

# NACME RESEARCH REPORT



## 2010 COMMUNITY COLLEGE TRANSFER STUDY

*This report was authored by NACME Director of Research, Evaluation and Policy Elizabeth I. Rivera*

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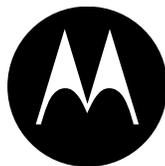


**Community College Transfers in Baccalaureate Engineering  
Degree Programs**

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## **About NACME**

Since its founding over 35 years ago, NACME has stayed true to its mission: To insure American resilience in a flat world by leading and supporting the national effort to expand U.S. capability by increasing the number of successful African American, American Indian and Latino women and men in science, technology, engineering and mathematics (STEM) education and careers. NACME alumni hold leadership positions in industry, medicine, law, education and government. With funding from corporate and individual donors, NACME has supported over 22,000 students with more than \$114 million in scholarships and other support. Currently, NACME is providing scholarship support to more than 1,300 college engineering students through a national network of 49 Partner Universities. NACME is also partnering with the National Academy Foundation (NAF) and Project Lead The Way (PLTW) to launch a national network of urban-centered, high-school Academies of Engineering (AOEs) that will provide all students with a strong science and math education so that they will be college-ready for engineering study.

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## Executive Summary

Enrollment at community colleges has risen, especially among minorities. According to the American Association of Community Colleges, over 50 percent of underrepresented minorities (URMs) in higher education attend a community college. Of the 1,173 community colleges in the United States, 610 (52 percent) offered programs in engineering technologies, and 223 (19 percent) offered programs in engineering. The 11 million students currently enrolled at community colleges in the United States represent a vast pool of talent for engineering schools.

The National Council for Minorities in Engineering, Inc. (NACME) provides scholarships to engineering students at 29 NACME Partner Universities through the NACME Scholars Program. NACME's relationships to leading engineering colleges provide unique quantitative data and access to important key informants able to address critical questions about transitioning minority engineering students from community colleges to four-year engineering programs.

### Key questions:

- (1) How does transfer student success compare to that of traditional students?
- (2) Why do students start at community colleges?
- (3) What strategies can engineering schools use to recruit and retain transfer students?

### Major findings:

- Twenty one percent of NACME scholars had transferred from a two-year to a four-year Partner University.
- NACME transfer students have higher grade point averages (GPAs) than traditional, four-year NACME scholars.
- Transfer students were more likely than those who had started at four-year schools to be retained (enrolled or graduated) as of the 2008-2009 academic year.
- Transfer student success varied by ethnic group: strongest positive impacts were seen for Latino students than for African American or American Indian transfer students.
- Financial need and lack of knowledge about the college application process were important factors in students' attending community colleges.
- Stronger articulation agreements between two-year and four-year institutions would assist students in transferring successfully.

Many students who cannot afford to attend a four-year university begin at a community college and hope to transfer to a four-year engineering degree program. First-generation college students can be impeded by the complicated admission and financial aid processes at many engineering colleges, with the result of choosing to begin their engineering careers at a community college.

Articulation agreements enable community college students to gain a better understanding of pathways leading to the completion of a four-year degree. Improved articulation agreements, would provide community college students with the chance to learn about other academic programs and gain a better understanding—from the community college as well as the four-year university—of which courses are transferrable. This understanding would greatly assist community college transfer students in obtaining a four-year degree without significantly increasing their enrollment time.

## Introduction

The United States needs to train and educate approximately two million workers in the sciences (NSB, 2002) over the next 10 years in order to be competitive in the global market. Recent enrollment trends indicate that increased recruitment, retention, and graduation of underrepresented groups (African Americans, American Indians, and Latinos) in the sciences is essential in meeting this demand. Students are being lost in the field of engineering all along the educational pathway. The participation and persistence rates of underrepresented minorities (URMs) significantly lower than those of the general student population. In 2008, URMs constituted 30 percent of the nation's undergraduate students; however, fewer than 12 percent of baccalaureate engineering graduates in this country are URMs (Frehill, DiFabio & Hill, 2008).

