
AC 2011-2089: REDUCING GPA SHOCK FOR ENGINEERING AND COMPUTER SCIENCE COMMUNITY COLLEGE TRANSFER STUDENTS

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Reducing GPA Shock For Engineering and Computer Science Community College Transfer Students

Abstract

The need for more engineers in the United States has caused greater attention to be focused on community colleges as an untapped source for more engineering students. Although a community college student may have developed a very solid GPA at their school, when the student transfers to a four-year institution, the GPA starts all over at 0.0. While this phenomenon is disappointing in itself, other factors come to play which may make the transfer student suffer severe “GPA shock”. The new transfer student faces many new obstacles and situations that can contribute to a poor academic performance, especially the first semester or year, and a shockingly lower, perhaps a whole grade point lower, GPA than that accumulated at the community college.

This paper conducts a literature review on “transfer shock” especially with students from community colleges and then describes an academic scholarship success program workshop solution to reduce this possible GPA shock. A key component of this workshop is the Guaranteed 4.0 Learning System developed by Donna O. Johnson. Along with learning the system, the students learn tips and receive help from other students using the 4.0 System successfully.

The GPA transfer shock is measured for the new community college transfer students in the Ira A. Fulton Schools of Engineering for the Fall 2010 semester. The transfer shock of the women students is then compared to that of the men and found to be higher. The primary interest of this paper is a comparison of the GPA shock for new engineering and computer science community college transfer students in this academic scholarship program with new transfer students not in the program by comparing their transfer GPA with their first semester four-year institution GPA. The scholarship students had a lower transfer shock of .112 to that of .488 of a grade point for students not in the program.

I. Introduction

Due to tougher economic times, more students are choosing the community college as a start for their college career. This also means that more community college students are being encouraged to transfer to four-year institutions in engineering and computer science to help meet the critical shortage of engineers in the United States. While there are many adjustments the new transfer student must face, one of the more difficult ones is “GPA shock”. While a community college student may have developed a very solid GPA, when the student transfers to a four-year institution, the GPA starts all over at 0.0, so there is no “cushion” of a strong GPA to lean on. Undoubtedly the new transfer student, especially one transferring from a community college with small classes to a large research university, faces many changes and barriers that can be responsible for a decrease in GPA, especially during the first semester. The student may have to work to afford the higher tuition. Other obstacles may include tougher course work, longer

homework assignments, longer driving times to attend school, less contact with professors, large classes, and a lack of knowledge of resources (including free tutoring, information on Blackboard, or tutorials that are readily available). In addition, the new transfer student may feel lonely and unsupported. All of these factors can combine to overwhelm a student or at least cause him or her to not do their best learning.

Karen Thurmond gives an excellent review of the literature and study of “transfer shock (which) refers to the tendency of students transferring from one institution of higher education to another to experience a temporary dip in grade point average during the first or second semester at the new institution.”¹ As early as 1954, researchers were comparing transfer students to native students to determine if they performed the same academically. Martorana and Williams at the State College of Washington found that the transfers had a problem of adjustment which affected their academics effectiveness during their first semester of transfer, which became “negligible” as the transfer students adjusted.³

The term “transfer shock” was coined by John R. Hills of the University System of Georgia in 1965.² The term grew out of the discussions on whether a community college transfer student does as well as a native student in their studies. Some argued that there was no difference between the two groups of students, but did not back it up with data or citations. Hill looked at data of studies on this subject from 1928 to 1964 and found that the results were consistent in showing a drop in grade point average after transfer. Hill asked guidance counselors in high schools to inform their students that this transfer shock occurred and that as a transfer student it would probably take longer to graduate than native students at a four year school.

