Sophomore Transfers: Who Are They and What Support Do They Need?

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Engineering Sophomore Transfers: Who Are They And What Support Do They Need?

Abstract

Due to the increasing need for more engineers in the United States and given that less than 50% of the students who begin an engineering degree actually complete it, retention has recently drawn a lot of attention and study. Over the past 10-20 years, an increased emphasis has been placed on supportive freshman programs as an answer to "weed-out courses." As freshman retention has increased, attention has turned to the next highest dropout point for engineering students which is during or after their sophomore year. Sophomore retention programs are becoming popular. As the need for more engineers continues, another area which has received increased attention is the recruitment of engineering students from community colleges. Although some upper division transfer students are able to graduate in two years, many take three years or more. Although classified as juniors, the students who need at least three more years to graduate are really "sophomore transfers." Very little research has been done on sophomore transfers in engineering. Beginning in fall 2013, Arizona State University recognized this group of students and placed a cohort of them in a lower division Academic Success and Professional Development class. This paper will discuss who "sophomore transfer" students are and explore the type of support that they need.

I. Introduction

Engineering is famous for having freshman "weed-out courses" where the professor tells the students at the beginning of the semester: "Look to the left of you. Look to the right of you. Only one of the three of you will survive this course." A beginning freshman engineering student is too valuable to lose as easily as this. Recent increased calls for more engineers by President Obama[1] have again fueled discussion and action for increasing the number of engineers. During the past 10-20 years, there has been an increased emphasis on freshman engineering programs, since it was not uncommon in the past for 30-40% of engineering freshman students to not continue in engineering to their sophomore year. The American Society for Engineering Education (ASEE) has an entire division devoted to first-year programs. In the 2013 ASEE Conference, there were at least 32 papers presented, with two workshops and one panel, in addition to 11 poster session entries, all focused on freshman engineering programs. The topics included retention, teamwork, design projects, putting fun in programming fundamentals, large classes, engineering math, and research.[2] As a result of these programs, retention to the sophomore year is increasing.

Some engineering programs have a common curriculum for all freshmen and sophomore students and then have students choose their major beginning their junior year. Since engineering students may not have identified with a particular engineering major or engineering field of interest

during the first two years, they may become interested in other fields and leave engineering by their junior year. In this paper, the term "engineering" shall include both engineering and computer science.

This paper is focused on engineering students who are both transfer students and sophomores, even though they may be classified as upper division students due to their total number of earned credit hours. During the 2012-2013 academic year, 581 students transferred into engineering and computer science in the Ira A. Fulton Schools of Engineering at Arizona State University (ASU). Of this total, 458 were classified as upper division and 123 as lower division students. The numbers of new transfer students in fall 2013 are shown in Table 1.

		Lower Division	Upper Division	Total
Fall 2013 New Engineering & CS Transfers	**Female**	22	51	73 (15.7%)
	Male	102	291	393 (84.3%)
	Totals	124 (26.6%)	342 (73.4%)	466 (100%)

Table 1. Fall 2013 New Engineering and Computer Science Transfers by Division and Gender.[3]

We note that approximately one-fourth of the new transfer students are lower division students. For fall 2013 this means that these 124 students, in general, did not fit the classification of freshman or upper division. However, many of the students classified as upper division will need three years or more to complete a Bachelor's degree in engineering and so are really sophomores.

A very disturbing number is that only 15.7% of the new transfer students were female, which is lower than the percentage of females (18%) in the college. One recent study found that females are retained in engineering as well as males.[4] The primary reason there are so few women in engineering is that so few even start engineering. This study also found that engineering students do not drop out at rates higher than other disciplines. The basic problems remain: better recruitment and retention are needed for the United States to have more engineers. We now look at characteristics of sophomores, transfers, and then engineering sophomore transfer students.

