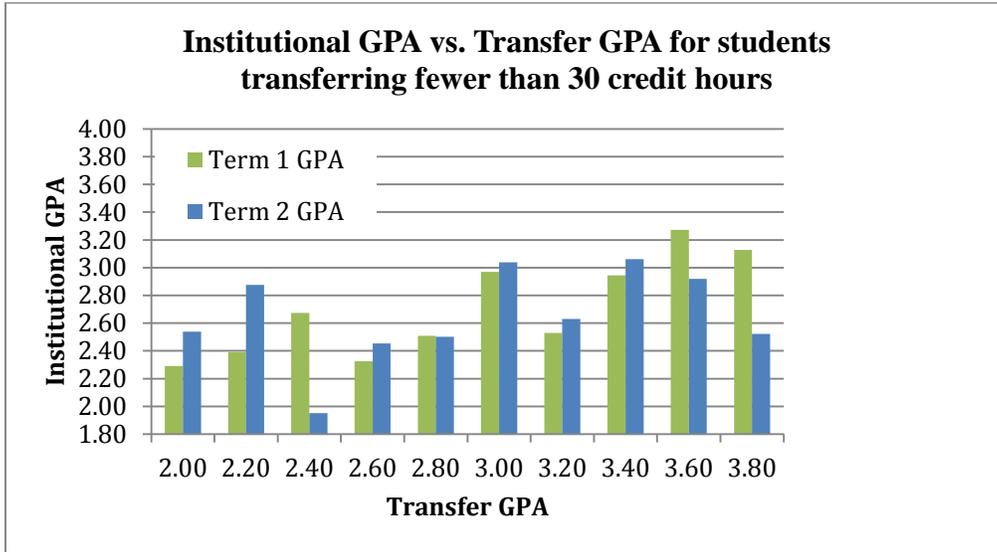


Figure 3: Institutional GPA compared to transfer GPA; students transferring <30 credit hours

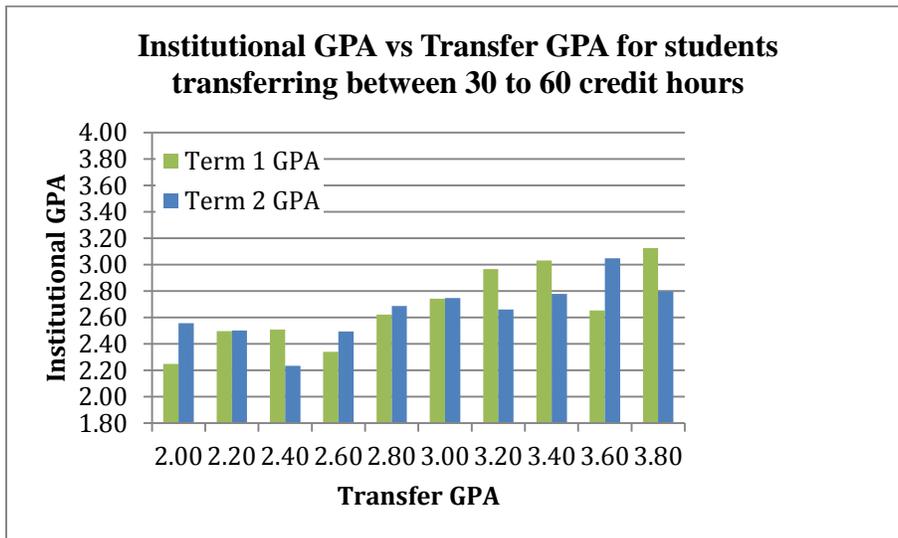


Figure 4: Institutional GPA compared to transfer GPA; students transferring 30-60 credit hours