The proportion of URM undergraduate students is expected to grow to 32 percent in 2010 and 38 percent by 2025 and Latinos will account for 90 percent of the growth (Frehill, DiFabio & Hill, 2008). According to a recent report by ¡*Excelencia!* In Education, more Latino students are enrolling in college than ever and they are concentrated in community colleges (Santiago, 2008). The key factors that drive college choice decision for Latinos are cost, accessibility and location. For that reason, 55 percent of all Latino undergraduates were at a two-year college in 2008 (AACC, 2008). Similar trends are occurring in the African American and American Indian communities.

Community colleges are recognized as a major pathway to an engineering baccalaureate for URM groups (NSF, 1996). Recently, enrollment at community colleges has risen, especially among minorities. According to the American Association of Community Colleges, over 50 percent of URMs in higher education attend a community college. And more importantly, 20 percent of engineering degree holders began their academic careers with at least 10 credits from community colleges (Adelman, 1988) and 40 percent of recipients of engineering bachelor and master's degrees in 1999 and 2000 attended community college (Tsapogas, 2004).

In all areas of study, community colleges are an important point of entry to higher education, especially for minority and low-income students. Many of these underrepresented students have their first exposure to higher education engineering at these institutions. Therefore, community colleges possess a special responsibility and influence in moving students through the engineering pathway. From 1999 to 2005, the number of associate's degrees conferred at

community colleges rose from 5.6 million to 7.1 million, an increase of 26.2 percent in six years. During that time, conferral of associate's degrees to URM students at community colleges increased by 51.5 percent (NCES, 2007).

In order to keep up with increasing global competition in the engineering field, our nation must increase the numbers and quality of engineers. In 2005, 66,152 people received their bachelor's degree in engineering in the United States (NSB, 2008). China produced nearly six times as many engineers in the same year (NSBC, 2006). To date, there has not been a significant increase. Nationally, the overall engineering first-year enrollment has declined by six percent from 2002 to 2006 (EWC, 2007).

## Transfer Conundrum

In 2005, community colleges made up almost two-fifths of the degree-granting institutions in the United States (NCES, 2007). Of the 1,173 community colleges in the United States, 610 (52 percent) community colleges offered programs in engineering technologies and 223 (19 percent) community colleges offered programs in engineering. Therefore, it is important that we examine the effectiveness of all strategies designed to attract, retain and graduate engineering students, and find ways to increase the pathway to four-year engineering programs from the community college.

Thousands of students transfer from community colleges to four-year colleges each year. However, there are many transfer problems that inhibit community college students from entering four-year universities. The overall low success of community college students can be attributed to significant dropout rates and low transfer rates. These problems are a major reason that minority and low-income students do not achieve a baccalaureate degree at the same rates as their more advantaged peers, since a majority of disadvantaged students start in community college (Dougherty & Reid, 2007).

One major issue has to do with transfer and articulation policies, which have been a prominent concern in community college research for almost 30 years. In the 1980s, various states began to develop policies that integrated state community colleges with the traditional four-year college and university. This trend continues today in the form of cross-institutional and articulation agreements, which facilitate the transfer of students across all institutions by aligning curriculum and degree requirements. Although articulation agreements occur between four-year universities, these agreements are particularly relevant in community college policy, considering that 28 percent of students enrolling in community colleges express an interest in transferring to a four-year institution (NCES, 2003). It is important to note that this percentage varies greatly by state. Nevertheless, only a small proportion of the transfer hopefuls actually get the opportunity to transfer.

Articulation agreements delineate the pathways for students wishing to use community college enrollment as a stepping stone toward a transfer to a four-year institution (Anderson, Sun and Alfonso, 2006). Agreements can include different components such as incentives to transfer (i.e.: financial assistance or guaranteed acceptance), common general education requirements or common requirements for specific program majors. These policies were intended to impact college enrollment by improving the quality of information available to students and minimizing

confusion about transferring, and receiving four-year institutions. Articulation agreements that define degree and/or program requirements better inform students – who some argue are poorly advised in high school (Rosenbaum, Deil-Amen, and Person, 2006) – and their two-year institutions about the classes students need to take while attending their two-year institution.