II. The Sophomore Slump

The second largest drop in the retention of engineering students typically occurs between the sophomore and junior years; therefore, it is not surprising that in recent years some attention has turned to sophomore retention programs. "In response to the growing call to increase college completion rates, many campus officials have turned their attention to the 'sophomore slump'—a term that broadly defines the somewhat-common and lackluster performance of a substantial portion of second-year college students."[5] As a consequence, Noel-Levitz produced a research report in 2013 based on a student survey given to 3,870 second-year college students at 28 colleges and universities nationwide in 2012. A majority of the 66.5% response rate students were female. Although this survey was not focused on only engineering students, the general findings may give us some insight to students classified as sophomores. The primary findings were:

- Only three-quarters of the second-year student respondents from four-year private and public institutions were able to affirm that they "felt energized" by the ideas they were learning in most of their courses;
- Only two-thirds of the respondents from two-year public institutions were able to affirm the statement, "I have many friends and feel at home here;"
- Respondents across institution types reported relatively low satisfaction in areas such as their frequency of communication with an academic advisor and the availability of work experiences associated with students' career interests;
- Only a slight majority (more males than females) of respondents across institution types indicated they had the financial resources they needed to finish college. Yet, on the upside, similar percentages of students indicated they were receptive to financial guidance.[5]

Interestingly, 73% of the surveyed students agreed that they needed to study more than they did last year. The study suggests that sophomores should not be assumed to have "successfully transitioned" to college: as a cohort and as individuals they have distinctive needs and experiences.[3] In general, students also realized that they needed to seek tutoring and complete their education programs. However, only 56% of the students in two-year institutions planned to transfer to another institution or were undecided. In particular the sophomores said that they needed more help with "financial assistance, interaction with academic advisors, and with the availability of relevant service learning/internship opportunities."[5] The report notes that campuses are putting programs for second-year students into their strategic plans and laud these efforts. However, another of their recent reports notes that "programs designed specifically for second-year students" is one of the top two least used strategy and tactical plans used by colleges.[6] Noel-Levitz encourages such strategic plans to include all of the services available campus-wide to assist sophomores.[5]

III. Transfer Students and Success

Since more U.S. engineers are needed, additional attention has also recently been focused on the community college (CC) and transfer students as a rich, largely untapped source for more engineers.[5] Since a high percentage of women and underrepresented minority students attend community colleges, transfer students are also an excellent source for diversity in engineering. Although one might assume that transfer students already understand the academic system and do not require special help, Noel-Levitz[7] found that transfer students exhibit similar levels of academic confidence as second-year students. In addition, transfer students may suffer from "transfer shock," a period of adjustment which usually results in a decrease in their GPA from a half to a whole grade point.[8,9]

Less than 50-55% of all students who begin a major in engineering, graduate in engineering.[10] This percentage is not unlike other majors, but is especially important to note for engineering since the nation and our economy need more engineers. This graduation rate generally refers to the retention of first-time, full-time freshman students to graduation. Typically, about 30% of engineering students drop out after their first year and an additional 20% drop out after their

sophomore year. In addition, a recent study by Noel-Levitz showed that only 70% of upper division transfer students in all majors actually earn a Bachelor's degree after transfer.[8] The percentage of upper division transfer students in engineering is suspected to be somewhat lower. At ASU the graduation rate for upper division transfer students in engineering and computer science is 70% for males and 64% for females.[3]

A recent book, "Completing College: Rethinking Institutional Action" by Vincent Tinto,[11] details the four conditions within colleges and universities that promote retention and graduation:

1. Expectations,
2. Support (academic, social, and financial),
3. Assessment and feedback, and
4. Involvement.

Student retention is greatly influenced by clear and high expectations. Tinto points out that students need to know what to do and what level and quality of effort is expected to be successful. The institution needs to have consistent and clear expectations for behavior and degree completion. Good advising and roadmaps (programs of study) are necessary. Students also need to know what is expected of them in the classroom.[11] The students then, of course, need to adopt these expectations as their own.

Support always includes academic and social support and, sometimes, financial support. Most transfer students need financial support. At ASU, over 90% of transfer students have unmet financial need. A major reason that most transfer students chose a CC is the lower tuition and the proximity to home which saves on room and board. The CCs in Arizona have a tuition fee approximately 25% that of the state universities. Tinto lists the usual academic support that is important for students: basic skills, developmental, or remedial courses (usually found at the CC); tutoring; study groups; supplemental instruction; and summer bridge programs.[11] Support programs help students succeed, enhance self-efficacy, reduce stress, and increase future success.[11] Social support is also important, especially "those that influence students' sense of belonging and membership in the social communities of the institution."[11] Peer mentoring is an additional good social support.