As more students began to attend community colleges in the 1980s, more studies occurred on transfer shock. During this time the studies showed that transfer students usually earned GPAs .20 to .30 points lower than they were before transfer. In general they showed that after one semester, the transfer student did as well as the native student. The studies also showed that in general, the higher the GPA before transfer, the higher the GPA after transfer.¹

Subsequent studies have looked at gender and ethnicity as factors in both GPA before transfer and the GPA during the first semester of transfer. A study in 1993 looked at the factors of academic class, gender, ethnicity, age, major, resident status, and GPA at transfer to determine any influence on transfer shock.⁴ The study showed that in their first transfer semester, junior students’ GPA declined from 3.099 to 2.764 and sophomore students’ declined from 2.971 to 2.667 (consistent with earlier findings). Earning an Associate degree seemed to be a positive factor in transfer academic performance. Students transferring from Illinois public community colleges generally had a higher degree of shock transfer than students transferring from all other institutions. Women brought in higher transfer GPA’s than men, and generally outperformed men at both the sophomore and junior levels. The minority Illinois community college transfers brought in lower transfer GPA’s and experienced a greater degree of transfer shock. This study also showed that transfer performance varied widely by majors.

Since we are interested in the transfer shock for engineering and computer science students, let us consider studies which looked at the transfer student’s major. Cejda⁵ reports a study of 100 transfer students by academic division and found that math and business majors experienced

transfer shock, but students in other fields did not. A follow-on study by Cejda and others⁶ studied the transfer shock for associate degree students in four categories: fine arts and humanities, mathematics and sciences, social sciences, and professions. Their study showed no significant differences existed among mean community college GPA's relative to the students' majors and no significant difference existed between two- and four-year college GPA's for the sample. At the same time, they did find an interaction between location and major on students' GPA's. For community college mathematics and science majors, the mean GPA declined significantly after transfer to the four-year school.

While many studies have been made on transfer shock, since the term is still around after 40 years, it is clear that there is not an easy solution to prevent its occurrence. One study reported that 79% of transfer students experience transfer shock.⁷ It is not possible to eradicate all of the changes that transfer students may face, so it is important to soften their effect as much as possible, to prepare transfer students for these changes, and to empower transfer students to do well academically and emotionally in spite of the changes. This preparation needs to be done by community colleges and four-year colleges need to work to soften the shock. Phillips⁸ urged that more attention needs to be paid at the community college to the academically well-prepared students. He suggests that one way to help this population with its special requirements is to offer honors classes or an honors program to challenge these students and to prepare them for transfer to a four-year institution.⁹ The studies go on. Pennington¹⁰ suggests that testing should be done to see if new counseling programs should be adopted. In his studies, he concludes that the community college GPA is the best predictor of success at a four-year institution.

Universities join the community colleges in being concerned about transfer shock. Southern Methodist University gives a list of activities on their website that a transfer student can do entitled, "How To Escape Transfer Shock".¹¹ Ishitani¹² explored how entry at different times and semester GPAs affected transfer student departure. His studies agreed with others, in that his study showed that first semester sophomores and juniors were 73% less likely to drop out than freshman transfer students. He also found that after controlling for explanatory variables, high semester GPA's were positively associated with higher persistence rates. At the recent meeting of the Creating Pathways for STEM Transfer Student Success sponsored by NISTS, two presentations focused on transfer shock.^{13, 14} The general conclusions are that each community college and university should study their particular situations and put in support systems such as: transfer orientation sessions, peer mentor programs, transition courses specific for transfer students, one-stop centers for transfers, developmental academic advising, and financial aid programs for transfers.¹⁴

II. Engineering and Computer Science Transfer Students at Arizona State University

Other than a standard "Transfer Orientation Night," the Ira A. Fulton Schools of Engineering had not been actively involved in working with transfer students until 2002. At that time, the author became the PI of an NSF CSEMS grant (grant # 0123146) and established an Academic Scholarship Program for upper division students. Half of the 22 students in the first cohort were transfer students. As we worked with the students, we noticed from their questions and remarks during meeting ice breakers that the transfer students were dealing with a different set of issues and concerns than the native students. The transfer students didn't know where "standard