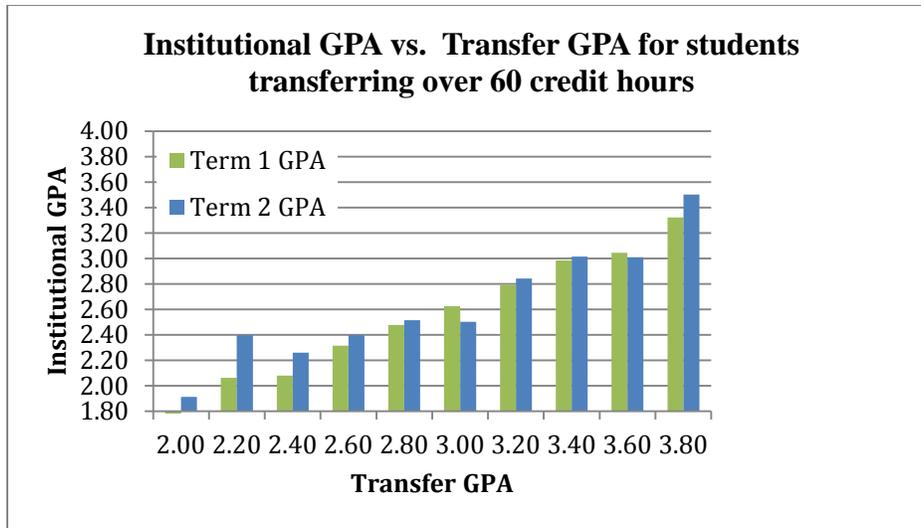


Figure 5: Institutional GPA compared to transfer GPA; students transferring >60 credit hours

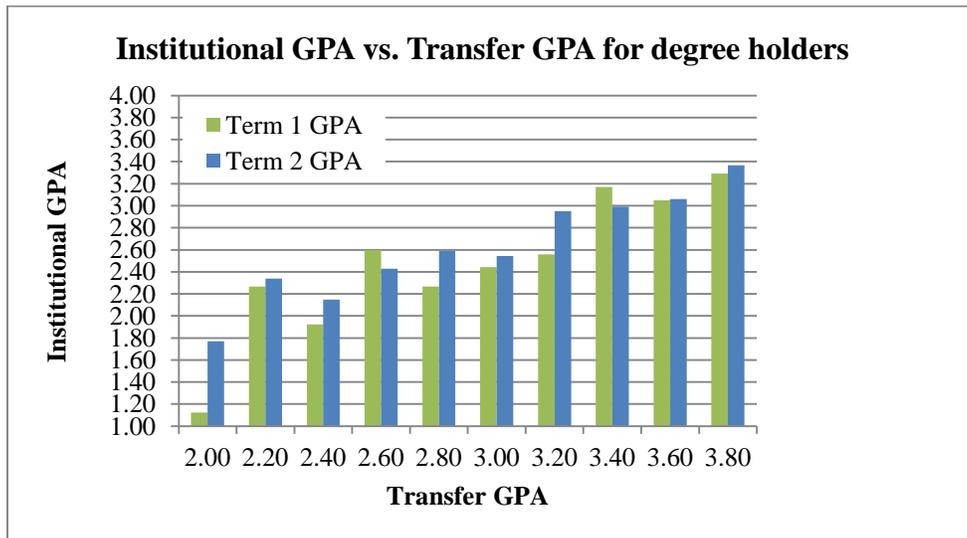


Figure 6: Institutional GPA compared to transfer GPA; transfer students with previous associate or baccalaureate degrees

### Critical GPA analysis

To help further evaluate the appropriate minimum GPA, the authors evaluated the retention and graduation rates of the cohorts up to six years from the date of transfer. In the developed data set, three cohorts reached the full six year time frame, and therefore, we limited our study to these three cohorts to determine the six-year graduation rates. Table 1 below shows the graduation rates for students in the 2007, 2008, and 2009 cohorts, broken into groups according to their transfer GPA.