Assessment and feedback and, lastly, involvement are the last two retention categories. Assessment at entry, classroom assessment, and early warning systems are effective with feedback to the student.[11] Either academic or social involvement can help a student to have a sense of belonging. In addition to student organizations, the classroom can be used to engage students, as well as learning communities and service learning.[11]

Since 2002, the Ira A. Fulton Schools of Engineering has had special scholarships and a success class for upper division transfer students which closely follow the four requirements for retention as listed by Tinto.[12-15] Scholarships are the key to the success for the transfer students program. Scholarships allow the students to work less hours or not at all. Scholarships can also require the students to take a class which can help them to succeed. From 2002-2015, we have had National Science Foundation (NSF) CSEMS or S-STEM grants, the latest of which was award # 1060226.

A major purpose of these grants is to provide scholarships to STEM students (in our case, engineering and computer science students). The minimum criteria for a scholarship is: US citizenship, permanent residency, or refugee status; full-time student of at least junior status; minimum 3.0 GPA; and unmet financial need as determined by FAFSA. Students are now awarded scholarships at the rate of $2K per semester ($3,250 per academic year in 2002 which almost matched tuition at that time) which covers about 40% of full-time tuition. A condition of the program is that a scholarship student must attend the academic success class each semester of the scholarship. The academic success class was at first a seminar, but it was difficult to maintain good attendance and to have a good effort on assignments. We changed the seminar to a one-credit class and then changed it to a two-credit class with buy-in from the students. The two-credit class does not count on a Program of Study, but the assigned grade does count in the student GPA.

The Academic Success and Professional Development (ASAP) class assignments are all designed to have the student know and do the things that they need to do to be a successful student including: a detailed time management schedule, the Guarantee 4.0 Plan,[16] visits to the professors of their classes, a resume, an interest/research paper, a career planning paper including 10 years past the Bachelor's degree, and a portfolio. Class topics include how to interview and work a career fair, understanding the different structures of companies, research, internships, and what graduate school is all about. The students are also given success tips and constantly encouraged to do well and to aim for graduate school. If the students turn in satisfactory assignments on time, they can earn an A+ in the course. Ten volunteer hours are also required. Hours for being either a mentor or a mentee count toward the 10 hours, as well as hosting potential students who visit the Motivated Engineering Transfer Students (METS) Center, which is the hub of the program. The transfer students who work in the Center act as informal consultants to especially assist new transfer students. This center is visited by 300-400 students per semester, 70% of which are transfer students.

Since 2009, we have had a second NSF funded program for transfer students that includes scholarships. The Motivated Engineering Transfer Students/STEM Talent Expansion Program (METSTEP) program (NSF award # 0856834) targets five non-metropolitan CCs: Arizona Western, Central Arizona, Eastern Arizona, Cochise, and Mohave. This program provides about 20 $4K scholarships per year for students from the five targeted CCs with the same minimum requirements as the scholarships previously described.

ASU is in the center of a large local high tech environment with a large demand for engineers with a graduate degree. One large local company expects that 50% of their hires will have a graduate degree. In order to meet this demand, both locally and nationally, and because we believe the engineer with a graduate degree has a much greater opportunity to work in an interesting area for which they have a passion, we encourage our transfer students from the time we talk to them in their CC classroom to their graduation to consider going directly to graduate school. The scholarship students continually hear about graduate school, must research which graduate schools would be best for them, and each year hear a panel of graduate students tell them "what graduate school is really like." Two programs also encourage our scholarship

students to pursue graduate school immediately. Our college has a "4 + 1" program for better students which allows students to double-count two or three courses for their Bachelor's and their Master's degree, enabling students (with careful planning) to obtain a Master's degree one year after receiving their Bachelor's degree. Our S-STEM grant provides $2K per semester scholarships for graduate school for up to four semesters to students who have graduated through our undergraduate program. Although many of our program graduates go to other graduate schools on scholarships or fellowships, a good number also continue at ASU and take advantage of these two programs.

The METS transfer program has proved to be very successful. The transfer scholarship students are graduating at a 95% rate (compared with a 70% national rate for all majors and an ASU engineering graduation rate of 70% for males and 64% for females for upper division transfer students). In addition, 50% of these scholarship transfer students go directly to graduate school after graduation. This rate is amazing when you realize that all of these students have unmet financial need. In addition, the national rate for engineering graduates going directly to graduate school is estimated at about 20%. At ASU, only about 11% of the graduated upper division transfer students go right on to graduate school. From the feedback that we receive from students, a major reason fewer students go to graduate school is that they have no idea how it can really help them in their career. Since more than 90% of CC transfer students have unmet financial need, it follows that most of them want to get a good paying job as soon as possible. In addition, although a few transfer students who join our scholarship program know that they want to go to graduate school, most do not. Our research has shown us that 70% of the scholarship students who started the program with no intention to go to graduate school and who later went right to graduate school, did so due to the influence of this scholarship program.