In addition to providing students with information about the transfer process, these articulation agreements could potentially increase the chances of a transfer student earning a bachelor's degree. In the past, many transfer students had a difficult time earning credits and experienced lengthier matriculation periods (Long and Kurlaender, 2009). Effective articulation agreements between institutions should improve this situation by limiting the number of credits lost in the transfer process. Articulation agreements must go beyond acceptance at the university level and address issues at the major level.

In 2001, the Education Commission of the States' (ECS) survey of transfer and articulation policies found that 30 states had some type of formal transfer and articulation policy written into legislation. Forty states had some sort of statewide cooperative agreement between postsecondary institutions. Cooperative agreements between institutions can sometimes take the place of legislation if there is no official written transfer and articulation policy in place, and are commonly created on a course-by-course, department-to-department or institution-to-institution basis (ECS, 2001).

In 2005, the National Academy of Sciences released a report titled, "Enhancing the Community College Pathway to Engineering Careers." One of the activities in completing the report was a workshop that explored best practices of 24 transfer partnerships between two- and four-year colleges. Workshop participants generally agreed that a strong partnership between two- and four-year engineering programs improved student recruitment and retention for both institutions.

Community colleges that reach out to potential students through a variety of messages and media and demonstrate that they have a proven record of success in preparing students to transfer to an engineering degree program are more likely to succeed in their recruitment and retention activities, especially if they have an established articulation agreement with a four-year institution. Four-year institutional partners also benefit by being able to draw on an expanded, and in some cases more diverse, recruitment pool that includes talented community college students. Moreover, four-year institutions will have better retention rates when they work together with community colleges to improve the preparation of students to pursue upper-division engineering courses.

Improving the pathway from a two-year institution to a four-year institution in engineering offers one way to increase minority participation in engineering. Partnerships between four-year institutions and community colleges would ensure that students at the two-year schools are prepared to take advanced science, mathematics and engineering classes at the four-year schools (Santiago, 2008).

Other research studies have examined the progress and academic achievement of transfer students. While there is much information available to assess transfer students' progress, there is little data that explores the effectiveness of community colleges in preparing students for a successful transfer, which depends on actions by both two- and four-year institutions.

Studies about transfer students use both quantitative and qualitative methodologies, with the majority being quantitative. Many use existing data because these data are reliable. Often collected for other reasons, these unobtrusive data do not require the cooperation of students, college faculty members, or administrators to complete the study. Existing institutional data on race, gender, age, full-time/part-time status, credits earned and transferred, GPA, and whether the student earned an associate's degree are often used by researchers to focus on student progress at only one institution. For example, Carlan and Byxbe (2000) used institutional data to show that lower-division GPA and college majors were significant predictors of transfer.

Other researchers such as C.E. Harbin (1997), have reported on surveys administered to current and former students to assess student preparation for transfer, providing information that goes beyond the usual institutional data. Harbin found that students felt they were academically prepared for a four-year university, but said they lacked information on transferring. Relying on individuals' impressions, though, can be problematic, as opinions may not be consistent with data on transfer rates and student success.

Qualitative studies are not common in the literature. Some researchers have used interviews and focus groups to understand key issues associated with community college transfer and student success. Davies and Casey (1998) and Townsend (1995) interviewed students to identify what worked in the transfer process and what the community college could do to make the transfer process more effective. In the study, "Traveling the Transfer Path" (1998) interviews of faculty and administrators explored the role of faculty and the barriers to transfer, finding that students benefitted from faculty interventions made on students' behalf.

There is little in the literature that focuses on the specific case of community college transfer students in engineering fields. In 1994, Brazziel and Brazziel studied minority science and engineering doctorate recipients with academic backgrounds in two-year colleges. As mentioned previously, the National Academy of Engineering's 2005 report the important role that two-year colleges could play in increasing the number of engineers in the United States was discussed. Both reports found that the community college pathway to engineering careers can be enhanced by improving communications between the two- and four-year institutions. In addition, the National Academy of Engineering report recommended additional study was needed to document performance outcomes such as recruitment, transfer, retention, and persistence to degrees in undergraduate engineering education (Mattis & Sislin, 2005). In short, how does the performance of engineering students who began at community colleges compare to that of other students?