Altogether, there are 424 students in these three cohorts. The average six-year graduation rate combined is 52.6% (223/424). However, there is a clear distinction between the graduation rates of students with transfer GPA above and below 2.6. The average six-year graduation of students

with transfer GPA greater than 2.6 is 56.3% (175/311) as compared to 42.5% (48/113) of those with transfer GPA below 2.6. This difference between the two groups is statistically significant. In terms of enrollment, if the minimum GPA is raised to 2.6 from the current 2.0, on average 38 (113/3) fewer students would be enrolled per year.

Table 1: Graduation rates for 2007, 2008, and 2009 transfer cohorts

Transfer GPA	Initial # Stud.	Totals	Graduation rate (%)					# Grad.
			Year 2	Year 3	Year 4	Year 5	Year 6	
3.8-4.0	43	311	4.7	23.3	44.2	51.2	62.8	175
3.6-3.79	28		10.7	53.6	64.3	67.9	67.9	
3.4-3.69	42		11.9	31.0	54.8	57.1	57.1	
3.2-3.39	46		10.9	45.7	54.3	58.7	58.7	
3.0-3.19	49		8.2	18.4	28.6	38.8	42.9	
2.8-2.99	63		11.1	33.3	46.0	50.8	54.0	
2.6-2.79	40		7.5	17.5	37.5	50.0	55.0	
2.4-2.59	46	113	2.2	19.6	39.1	45.7	47.8	48
2.2-2.39	43		2.3	14.0	32.6	41.9	41.9	
2.0-2.19	24		4.2	16.7	25.0	33.3	33.3	
Total		424	Total					223

Table 2 shows the graduation rates for all five transfer groups. While the overall six-year graduation rate for these cohorts is 52.6% (223/424), this rate increases with increased transfer credit. Students transferring over 60 credit hours had a six-year graduation rate of 55.9% (151/270), while students transferring under 30 and between 30 and 60 credit hours had 6-year graduation rates of 40.8% (20/49) and 49.5% (52/105), respectively.

Table 2: Graduation rates for 2007, 2008, and 2009 transfer cohorts by number of credit hours

	< 30	30 to 60	>60				Total
			Assoc.	Bach.	No degree	Subtotal	
Initial #	49	105	152	18	100	270	424
# Graduated	20	52	95	6	50	151	223
% Graduated	40.8	49.5	62.5	33.3	50.0	55.9	52.6

Furthermore, we noted that among the three cohorts in our study, students transferring with previous degrees demonstrated higher six-year graduation rates than average. Overall, these students had a six-year graduation rate of 59.4%  $[(95 + 6) / (152+18)]$ . Notable among these students is that students transferring with associate degrees had the highest rate at 62.5% (95/152). These findings are similar to those of Crosta, et al. <sup>9</sup>, who identified a strong influence of earning an associate of arts or associate of science degree on the probability of successfully completing a bachelor degree within six years.

We also noted a very low graduation rate for students transferring with a previously earned bachelor degree. Although the number of students in this category is rather low (18 students), it should warrant further investigation for a reasonable explanation.

## Female and under-represented minority transfer student analysis

For these cohorts, 11.3% (48/424) students are female and 12.5% (53/424) are URM students (according to United States Department of Education classification). As shown in Table 3, female students in these cohorts tend to be more heavily represented in the higher transfer GPA groupings. Hence while 48 of the 424 students in these cohorts are female, only 8 of these 48 (16.7%) students fall below 2.6 GPA. An increased transfer GPA of 2.6 would result in a slight increase in the percentage of accepted female students from 11.3% to 12.8% (40/311).