The required attendance in the ASAP class due to the scholarships is at the heart of this program. Noel-Levitz's Report on college transfer students[7] stated that the key to retain transfer students is the same as that for native students: student success programs "based on the unique needs of individual transfer students and their unique cohorts." The study goes on to say that "programs that are required, rather than optional, are likely to benefit more students." [7] To encourage transfer students in addition to those awarded the $2K scholarships, we have provisions through our S-STEM awards to give $300 scholarships (for a maximum of two semesters) to students who enroll in and earn an A in the Academic Success class, and who were also qualified for the regular scholarship. Although students declare that if they had known how much the course would help them, they would have taken it for free, some students admit that they only took the course initially because it offered the small scholarship. Some students without scholarships attend the course semester after semester because it helps to encourage them to do well in their studies.

IV. Sophomore Transfers

Some CC transfer students are upper division engineering students: they need only two more years to complete the work for a Bachelor's degree. We have a considerable number of students who come as "sophomore transfers" into engineering. This can occur when the student has

enough transfer credit hours to classify as a junior, but not all of these transfer hours count in an engineering Program of Study. Therefore in terms of an engineering Bachelor's degree, the transfer student is really a sophomore. Beginning in fall 2013, we recognized this group of students and placed a cohort of them in our lower division ASAP class. In the past, these students were placed in an Academic Success class that included upper division native and transfer students, as well as graduate students.

In our work with community colleges over the last 12 years,[12-15] we have always stressed that the CC student should stay at the CC as long as they can make progress in their engineering or computer science program. The reality is that in spite of this encouragement, some students transfer to a university and are really engineering sophomores with at least three years of undergraduate engineering left to complete, even though the university may classify the student as a junior. This is a matter of concern when the minimum qualification for a scholarship is that the student be qualified as an upper classman as an engineering major. An upper division engineering student should only take 2 to 2.5 years to graduate, however, "sophomore transfers" take three or more years. We have had a few of these students apply and be accepted into our upper division scholarship programs in the past. However, recently we are encountering quite a few of these students. There are several problems with this situation. One problem is that instead of committing a scholarship for two or two and a half years, the student may take three to four years to graduate. If that student then goes on to graduate school after earning the Bachelor's degree, the student may be in the program receiving scholarships for six years. Attending the same type of class for that many years is not good for the student and is a challenge to the instructor to continually change the program.

How do these "sophomore transfers" develop? There are several paths.

- The student may have earned an Associate Degree at a CC and therefore conclude that it is time to go to a university. This Associate Degree may be an Associate of Arts degree and include very few of the lower division engineering courses required in a university. Even an Associate Degree in Science or Engineering may not include the complete lower division Program of Study required for a Bachelor's degree at a university.
- A student who wants to earn an Associate Degree at a CC may have to take several general education credits that do not count toward an engineering program.
- Many CCs do not offer all of the courses required in a lower division engineering program, so the transferring student necessarily has some engineering courses to complete before they can be considered a junior.
- Many CC students are not sure of their major at first, so are not necessarily taking only the courses that will count toward an engineering major.
- This same pattern of taking courses that may not count in a Bachelor's degree engineering program can also happen to students who transfer from another college or university.

These students then include those who attended CCs or other colleges and universities that did not have complete lower division engineering programs, but also students who may have earned

an Associate degree which did not include all of the lower division engineering courses. This may be due to the classes not being available at the CC or that the student decided rather late in their time at the CC that they wanted to major in engineering. Through our research we have learned that at least a third of the engineering CC transfers only decided on engineering as their major after they were at the CC. This means that they may have been behind in their mathematics and physics when they came to the CC.