## Research Design

The transfer process for engineering schools, primarily for students from community colleges, is a significant access point to higher education, particularly for low-income students who are from the nation's rapidly growing populations of color. NACME's mission is focused on the performance of URM students in engineering and, as a consequence, NACME is well aware of this pathway as an important source of potential talent for the nation. However, little analysis is available to give educators and policy leaders a greater understanding of this process as it relates to engineering, and how we can increase success and graduation outcomes for community college students.

NACME has analyzed data collected in conjunction with our NACME Scholars program to understand the level of success of their transfer NACME Scholars. While a transfer is, in and of itself, a major success, in this report, NACME looked at student GPA, and retention-to-graduation rates as critical indicators of transfer success.

In the process of exploring our two research questions, the institutional impact on these student groups was also analyzed. For instance, we looked at whether there are differences in transfer student success in public schools versus private schools; if transfer students are more successful at research institutions than at other types of institutions; and if students at Minority Serving Institutions (MSIs), Historically Black Colleges and Universities (HBCUs), and Hispanic Serving Institutions (HSIs) are more successful than those not designated as minority serving institutions. Further, we explored why students started at community colleges and how engineering schools could tap this rich resource of talent.

### Data

Of NACME's 49 Partner academic institutions, NACME collected data from its 29 Partner Universities in the Block Grant NACME Scholars Program on retention and graduation trends. In addition to the major, GPA and graduation status for the scholars, these data included standard demographic information on 1,688 scholars starting in the 2003-2004 academic year through the 2008-2009 academic year (see Appendix A for a list of NACME Partner Universities). All NACME Partner Universities are four-year institutions. One in five (21 percent, 355 scholars)

students had transferred to one of the NACME Partner Universities from a two-year institution.<sup>1</sup>

Interviews were conducted at three NACME Partner Universities with the largest number of community college transfers among the NACME Scholars in the 2008-2009 academic year. Interviews of students, administrators, and minority/multicultural engineering program leaders focused on how transfer students are supported once they are in four-year universities, how they are doing once they are there, and what support they have received at the four-year school (See Appendix B for interview questions).

### **Definition of Transfer**

Students are considered transfers if they were initially enrolled at a community college prior to enrolling at a NACME Partner University. Students who have started in four-year universities as first-time, full-time students are referred to as traditional students.

The definition of transfer often differs by organization. Some define a community college transfer student as someone who has taken at least one course at the community college level. The NACME definition ensures that our transfers have been enrolled for at least a year at the community college and most have graduated with either an Associates of Science or Associates of Applied Science degree.

### **Methods**

All data items are collected at the end of each academic year by NACME's University Programs department. We then used the Statistical Package for the Social Sciences (SPSS) to complete quantitative analyses of the data. Group differences in retention rates (a nominal variable) were analyzed using cross-tabulations and the Pearson's chi-square test of significance<sup>2</sup>. To examine group differences in mean grade point average (GPA) we used t-tests. After completing the quantitative analysis representatives at three institutions that historically had the most NACME transfer scholars were contacted for interviews. These three institutions are located in different regions in the United States.

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<sup>1</sup> High School & Beyond (HS&B) data shows that 24 percent of students who entered community college within 2 years of graduating from high school transferred to 4-year institutions within 4 years of graduating from high school.

<sup>2</sup> Results are reported as significant at the 0.05 level.

## Major Findings

### Student Demographics

Table 1 shows that as of the 2008-09 academic year, 21 percent of NACME Scholars transferred from a two-year college to a NACME Partner University. Some have completed two-year degrees while others have not. The majority of NACME Scholars (98 percent) are URM: nationally, URMs account for just 16.5 percent of the undergraduate engineering student population. Thirty-one percent of NACME Scholars are female compared to the 21 percent of all students in the United States that received a bachelor’s degree in 2003, 2004 or 2005.

