

Does “ENGR290: Professional Skills for Engineers” improve overall self-efficacy of first term transfer students?

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Summary

- On average, transfer students who entered the College of Engineering during the Fall Terms 2012-14 experienced a decrease in first-term GPA when compared to their final GPA at their previous educational institution.
- Survey respondents who enrolled in “ENGR290: Professional Skills for Engineers” during the Fall Term 2014 indicated greater self-efficacy with respect to written forms of technical communications when compared with respondents who did not enroll in the seven week short-course. Unfortunately, the response rate for students who enrolled in “ENGR290: Professional Skills for Engineers” during the Fall Term 2014 was low (N=6).

Motivation

According to Bandura and Schunk (1981), “self-efficacy is concerned with judgments about how well one can organize and execute courses of action required to deal with prospective situations containing many ambiguous, unpredictable, and often stressful elements.”

For transfer students, such “stressful elements” include an unfamiliar campus, large class sizes and increased workload. Like traditional college students, transfer students need support understanding the difficulties they may face, bolstering their confidence in their ability to persevere in the face of these challenges, and reinforcing a personal connection to support people. (Owens, 2010; Glass & Harrington, 2010; Moser, 2012). As a result of these challenges, undergraduate transfer students often face “transfer shock”, which is manifested in a significant drop in their first term grade point average (GPA) when compared to their final GPA at their previous educational institution.

Since the Fall Term 2012, the University of Michigan College of Engineering has offered a course entitled “ENGR 290: Professional Skills for Engineers”. The seven week short-course at the start of the Fall Term seeks to ease the transition of transfer students into the college. This project was developed to assess whether the current short-course format is effective at improving transfer student self-efficacy within the College of Engineering.

Approach

The primary goals of this research include:

1. An assessment of whether the decrease in first-term GPA typically reported in education literature is observed in first-term transfer students within the College of Engineering.
2. An assessment of the first-term, transfer student self-efficacy within the College of Engineering.
3. An assessment of the effectiveness of “ENGR290: Professional Skills for Engineers” in improving the transfer student self-efficacy within the College of Engineering.
4. An assessment of the relative comprehension of basic forms technical communications by the students enrolled in “ENGR290: Professional Skills for Engineers” during Fall Term 2014, as compared with those transfer students who did not enroll in the course.

To address the first goal, demographic and first-term academic performance data was obtained from the College of Engineering. The data for transfer students entering the College of Engineering during the Fall Terms of 2012-14 were included, as these academic terms represent those during which “ENGR290: Professional Skills for Engineers” has been offered.

To address the second and third goals, two online surveys were used. The first survey, offered during September 2014, was offered solely to transfer students who were enrolled in “ENGR290: Professional Skills for Engineers” for the Fall Term 2014. A second survey was offered to all transfer students who enrolled in the College of Engineering during the Fall Term 2014. An incentive was offered for students choosing to participate in the second survey: an opportunity to win one of four \$50 gift cards.

To address the final goal, the second online survey included two, short-answer questions, which required the students to complete a foreword from a technical memorandum and to discuss elements of professional meeting minutes.

Given that the second online survey was completed on 28 February 2015, only preliminary survey results are included.

1. GPA Change

First, we investigated the degree of “transfer shock” experienced by first-term transfer students within the College of Engineering. This was measured by determining the difference between their GPA at the end of the first term within the College of Engineering and their final GPA at their previous institution. A negative value represents a drop in their GPA. These results suggest:

- A consistent, mean decrease in GPA for each of the three years studied (Table 1).
- A distribution in GPA Change centered near zero, but skewed toward negative GPA Change (or decreases) (Figure 1).
- A generally positive GPA Change for international students and Ann Arbor campus cross transfers, but negative changes for the remaining transfer type categories (Table 2).

Table 1. Mean First Term GPA Change for Transfer Students entering Fall Terms 2012-14

First Term	Number of Transfer Students	Mean Change in GPA	Standard Deviation
Fall 2012	326	-.15	.50
Fall 2013	236	-.17	.58
Fall 2014	300	-.16	.60

Figure 1. Distribution of first-term GPA change for transfer students entering Fall Terms 2012-2014