Because they are new transfers to the university, the sophomore transfers would normally have approximately the same "transfer characteristics" as an upper division transfer student. In a study done in Fall 2012, 120 of 133 transfer students in an ASAP class completed an on-line survey.[15] The students were asked what their expectations were before transferring to ASU and what were their realities. The top 10 realities for females were the same as for males except that males were not "overwhelmed with classes/logistics" in their top 10.The females top 10 realities were: higher tuition, expensive parking, some very large classes, the university is large, the Transfer Center helped, a long commute, overwhelmed with classes/logistics, difficulty parking, pace of classes is much faster, and classes have more assigned homework. These 10 realities were each selected by 50% or more of the 24 female respondents. Additional realities included: classes are harder than expected, hard to get into study groups, lonely (don't know anyone in class), too many credit hours/too much work, easy classes taken (upper division classes are harder), did not spend much time on campus, had a friend/mentor, transfer GPA may drop, hard to get to know professors, feel like a freshman, don't know where the resources are, feel lost, and worked too much to do well academically. In addition, there were five categories that were statistically more of a reality for females than for males: higher tuition, upper division classes are harder, took too many credit hours to do well or due to work, all of the easy non-engineering classes have already been taken, and being overwhelmed with classes and logistics.[10] These results indicate that female transfer students may have a more difficult time adjusting to transfer than male students.

There were also statistically significant differences between what the students expected and what they actually encountered in their transfer. For females, they overestimated that they would have no friends and be all alone and underestimated that they would have more assigned homework. On the other hand they overestimated that their GPA would drop and that the pace of the classes would be much faster. At the same time, the males also underestimated that they would find friends. Other factors that they underestimated were more assigned homework, that the university is large, and that the pace of classes is much faster. In these realities we clearly see the need for academic and social support.

V. How Can "Sophomore Transfers" Best Be Retained?

Since "sophomore transfer" students still have three or more years at a university, how can they best be retained to graduation? We have run programs for upper division transfer students and lower division native students for over 10 years. Do these programs work as well for "sophomore transfers"? What encouragement and support is the same as that needed for upper division students and what needs to be different? We will now analyze how well our upper division

program (which includes graduate students) matches Tinto's[11] four points for good retention for sophomore transfer students.

High Expectations: An area of our Academic Success program for upper division students that is equally appropriate for sophomore transfers is having high expectations and strong encouragement for the students. The program students are told from day one that we expect them to graduate with a strong GPA and to go on to graduate school and that we believe they are capable of doing so. In fact, when we talk to CC students about our program before they have even decided on a transfer, we tell them that we will expect them to go to graduate school. At first we thought that this would scare off students, but they have told us that it was a factor in them choosing to transfer to ASU.

From the feedback that we have received from students, a major reason so few students go to graduate school is that they have no idea how it can really help them in their career. Since more than 90% of CC transfer students have unmet financial need, it follows that most of them want to get a good paying job as soon as possible.

Two other major questions, especially for transfer students with unmet financial need, is are they capable of doing graduate work and how will they pay for graduate work. Transfer students, especially females and underrepresented minority students, may need extra encouragement to believe that they are capable of doing graduate work. By holding graduate panels where the students can see and talk to students similar to themselves, many transfer students can be encouraged to believe that they, too, are capable of doing good graduate work. The sophomore transfer students are encouraged to seek summer engineering internships to help pay for school. Assignments through the Academic Success class helps them to prepare for interviews and internships, as well as jobs. The students also learn about ways to support themselves in graduate school, such as with fellowships, scholarships, and assistantships. The students are also shown the value of securing a loan for graduate school rather than working part-time for low wages, or having the difficult situation of working full-time and taking graduate classes part-time.

Support: Tinto classified support in three categories: academic, social, and financial. By support in these areas, we will include tools, skill building, and advice for success. In our Academic Success Program, the key to success is providing some financial support through scholarships and to, more importantly, as a part of the scholarship, require that the students register for an ASAP class.

Our ASAP class for upper division transfer students includes academic support, primarily through the Guaranteed 4.0 Plan[16] which includes detailed time management and a system to learn how to learn. The plan is difficult to follow since it includes the requirement of 8 hours of sleep per night, but the closer students follow the plan, the better they can do academically. The students are encouraged to get in a study group for each of their classes. This not only helps them academically, but helps them get involved and provides social support. They are also warned that they cannot work as much and carry as many hours as they could at the CC. The students are encouraged to spread their class load over the week and to spend as much time on campus as possible to avoid being a PCP (parking lot to class to parking lot) student. PCP students are

usually very lonely. Students are advised to, if possible, take only one lab per semester, but certainly not more than two. Students are also warned about transfer shock and told experience has shown that the closer they can follow the 4.0 Plan, the less transfer shock they are likely to experience.