**Table 1. NACME Scholar Demographics and Institutional Characteristics**

	TOTAL		Traditional		Transfer	
	Number	Percent	Number	Percent	Number	Percent
Sex						
Female	524	31.0%	422	31.7%	102	28.7%
Male	1164	69.0%	911	68.3%	253	71.3%
Race/Ethnicity						
Latino/a	791	46.9%	586	44.0%	205	57.7%
African American	776	46.0%	652	48.9%	124	34.9%
American Indian	83	4.9%	64	4.8%	19	5.4%
Other	38	2.3%	31	2.3%	7	2.0%
Institutional Control						
Public	1435	85.0%	1106	83.0%	329	92.7%
Private	253	15.0%	227	17.0%	26	7.3%
Research University	1157	68.5%	928	69.6%	229	64.5%
Minority Serving Institution	525	31.1%	391	29.3%	134	37.7%
<b>Grand Total</b>	<b>1,688</b>	<b>100.0%</b>	<b>1,333</b>	<b>79.0%</b>	<b>355</b>	<b>21.0%</b>
Note: "Research Universities" are those institutions classified in either the "Very High Research Activity" or "High Research Activity" category using the 2005 Carnegie categorization scheme. "Minority-Serving" refers to any institution that was classified as any combination of "Historically Black College or University," "Hispanic Serving Institution," or "Minority Serving Institution". In subsequent analyses, each of these groups--Research Universities and Minority Serving Institutions--are compared to all others.						

Table 1 also shows information about the types of institutions attended by NACME Scholars. The overwhelming majority, 85 percent, attended a public institution, while two thirds attended a research university. Just under one-in-three NACME Scholars attended an institution that was categorized as a Historically Black College or University, Minority Serving Institution, or as a Hispanic Serving Institution.

## Academic Performance

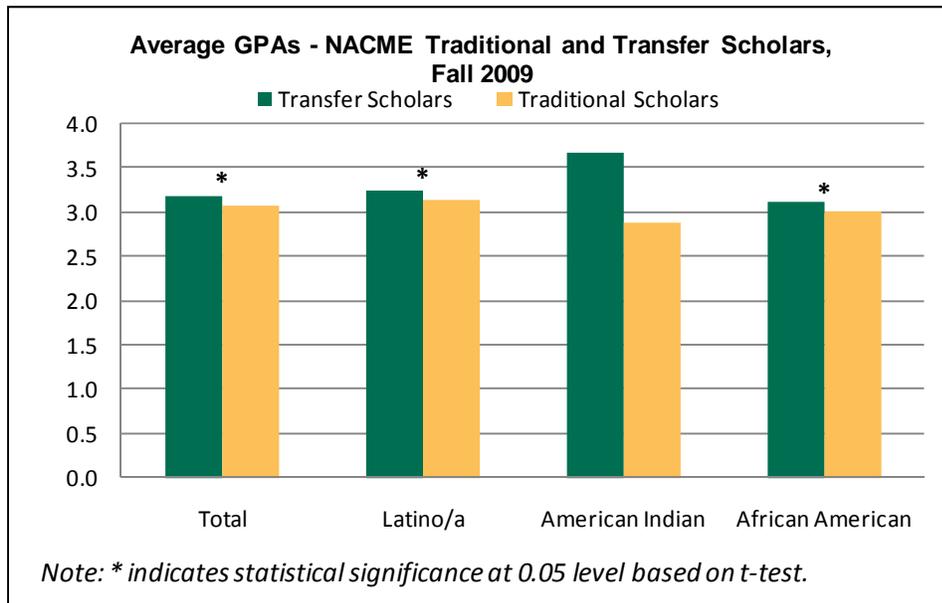
As shown in Table 2 and Figure 1, the average GPA<sup>3</sup> for all students who have received a NACME grant at one point in their academic career was a 3.09. This was lower than the average GPA for NACME Scholars who had transferred into a NACME Partner University (3.17). Latinos, and African Americans follow this trend, with transfer NACME Scholars in these two groups having higher GPAs than traditional NACME Scholars. While the mean GPA gap between transfer and traditional American Indian students appears large, because of the small number of American Indian transfer scholars and the larger variation within this group compared to the other ethnic groups, the difference is not statistically significant.