Table 3: Female and under-represented minority composition of 2007, 2008, and 2009 cohorts

<b>Transfer GPA</b>	<b>Initial # Stud.</b>	<b>Total Female</b>	<b># Female</b>	<b>% Female</b>	<b>Total URM</b>	<b># URM</b>	<b>% URM</b>
<b>3.8-4.0</b>	43	40	8	18.6	28	4	9.3
<b>3.6-3.79</b>	28		5	17.9		1	3.6
<b>3.4-3.69</b>	42		9	21.4		4	9.5
<b>3.2-3.39</b>	46		10	21.7		4	8.7
<b>3.0-3.19</b>	49		2	4.1		4	8.2
<b>2.8-2.99</b>	63		5	7.9		4	6.3
<b>2.6-2.79</b>	40		1	2.5		7	17.5
<b>2.4-2.59</b>	46	8	4	8.7	25	12	26.1
<b>2.2-2.39</b>	43		2	4.7		10	23.3
<b>2.0-2.19</b>	24		2	8.3		3	12.5
<b>Total</b>	424	48	48	11.3	53	53	12.5

In contrast to female students, URM students in these cohorts are disproportionately represented in the lower transfer GPA groupings. Of the 53 URM students, 25 transferred with a GPA lower than 2.6. An increased minimum transfer GPA of 2.6 would result in a decrease in the percentage of accepted URM students from 12.5% (53/424) to 9.0% (28/311). This indicates that any adjustment to minimum transfer GPA standards above the current 2.0 level would disproportionately affect URM students. It should be noted that eight students in these cohorts are both female and URM students. These eight students were evenly split below and above a 2.6 transfer GPA. After six years, three out of the eight students graduated: two in the below 2.6 and one in the above 2.6 category.

The six-year graduation rates of female and URM students further underlines the severity of low representations of these groups in the overall population. Tables 4 and 5, along with Figures 7 and 8, indicate that the overall graduation rates of these two groups are notably below the 52.6% graduation rate of the overall transfer population.

What is perhaps more surprising is that the graduation rates of students with transfer GPA below 2.6 (50.0% for female students and 44.0% for URM students) is higher than those with GPA higher than 2.6 (42.5% for female students and 35.7% for URM students). Although the sample sizes are small, this was another eye-opening statistic for the investigators.

The implication of these findings is that, to improve the percentage of representations of these two groups in the overall population and their graduation rates to respectable levels, a strong recruitment and retention program must be developed.

Table 4: Six-year graduation rates of female students

	<b>Total #</b>	<b># Graduated</b>	<b>% Graduated</b>
<b>&gt; 2.6 GPA</b>	40	17	42.5
<b>&lt; 2.6 GPA</b>	8	4	50.0
<b>Total</b>	48	21	43.8

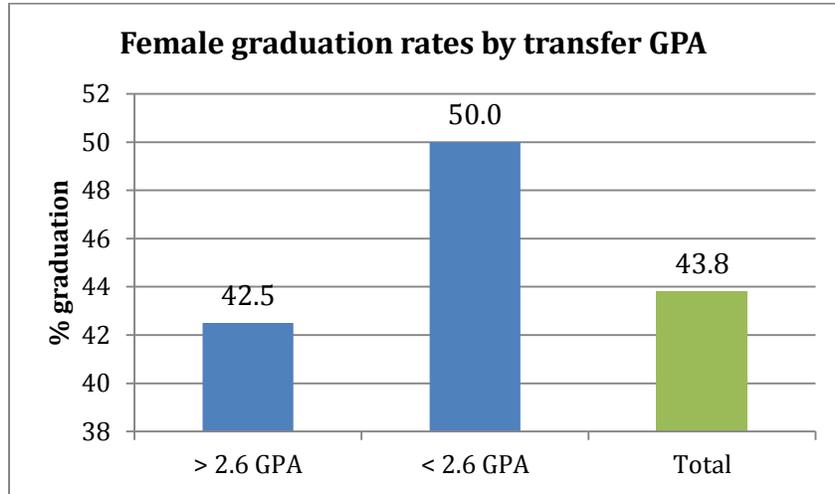


Figure 7: Female graduation rates by transfer GPA

Table 5: Six-year graduation rates of URM students

	<b>Total #</b>	<b># Graduated</b>	<b>% Graduated</b>
<b>&gt; 2.6 GPA</b>	28	10	35.7
<b>&lt; 2.6 GPA</b>	25	11	44.0
<b>Total</b>	53	21	39.6