Social support is provided through the ASAP class and the METS Center. The Academic Success class with over 100 students, meets at five different times for each program. In this way each meeting has only16-25 students in attendance, which allows for networking and discussions with and between the students. The smaller meetings of the Academic Success class help to mitigate the large classes that the students may face. Not only are the students given advice, but questions are answered, and students receive social support when they learn from their peers that they are not the only one with challenges in one or two classes. A discussion about the "imposter syndrome" is also very reassuring to students who thought that they really were not as "smart" as the other students and that soon someone would discover this. The METS Center is run by a Director, who is also an engineer and counselor, and successful transfer students who are always available to help students and who provide strong social support. The transfer center provides a "home away from home," a place with familiar faces in the middle of the largest single campus in the nation. The students are encouraged to use the center for studying, study groups, networking, relaxing, eating lunch, and getting information from the students and Director who work in the center. The program PI and co-PI are also available to help students with problems and questions they may encounter in their classes or outside of their classes. The students are encouraged to ask for help when they need it, especially about possible resources.

Assessment and Feedback: Early assessment is made on the students when they apply for the scholarship and program. The students are given feedback on a tendency for new transfer students to enroll for too many credits while working too many hours. The students are given feedback on their time management plans and all assignments designed to help them become better students. The students know they have several people in the METS Center with whom they can talk if they have problems. Of course, the students also need to get good assessment and feedback from their other classes.

Involvement: Since the ASAP class meetings are small, networking is encouraged through introductions and answering a question of the day, such as "What was the best thing that happened to you in the past two weeks?" or "What is your biggest concern between now and the end of the semester?" The students are further urged to become involved in two student organizations: one in their major and one such as the Society of Hispanic Engineers (open to all students), the Society of Women Engineers, or an engineering fraternity. All students in their first or second semester at ASU are required as a part of the ASAP class to have a more senior mentor from the class. This mentoring relationship must have a minimum of three meetings per semester, with at least one meeting face-to-face. The mentee is required to have at least 3 questions prepared for each meeting. The time spent in this mentoring by both the mentor and the mentee counts toward the 10 hours of volunteer time required by the ASAP class. As a part of the ASAP class assignments, the students must go and introduce themselves to their professor

and make regular visits to make asking for help or a letter of recommendation easier and as a way of learning about the professor's research for possible future involvement.

Our experience with the 4.0 Plan for over nine years tells us that this program works equally well for freshman through graduate students. Since we have already tested this program for students from freshman through graduate students, we know that the 4.0 Plan is necessary for good retention for sophomore transfer students. However, the question remains, are sophomore transfer students best served by being in a class with upper division students?

For the Fall 2013 semester, we placed 12 "sophomore transfer" scholarship students in the lower division ASAP class. The class of 25 also included freshmen and sophomore native students and met nearly every week. This class addressed the same main topics that the upper division ASAP class did, but the upper division class was composed only of upper division undergraduates and graduate students. Therefore the emphasis in this second class is more on graduate school and preparing for after graduation. The topics of the lower division ASAP class included ways to help students with the transfer realities.

Since transfer students have the academic confidence of a second-year students, perhaps by placing them with native sophomore students, they will feel more "normal." It may also be that because the sophomore transfer student is not as far into their engineering program, there may be more doubt if engineering is the right major. We have found in our research that at least 30% of the transfer students only decided on engineering while at the CC; therefore, sophomore transfer students may need more of an emphasis on what engineers do and more of an effort to get them to discover a "passion" for some area related to engineering. We know from working with transfer students that they are older in general than 18-year old freshmen students and usually have different interests, and therefore would rather be with "older" students than freshmen.

VI. Results and Future Work

We know that the basic topics that we cover in both the lower division and the upper division ASAP classes are very helpful to the students and follow Tinto's four basic factors for retention. Over the past 11 years we have noted that now upper division transfer scholarship students are graduating at a rate of 95%. In general, only 70% of ASU upper division transfer students in engineering graduate, with a rate of 64% for females. In addition, close to 50% of the ASU upper division transfer scholarship students are going on to graduate school. In general, about 11% of ASU upper division engineering transfer students go on to graduate school. Nationally, less than 25% of all engineering graduates are estimated to go right on to graduate school.