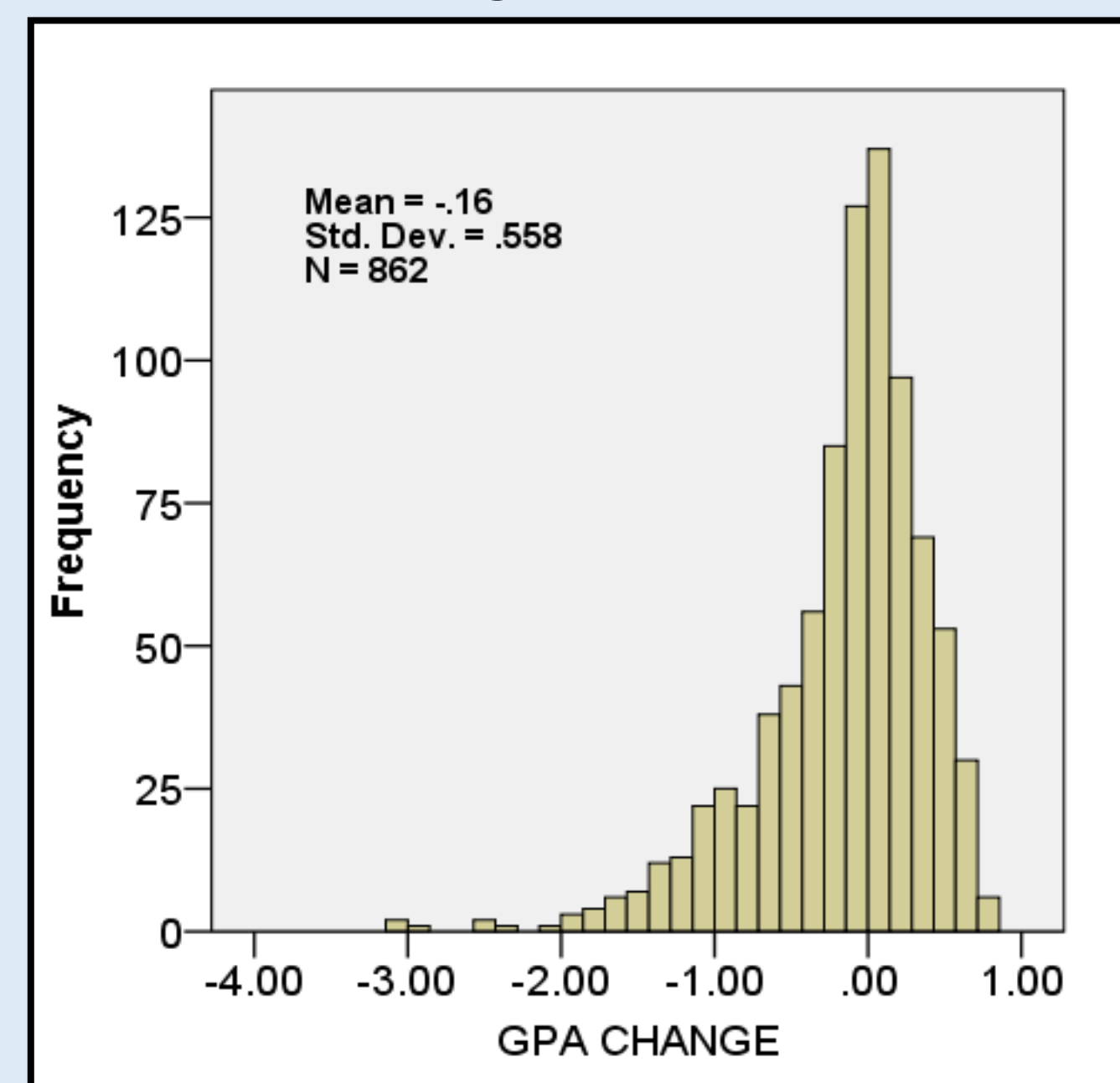


Table 2. Mean first-term GPA Change for transfer students entering Fall Terms 2012-14, by transfer type

Transfer Type	N	Mean Change in GPA	25th-Percentile	50th-Percentile	75th-Percentile
SJTU	310	.25	.11	.27	.43
CROSS	210	-.04	-.13	-.04	.04
INTL	73	-.33	-.60	-.28	.02
USPR	96	-.53	-.82	-.39	-.17
UMFLINT	24	-.71	-1.10	-.60	-.38
MCC	138	-.75	-1.05	-.67	-.33
AUC	11	-.78	-1.39	-.79	-.39

SJTU	Shanghai Jiao Tong University
CROSS	From other UM-Ann Arbor unit
INTL	From other international school other than SJTU
USPR	US Citizens or Perm Residents too
MCC	From a Michigan Community College
AUC	Atlanta University Center

2. First Term Concerns/Challenges

First-term transfer students often have a number of concerns which can impact their self-efficacy, and thus academic performance, at their new academic institution. As part of our second online survey, we asked the Fall 2014 transfer students to provide their top three concerns upon entering the College of Engineering. We also asked the students to indicate which challenges they actually faced during their first term. The results are summarized below.