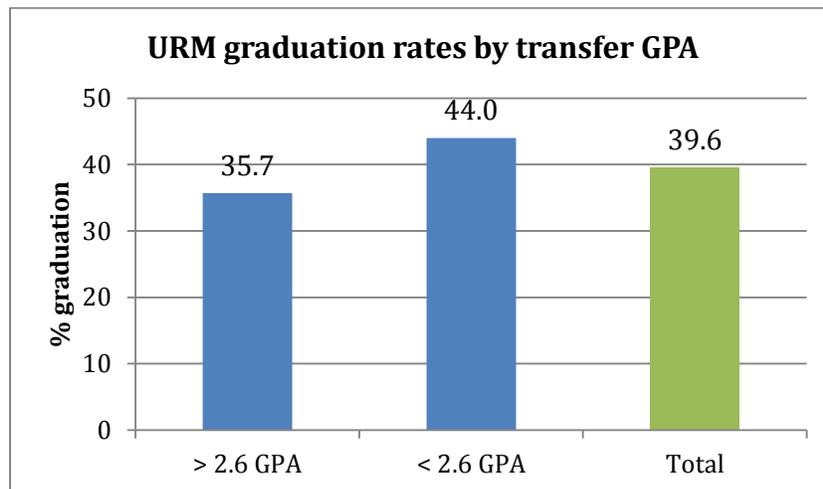


Figure 8: URM graduation rates by transfer GPA

## Conclusions

The minimum admission GPA for transfer students has been a topic of discussion in the School of Engineering for quite some time. This is because there have been concerns that students transferring in with low GPA would most likely not be ready for a rigorous engineering curriculum. Therefore, the authors conducted a systematic study using a newly developed database covering transfer student enrollment from 2007 to 2014 to determine if there is a critically low transfer GPA, below which students are less likely to successfully complete an engineering degree. To facilitate this study, two hypotheses were postulated. The conclusions are presented below:

**Hypothesis 1:** *There is a critically low transfer GPA, below which the student should consider majors outside of engineering.*

The data set we analyzed indicated that the critically low transfer GPA is 2.6, below which the six-year graduation rate is 42.5%. However, the graduation rate for students who transfer with a GPA above 2.6 is only 56.3%. Although the difference in graduation rates between the two groups is statistically significant, a 56.3% graduation rate in six years should not be viewed as an acceptable rate. The School should design and implement performance improvement programs as soon as possible. This is an absolute necessity, especially for female and under-represented minorities, as their graduation rates are significantly lower than the rest of the transfer population.

Another disturbing statistic is that, of the 48 graduating students who entered the School with a GPA below 2.6, 25 were under-represented minorities. The adaptation of a minimum 2.6 GPA for future admissions needs to be further evaluated both quantitatively and qualitatively as part of a cost-benefit analysis since it will critically affect enrollment of under-represented minorities into engineering programs.

**Hypothesis 2:** *There are differences in performance in students transferring with different credit hours.*

While each category of students investigated (under 30 credit hours, 30 to 60 credit hours, over 60 credit hours, and students with and without previous degrees) exhibited some degree of “transfer shock,” the six-year graduation rate increased with increased transfer credit and was highest for students who had earned an associate degree (62.5%).

## Future study

The compiled database and the findings of the investigation reported in this paper encouraged the authors to conduct future studies encompassing various issues related to the admission, retention, and graduation of transfer students. We defined six major areas of future investigation:

- conduct a cost-benefit analysis, qualitatively and quantitatively, for increasing the current admission GPA from 2.0 to 2.6;

- investigate whether there are differences in retention and graduation rates among various engineering majors;
- investigate and design methods of improving retention and graduation rates under the current admission standards;
- identify high-risk courses for transfer students and design support programs;
- investigate if there are differences in performance of students transferring from different institutions; and
- investigate the applicability of the findings to transfer students in other disciplines within the institution.

## Acknowledgements

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