**Table 2. NACME Scholar GPAs by Transfer Status**

		Total*	Latino/a**	American Indian	African American**
Overall	Mean	3.09	3.17	2.82	3.03
	Std. dev.	0.52	0.52	0.72	0.48
	N	1,688	791	83	776
Transfer	Mean	3.17	3.24	3.66	3.12
	Std. dev.	0.52	0.51	0.80	0.43
	N	355	205	19	124
Traditional	Mean	3.07	3.14	2.87	3.01
	Std. dev.	0.52	0.52	0.70	0.49
	N	1,333	586	64	652
Notes: * Total includes those who reported "other" ethnicities. ** Significant means difference between transfer and traditional students at 0.05 level t-test.					

<sup>3</sup> In order for students to maintain their NACME grant, they must have a GPA of a 2.5 or higher.

**Figure 1.**



### Retention

NACME transfers also have higher retention-to-graduation rates than traditional NACME Scholars by a difference of eight percentage points. As shown in Table 3 and Figure 2, Latinos follow this trend, with transfer NACME Scholars in having a higher retention rate measured as the percentage of scholars enrolled or graduated. African Americans and American Indians, however, did not have different retention rates among transfer or traditional students.

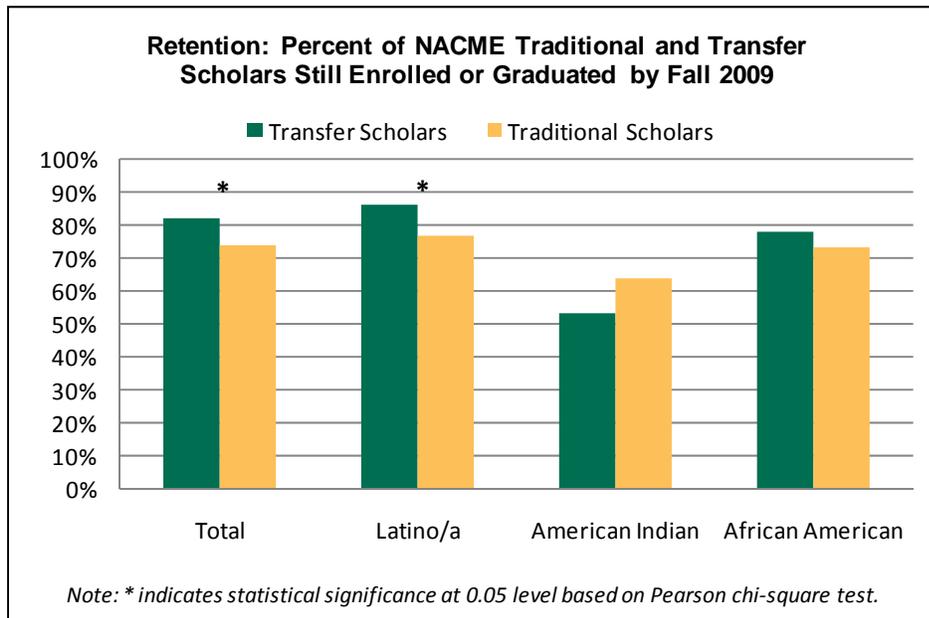
**Table 3. Percent of NACME Scholars Enrolled or Graduated as of the 2008-09 Academic Year**

	Total*	Latino**	American Indian	African American
<b>Overall</b>	76%	80%	61%	73%
<b>Transfer</b>	82%	86%	53%	78%
<b>Traditional</b>	74%	77%	64%	73%

Notes: \* "Total" includes Latinos, American Indians, African Americans, and "Other," which included 38 students.

\*\* Difference between transfer and traditional students is significant at the 0.05 level based on a Pearson's chi-square test.

Figure 2.