1. Concerns entering first term

- a. Difficulty of coursework/adequately prepared (N=27)
- b. Making friends/fitting in (N=18)
- c. Time management/workload (N=13)
- d. Finances (N=7)
- e. How to study (N=6)

2. Challenges actually experienced during first term

- a. Time management/workload (N=22)
- b. Difficulty of coursework/adequately prepared (N=11)
- c. Making friends/fitting in (N=8)
- d. Communications/Language (N=7)
- e. TIE (with 5 each)
 - i. Access to/Interaction with instructors
 - ii. Commuting/transportation
 - iii. Getting involved in research or co-curricular activities

3. Impact of “ENGR290: Professional Skills for Engineers” on Student Self-efficacy

The students were asked about the extent to which they agreed (Strongly Disagree, Disagree, Agree, Strongly Agree) with the following statements regarding particular skills which transfer students traditionally express concern.

Table 3. General skills self-efficacy

Question	Fall 2014 Non-ENGR290 Transfer Students Percent of Total Responding Either Agree or Strongly Agree (N=46)	Fall 2014 ENGR290 Transfer Students Percent of Total Responding Either Agree or Strongly Agree (N=6)
I am familiar with the campus resources that are available for use in performing literature reviews and other research-related investigations.	67%	67%
I am confident in my ability to manage my time and academic tasks effectively.	87%	83%
I am confident in my ability to work within a diverse (gender, race, ethnicity) engineering project team.	89%	100%

A key component of the course involves the introduction of the primary forms of technical communication. The students were asked to imagine that they were part of a research group for which they had been asked to brief their faculty advisor on any research progress. The students were asked about the extent to which they agreed (Strongly Disagree, Disagree, Agree, Strongly Agree) with the following statements about their technical communications proficiency.

Table 4. Technical communications self-efficacy

Question	Fall 2014 Non-ENGR290 Transfer Students Percent of Total Responding Either Agree or Strongly Agree (N=46)	Fall 2014 ENGR290 Transfer Students Percent of Total Responding Either Agree or Strongly Agree (N=6)
I would feel comfortable writing professional meeting minutes.	65%	100%
I would feel comfortable writing a professional memorandum.	72%	83%
I am comfortable making an oral presentation.	80%	67%

Preliminary Findings

The preliminary findings from this study are as follows:

1. On average, transfer students who entered the College of Engineering during the Fall Terms 2012-14 experienced a decrease in first-term GPA when compared to their final GPA at their previous educational institution. Only the cohort of first-term transfer students from the Shanghai Jiao Tong University experienced a mean increase in GPA.
2. For transfer students entering the College of Engineering during the Fall Term 2014, the top three concerns were: (i) their ability to handle the difficulty of coursework, (ii) their ability to make friends and/or fit in with their new peers, and (iii) their ability to properly manage their time.
3. The top three challenges actually experienced by transfer students entering the College of Engineering during the Fall Term 2014 where the same as the concerns that they had as they entered their first term.
4. The students who enrolled in “ENGR290: Professional Skills for Engineers” indicated greater self-efficacy with respect to written forms of technical communications, though the number of respondents was low (N=6) for the students enrolled in the course.

Next Steps

During the final portion of this project:

1. The analysis of technical communications proficiency based upon online survey results will be performed, with comparisons made between students who enrolled in “ENGR290: Professional Skills for Engineers” during the Fall Term 2014 and those who did not.
2. A more formal statistical analysis will be performed to determine the statistical significance of differences noted in results.
3. Online survey results will be used to determine potential relationships between transfer student self-efficacy/performance and other factors such as transfer student type, declared major, and other demographic information collected during survey (ex: whether students were working to pay for school, extent of commute to campus, whether the student participated in the College of Engineering’s Schematics for Success Program, etc.).

References

- Bandura, A. and Schunk, D.H. (1981). Cultivating Competence, self-efficacy, and intrinsic interest through proximal self-motivation. *Journal of Personality and Social Psychology*, 41, 586-598.
- Glass Jr., C. J. & Harrington, A. R. (2002). Academic Performance of Community College Transfer Students and “Native” Students at a Large State University. *Community College Journal of Research and Practice*, 26(5), 415-430.
- Moser, K. M. (2012). *Redefining transfer student success: Transfer capital and the Laanan-transfer students’ questionnaire (L-TSQ) revisited*. (Doctoral Dissertation). Proquest Dissertations and thesis.
- Owens, K. R. (2010). Community College Transfer Students’ Adjustment to a Four-Year Institution: A Qualitative Analysis. *Journal of The First-Year Experience & Students in Transition*, 22(1), 87-128.

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