In the lower division ASAP course, 11 of the 12 "sophomore transfers" did well in their first semester, the 11 having an average GPA of 3.47 and GPAs ranging from 2.86 to 3.90. Only two of these 11 students had a semester GPA of less than 3.00. The twelfth student did not attend the ASAP course nor complete any assignments in the course, which is very unusual, and is not included in the above average/range. This student had less than a 1.0 GPA the first semester, switched to a non-STEM major the next semester, and is now doing well. The average GPA of the 11 new transfer students in the upper division ASAP class was 3.54 with individual GPAs

ranging from 2.06 to 4.00. Again, only two of these students had a GPA of less than 3.0. The other 9 students all had a GPA of 3.5 or better. Therefore, academically the two groups performed about the same if we exclude the one "sophomore transfer" student who appeared to not be academically ready to continue in engineering.

We believe that we are on the right track to separate the "sophomore transfers" from the upper division transfers in our ASAP class. A question that remains is if transfers in general have the academic confidence of a second-year student, do they also have other characteristics of the "sophomore slump" that need to be addressed? Next we will interview and survey the "sophomore transfers" to learn more about their first semester experience, how their transfer expectations and realities compare with upper division transfers, and to determine how closely they behave like native sophomores.

References

1. "Obama: 'We don't have enough engineers'", http://www.computerworld.com/s/article/9717624/Obama_We_don_t_have_enough_engineers , Downloaded 12/31/2012.
2. www.asee.org/search/proceedings
3. Office of Institutional Studies, Arizona State University, obtained 01/06/14.
4. Venere, E., "Research Findings Contradict Myth of High Engineering Dropout Rate," *The Purdue News, August 4, 2009.*
5. Noel-Levitz Research Report (2013). *The Attitudes of Second-Year College Students*, Noel-Levitz, LLC.
6. Noel-Levitz (*2013). 2013 student retention and college completion practices report for four-year and two-year institutions*. Coralville, Iowa: Noel-Levitz, Retrieved from www.noellevitz.com/BenchmarkReports
7. Noel-Levitz Research Report (2013). *The Attitudes and Motivations of College Transfer Student,* Noel-Levitz, LLC. Presentation at National Institute for the Study of Transfer Students, 2/6/2014.
8. Keeley, E. & House, J. (1993). *Transfer shock revisited: A longitudinal study of transfer academic performance.* Northern Illinois University.
9. Anderson-Rowland, M.R. (2011). "Reducing GPA Shock for Engineering and Computer Science Community College Transfer Students," *2011 American Society for Engineering and Education Annual Conference and Exposition, Conference Proceedings,* Vancouver, British Columbia, Canada, 11 pages.
10. "50% of US Engineering Students Dropout – Why?" *Don Dodge on the Next Big Thing –Thoughts on Business and Technology, Nov. 10, 2008.* https://www.dondodge.typepad.com/the_next_big_thing/2008/
11. Tinto, V. (2012), *Completing college: rethinking institutional action*. The University of Chicago Press, Chicago and London.
12. Anderson-Rowland, M.R., Banks, D.L., Zerby, D.L., and Chain, E.I. (2005). "METS Center: A Place Where Community College Transfer Students Encourage Each Other in Obtaining an Engineering Degree." *Proceedings of the 2005WEPAN/NAMEPA Joint Conference*, Las Vegas, Nevada, 11 pages.
13. Anderson-Rowland, M.R. (2008). "Community College Transfer Engineering Students: Does Gender Make a Difference?" *2008 American Society for Engineering Education Annual Conference & Exposition, Conference Proceedings*, Pittsburgh, PA, 13 pages.
14. Anderson-Rowland, M.R. and Rodriguez, A.A. (2010). "Motivated Engineering Transfers – STEM Talent Expansion Program (METSTEP)," *2010 American Society for Engineering Education Annual Conference and Exposition, Conference Proceedings,* Louisville, KY, 12 pages.

15. Anderson-Rowland, M.R. (2013). "Expectations and Realities for Community College Engineering Transfers at a Large University," *43rd ASEE/IEEE Frontiers in Education Conference*, Oklahoma City, OK, 7 pages.
16. Johnson, D.O. & Chen, Y.C. (2004). *Guaranteed 4.0 Plan*. DJYC Studio.