### Institutional Effects

Table 4 shows mean GPAs and retention rates for transfer and traditional students broken out by three key institutional features: Control (public or private); Minority Serving Institution Status (HBCU, HSI, and/or MSI); and Research University. There are few significant differences when we look at transfer students as a group or traditional students as a separate group. Among traditional students, those who attended private institutions (81.5 percent) were more likely to be retained than those who had started at a public institution (72.9 percent). Mean GPAs were also significantly different for students depending on the minority serving status of the institution. Regardless of transfer status—i.e., both transfer and traditional students—NACME Scholars who enrolled at an institution designated as an HBCU, HSI, and/or MSI had the highest GPAs (3.27 for transfer students and 3.20 for traditional students), while students at private institutions had lower GPAs (3.11 for transfer students and 3.02 for traditional students). Although not shown, explicitly, here, when we tested the gap in mean GPAs for students at public institutions separately from those at private ones, we found that average GPAs were higher for transfer students—regardless of the institutional control—than for non-transfer students.

**Table 4. Relationship Between Institutional Characteristics on Transfer Student GPAs and Retention**

Institutional Control	Transfer		Traditional	
	Public	Private	Public	Private
Grade Point Average				
Mean	3.17	3.15	3.06	3.09
Std. dev.	0.52	0.48	0.53	0.47
Retention				
Percent enrolled or graduated, 2009	82.1%	76.9%	72.9%*	81.5%*
Total (N)	329	26	1106	227
Minority Serving Institution Status	Transfer		Traditional	
	Minority Serving	Not Minority Serving	Minority Serving	Not Minority Serving
Grade Point Average				
Mean	3.27*	3.11*	3.20*	3.02*
Std. dev.	0.43	0.56	0.44	0.54
Retention				
Percent enrolled or graduated, 2009	82.1%	81.4%	75.4%	73.9%
Total (N)	134	221	391	942
Research University	Transfer		Traditional	
	Research University	All Other	Research University	All Other
Grade Point Average				
Mean	3.15	3.20	3.05	3.11
Std. dev.	0.57	0.40	0.55	0.43
Retention				
Percent enrolled or graduated, 2009	83.4%	78.6%	75.6%	71.4%
Total (N)	229	126	928	405

Note: \* indicates statistical significance at the 0.05 level using a t-test for GPAs and the Pearson's chi-square for retention.

## Interview Results

The relationship between student success and whether or not the student had taken courses at a community college was examined in order to answer the research question, “do engineering students at community colleges perform as well, better than or not as well as other students?”

NACME transfer students have higher GPAs than traditional NACME Scholars. NACME also wanted to explore, “why did these scholars start in community college and what would assist them during their transfer process?” These questions were explored by interviewing administrators (eight), and transfer students (12) at three of the NACME Partner Universities during the spring of 2009.

### Why Community College?

As has been the case in most other studies (e.g., Santiago, 2009), the majority of students who NACME interviewed indicated that they started at a community college because of the lack of financial aid at four-year schools when they first applied. Students also mentioned not being able to afford to go to a four-year college right away because of family circumstances, both in regards to money and distance of the four-year university.

Lack of appropriate guidance was also important in some cases. One student mentioned that as a first generation college student, without guidance on applying to a four-year university, he had to start at a community college. He did not know how to go about applying to college until it was too late. Therefore, he attended a community college until he could apply to a four-year university. Another student mentioned that she was not academically prepared to attend a four-year college right after high school and going to community college allowed her to raise her GPA and reapply to four-year colleges after receiving her associate’s degree.

### Recruitment of Transfer Students

There was a mixture of experience when it came to how students heard about the four-year engineering program. Some students heard about the four-year engineering program while they were attending their community college. The three universities that were contacted for interviews provide a lot of outreach and recruit at the community colleges in their local areas. One school administrator said, “We really want to find community college students that didn’t go to community college knowing that they would transfer to a four-year college. I think that situation is becoming more and more common. We really want to find the students that weren’t thinking about coming to college five years ago.”

While our NACME Partner Institutions still want to attract transfers who attend community colleges with the intention of transferring to a four-year school, universities are working harder to find students at community colleges who haven't thought about transferring to a four-year university in order to increase transfer applications and, therefore, transfer admits.<sup>4</sup> These universities were working with their neighboring community colleges to provide information to students about available programs and financial assistance. "[College administrators] address the idea of affordability, because it can be seen as a barrier. [They] try to make sure that students know about financial aid. There is money available. Summer funding stipends and board allowance." (Director of Academic Programs, NACME Partner University)

In addition, one of the three universities in the study has a transfer agreement program with the local community colleges. Through this program, students can opt to attend a community college and then transfer to the university if they do not gain admission when they first apply to the university. When they complete their degrees at the community college, they are guaranteed admission at the university.