resources” were located, had difficulty getting into study groups, felt isolated, and were not very persistent in getting their problems solved, primarily because they did not know how and felt overwhelmed with all of the issues of being a “new student”. No matter how well they had done at the Community College, they were now starting all over with a 0.0 GPA. It became obvious that more needed to be done to specifically help support upper division transfer students. The next year a second NSF CSEMS grant was awarded (grant # 032412) and through this funding an Academic Scholarships Program for transfer students was begun that continues to the present, now funded by an NSF S-STEM award (grant # 0728695). The purpose of the programs is to graduate the students in good academic standing and to have the students go right on to graduate school full-time after obtaining their undergraduate degree.^{15,16,17} The scholarship students all have financial need. Women and underrepresented minority students are especially encouraged to apply for a scholarship, now \$4K per academic year. In this paper, the word “engineering” includes both engineering and computer science.

The minimum requirements for the NSF S-STEM scholarship award are as follows:

- U.S. Citizenship or Permanent Resident Status
- Minimum 3.0 GPA
- Unmet financial need as shown by FAFSA
- Full-time student enrolled in engineering or computer science majors
- Completed application including a personal statement
- Two letters of recommendation from math, science, or engineering professors

Women and underrepresented minority students are especially encouraged to apply for the program through emails and phone calls. The program and program applications are displayed publicly on the Ira A. Fulton Schools of Engineering Scholarship website. Generally, 60% of the transfer scholarship students are female or underrepresented minority or both.

Since this is a study on the effects of an Academic Scholarship Program on a cohort of transfer students, a natural question arises: Is the scholarship group from a different population than the transfer students not in the program? Are the GPA's different? Do qualifications for the Scholarship Program contribute to making the scholarship group different from those not in the program? Since U.S. citizenship or permanent resident status is required for the scholarship transfer students, there is a small difference in the two groups. However, in general, only about 10% or less of the ASU engineering transfer students are international students. Currently, all students must have at least a 3.0 GPA to be enrolled in the Ira A. Fulton Schools of Engineering, so there is no automatic differentiation due to incoming GPA. A higher GPA may play a role in the selection of scholarship students since there are more applicants than there are scholarships. Students with higher GPAs may also be better writers of their Personal Statement and be able to solicit more enthusiastic recommendation letters from faculty. Also students with higher GPA's may be more likely to apply for a scholarship since they believe that they have a pretty good chance of getting a scholarship. The average GPA of the 183 transfer students in this study was 3.42809. The average GPA of the 19 scholarship transfer students was 3.60474 and the average GPA of the transfer students not in the scholarship program was 3.40762. On the other hand, all of the scholarship transfer students had unmet financial need, while this was not true of all transfer students. The students with unmet financial need tend to work more and have the worry of making ends meet each semester. These students may also be more inclined to take a larger

class load in order to complete school as quickly as possible and be in a position to start earning money.

In addition to the scholarship, the transfer students are encouraged to take advantage of the METS (Motivated Engineering Transfer Students) Center. Computers and free printing are available at the Center as well as space for studying, networking, group study, and a refrigerator and microwave to aid with lunch. The Center is staffed by a Director, who has a Master's degree in engineering, and students, who are mainly underrepresented (woman or underrepresented minority) and a transfer student. This staff is qualified to provide informal counsel at all times. Regular workshops are made available in the Center to help with academic and professional skills.

Students who are awarded the \$4K academic scholarship are required to enroll in a one credit course each semester called a STEM Academic Success Class. The class meets six times per semester, with each meeting occurring five times (three times on Thursday and two times on Friday) to accommodate all of the student schedules. The students are taught learning skills through the "Guaranteed 4.0 Plan" developed by Donna O. Johnson.¹⁹ The Plan is the only guaranteed learning system in existence. Johnson offers any student that she trains \$100 which she will pay if the student follows the Plan 100% and does not received straight A's. Ms. Johnson has yet to pay out any money. The most difficult part of the plan may be to get at least 8 hours of sleep each night. The Academic Success Class helps the students to do well academically, as well as broaden their general knowledge about engineering, including resumes, internships, research, networking, portfolios, career planning, graduate school, industry (through industry speakers with graduate degrees), and academia. This program has been described in detail in other papers. In this class, the transfer students are warned about trying to be a full-time student and working more than 20 hours per week.

Additional transfer students are receiving \$300 scholarships if they enroll in the Academic Success Class, attend the classes, and turn in the assignments on time, all designed to help the students develop their academic and professional skills. Additional \$4K scholarships are being awarded to students from five non-metropolitan community colleges (Arizona Western College, Central Arizona College, Eastern Arizona College, Cochise College, and Mohave College) from an NSF STEP award (grant # 0856834) called METSTEP.²¹

This Academic Scholarship Program for transfer students has been very successful in retaining and graduating them with over a 90% success rate. In general, the upper division engineering transfer students at ASU have a retention and graduation rate of less than 70%. In addition, for the first five years of the transfer Academic Scholarship Program, 30% of the scholarship transfer student graduates went right on to graduate school full-time in engineering. Considering that these students all had unmet financial need and the fact that less than 20% of all engineering graduates nationally go right on to graduate school, this is an excellent percentage. At the same time, the percentage has only been 10% for all ASU engineering students. During the last two years, an amazing 50% of the scholarship transfer students, who have graduated, have gone right on to graduate school full-time.

Now we ask three questions: Is the GPA transfer shock of transfer students engineering students entering ASU typical of transfer shock shown by studies that have been made? Is there a difference by gender? Is the GPA transfer shock for engineering students less for the transfer students in the NSF Academic Scholarship program than for the average transfer student?

III. Engineering GPA Transfer Shock

For Fall 2010, a total of 344 new engineering and computer science students transferred into the Ira A. Fulton Schools of Engineering. Of this group of students, 198 were upper division transfer students from community colleges. Fifteen of these students did not complete the semester. Since we do not know the cause for their withdrawal from school, these students were eliminated from this study. Interestingly, the transfer GPA of the students who withdrew during the first transfer semester was 3.32, not that different from the GPA (3.43) of the transfer students who completed their first semester. The incoming GPA of these 183 students was compared with their average GPA at the end of the Fall 2010 semester. A cumulative GPA of at least 3.0 is required for admission to the Ira A. Fulton Schools of Engineering and the average incoming GPA for these students was 3.42809. The average GPA for these 183 new transfers at the end of their first semester was 2.97914 with a GPA drop of a .44896 grade point. This grade drop is a little higher than the average shown in the literature (.20-.30), but most studies included all majors and, in general, showed that the GPA drop was greater for math and science majors. The comparison of the pre-transfer GPA with the GPA at the end of the first transfer semester was done with a paired t-test and showed that this is a GPA transfer shock at a P-value of 0.00. This says that we are 100% sure that there is a GPA drop after transfer. The test results are shown in Table I where the variable is the Transfer GPA – ASU 1st Semester GPA. A large positive T means that the differences between the transfer GPA minus the ASU 1st Semester GPA are positive in general and the ASU 1st Semester GPA is lower than the transfer GPA.

Paired T-Test and CI: Transfer GPA, 1st Semester ASU GPA

Paired T for Transfer GPA - 1st Sem ASU GPA

	N	Mean	StDev	SE Mean
Transfer GPA	183	3.42809	0.29899	0.02210
1st Sem ASU GPA	183	2.97913	0.86054	0.06361
Difference	183	0.448962	0.791816	0.058533

95% lower bound for mean difference: 0.352191

T-Test of mean difference = 0 (vs > 0): T-Value = 7.67 P-Value = 0.000

TABLE I. Paired T-Test of the Transfer Shock = (Transfer GPA – ASU 1st Semester GPA) for Fall 2010 Community College Transfers to ASU Ira A. Fulton Schools of Engineering.

We note that the standard deviation for the ASU scores is much larger (indicating more scatter) than that for the transfer GPA's. Figure I shows the scatter of the differences (the transfer shock).

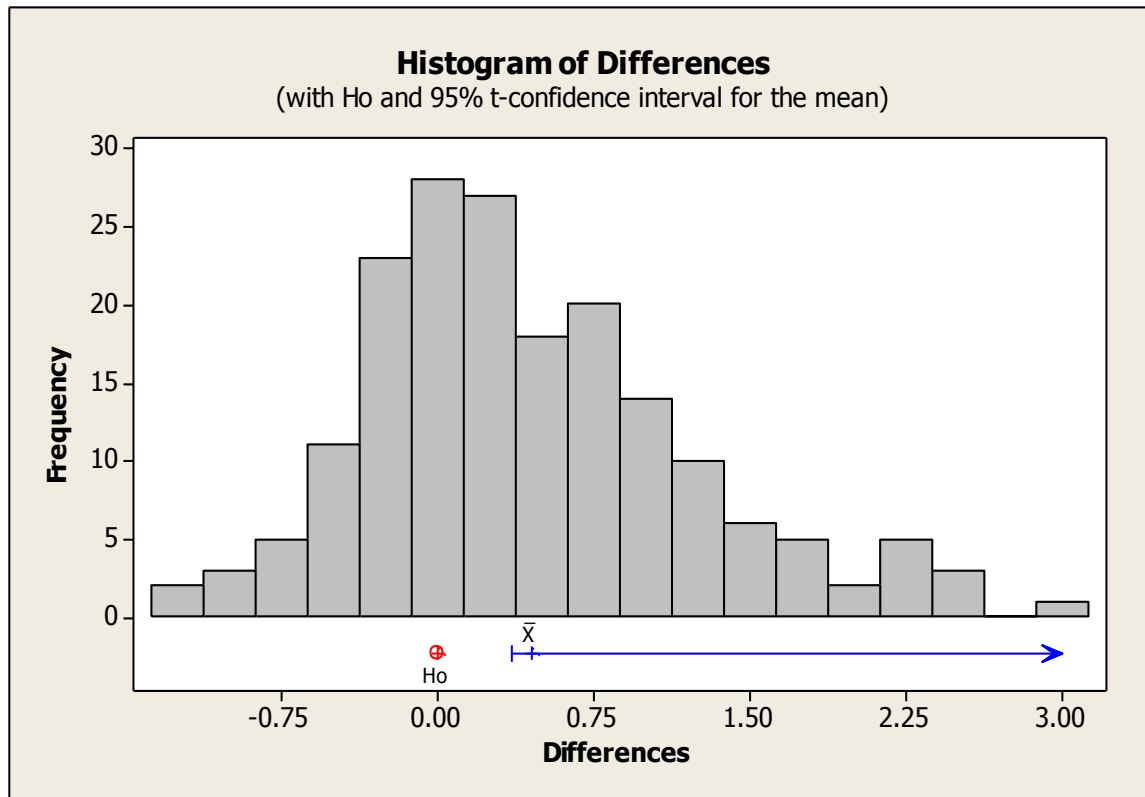


FIGURE I. Histogram of Differences of Transfer GPA – ASU 1st Semester GPA for Community College Upper Division Engineering Transfer Students Fall 2010. The sample size $n = 183$.

We note that the most negative a difference can be is -1.33, in the case where a transfer GPA is 3.0 and the ASU first semester grade is a 4.33 (all A+'s). On the other hand, a positive difference could be at most 4.0, when a transfer GPA is 4.0 and the ASU first semester grade is 0.0. The \bar{x} is shown at the mean of the differences, .448962.

Of the 183 students, 35 were women. The paired t-test and histogram for the differences for the women are shown in Table II and Figure II. The women transfer students had a grade drop of .5674 compared with a grade drop of .4209 for the men and an overall grade drop of .4490. Because the sample size of the women is only 35, the T value is smaller than with all of the of the students, but the P-value is still 0 (100% sure that there is a grade point drop for the first transfer semester.) This would appear contrary to the literature, but the studies that cited that women had higher transfer GPA's and higher GPA's as a transfer students, were not looking at engineering only. Figure II shows that the women students suffered a slightly larger GPA drop than did the men. Their average drop in grade point was about .57.

Paired T-Test and CI: Female Transfer GPA, Female ASU 1st Semester GPA

Paired T for Female Transfer GPA - Female ASU 1st Semester GPA

	N	Mean	StDev	SE Mean
Female Transfer	35	3.43743	0.33743	0.05704
Female ASU 1st S	35	2.87000	0.85909	0.14521
Difference	35	0.567429	0.725025	0.122552

95% lower bound for mean difference: 0.360203

T-Test of mean difference = 0 (vs > 0): T-Value = 4.63 P-Value = 0.000

TABLE II. Paired T-Test of the Transfer Shock = (Transfer GPA – ASU 1st Semester GPA) for Fall 2010 Community College Transfers to ASU Ira A. Fulton Schools of Engineering for Female Students.

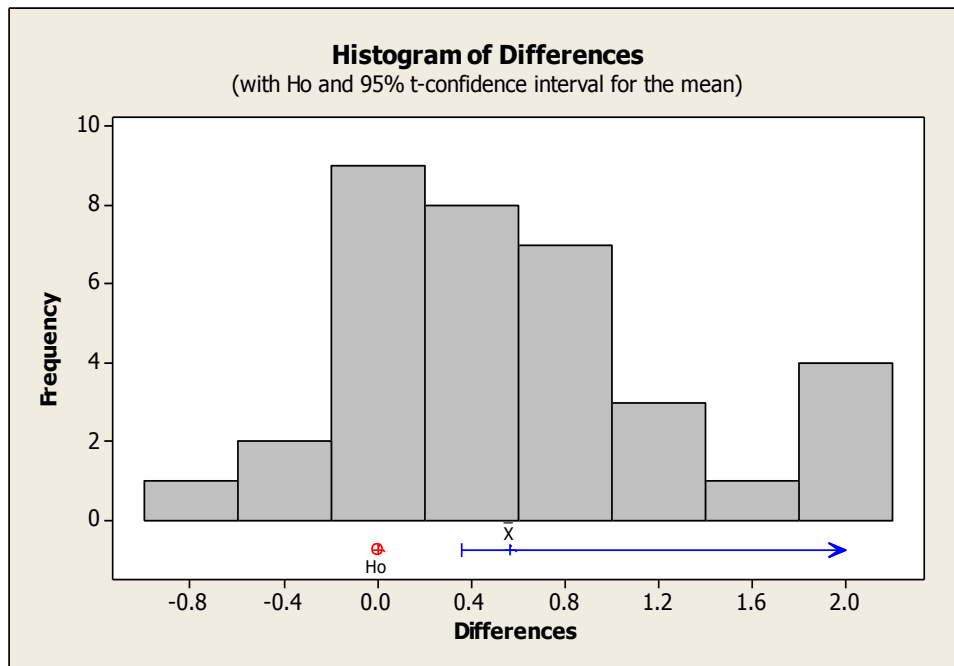


FIGURE II. Histogram of GPA Differences Between Transfer GPA and ASU 1st Semester GPA for Community College Transfer Females. The sample size n=35.

The third question is if the Academic Scholarship Programs community college transfer students had less transfer shock than the whole group of transfer community college students. The 19 scholarship students had an average transfer grade drop of only .1116 (Table III), while all other new transfer students had a transfer grade drop of .4881. A paired t-test shows that statistically speaking with a P-value of .194, the average GPA of the scholarship students did not drop their first semester: they did not have GPA transfer shock. Seven of the students had a higher ASU grade than their transfer grade. Of these students, three had straight A's and two others had a

3.87 or above. Five students had less than a drop of .17 in their GPA. The scholarship students also included two students who had a drop of a full grade or more. This is seen in Figure III.

Paired T-Test and CI: Scholarship Transfer GPA, Scholarship ASU 1st Semester GPA

Paired T for Scholarship Transfer GPA - Scholarship ASU 1st Semester GP

	N	Mean	StDev	SE Mean
Scholarship Tran	19	3.60474	0.25454	0.05840
Scholarship ASU	19	3.49316	0.54194	0.12433
Difference	19	0.111579	0.549133	0.125980

95% lower bound for mean difference: -0.106878

T-Test of mean difference = 0 (vs > 0): T-Value = 0.89 P-Value = 0.194

TABLE III. Paired T-Test of the Transfer Shock = (Transfer GPA – ASU 1st Semester GPA) for Fall 2010 Community College Scholarship Transfer Students to ASU Ira A. Fulton Schools of Engineering.

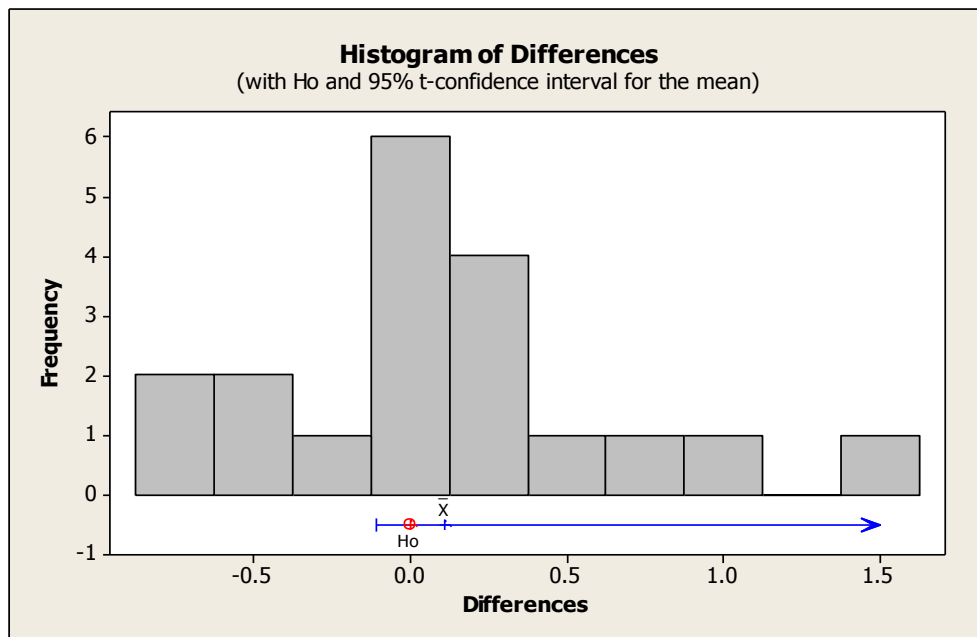


FIGURE III. Histogram of GPA Differences Between Transfer GPA and ASU 1st Semester GPA for Fall 2010 Scholarship Community College Transfers. The sample size n=19.

This is a small sample and it is difficult to say that the difference in GPA transfer shock for the scholarship students was all due to the METS program and primarily the Guaranteed 4.0 Plan. However, one transfer scholarship student, when told of the difference in transfer shock for the scholarship transfer students, said that, certainly for her, the difference was the Academic Scholarship Program and the 4.0 Plan. She noted that a comparable new female engineering

transfer student from her community college, who was not in the scholarship program, really struggled her first semester.

The average GPA transfer shock for the scholarship transfer students was .1116 compared with an average GPA transfer shock of .4880 for all non-scholarship transfer students in this study. Further analysis will be done including transfer students from more semesters.

IV. Conclusions

Our review of literature showed that often new transfer students, in general, suffer a GPA loss of about .2-.3 of a grade point when going from a two-year to a four-year college. Studies have shown, however, that mathematics and science students usually suffer a larger loss than other transfer majors. Our 183 community college new transfers had an average grade drop of .449. The women students had a larger transfer shock than the men, .567 to .439 of a grade point. The community college scholarship transfer students, our main interest, had only a .112 grade drop compared with a .488 grade point drop for non-scholarship students.

Although we may have not accounted for all factors which may have played a role in the students' GPA transfer shock, it would appear that the Academic Scholarship program is a positive influence in lowering transfer shock.

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