From the students' point of view, they really appreciate the system because it saves a lot of money and time. They save a lot of money on tuition fees. They work in smaller classrooms and interact more with faculty in the community colleges. The programs help with transfer shock. Some students have difficulty with the first one and two quarters. I have seen them grow with the program. They have accomplished a lot of things. They have the opportunity to be contacted by employers. I have several examples of this kind. They really can take advantage of this blend of opportunities.

*Program Coordinator, NACME Partner University*

### **Transfer Student Success**

While transfer shock and under-preparation are often problems for transfer students, all of the students that were interviewed felt that their community college experience prepared them for their four-year engineering degree work. One student mentioned that, "transfer students normally do better and they normally sit in the front. We are normally more mature." Another student said, "I feel like I do better [than the traditional students]. Transfer students do better because they had that period where they had to work harder to catch up to everyone else when we first entered the university."

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<sup>4</sup> This is not true across all universities. In fact, some universities do not allow transfer students to maintain their credits when they transfer in.

Administrators and faculty believe that transfer students appear do much better than traditional students. “After the initial transfer shock, they tend to do just as well.” Although matriculation time to degree is a little longer for transfer students than it is for traditional students, “the retention to graduation rate for transfers is higher”.

### **Successful Transfer Student Support**

Students, administrators and faculty agreed that the programs in place at universities that support community college transfer students when they enter their four-year engineering universities can be attributed to the success of the community college transfers. Among the support services for community college transfer, four-year universities for engineering students, universities have provided orientations for transfer students to get them acquainted with the university. “This helps them to survive the transfer shock. The program does help them tremendously. They are not always aware of all the support services available when they first come, so we make sure that they know so they can use the services.”

In addition to helping students succeed at the university, programs are also geared at success beyond their BS degree. There are services on campuses that can directly and indirectly assist students with their academic and career decisions. “[Staff] also help those students who are interested in graduate school. We have workshops on making graduate school affordable.”

## **Discussion**

Underrepresented transfer students are more successful in regards to undergraduate GPA and retention-to-graduation rates. The data shows that NACME scholars that have started at community colleges have better GPAs and better retention-to-graduation rates. The reasons for beginning at a community college stems from two main issues: money and not knowing about the college application and the financial aid processes. Many students who cannot afford to attend a four-year university will begin at a community college and transfer their community college credits to their four-year engineering degree. First-generation college students are faced with a complicated admission and financial aid process that they are not prepared to tackle at first and must begin their engineering careers at a community college.

Colleges are continuing to improve their recruitment strategies at community colleges and the support system they have set up for their transfer students. Overall, students have felt supported by their universities and want to go on to obtain a graduate degree in engineering.

It would be beneficial to get a more in depth look at the community college transfer students to see which programs are influencing them to transfer and which are benefitting them the most once they are at a four-year university. This would identify best practices and provide insight for other engineering schools that are trying to increase the number of transfer students as a way of increasing their overall numbers and diversifying their programs.

## Policy Implications

In the wake of the economic recession, nearly one-fifth of private colleges and universities reported a smaller than anticipated first-year class for the fall of 2009 (National Association of Independent Colleges and Universities survey), while AACC reports that community college enrollment rose from eight to 10 percent with the average age on their campuses remaining low because there are so many traditional-aged students. The proportion of high-school seniors with high standardized-test scores and strong overall qualifications enrolling in community colleges has grown since 1992. What's more is that two-thirds of students who apply to community colleges intend to transfer to a four-year college or university (Department of Education, 2008). An increasing number of students are starting at two-year colleges and then transferring to four-year colleges and universities in order to save money.

Stronger articulation agreements between two-year and four-year institutions would assist students in successful transfer between community college and four-year colleges and universities. Articulation agreements allow community college students to learn about possible ways to get their four-year degree. While at their community college, students would find out about other programs and what courses are transferrable. Both the community college and the four-year college would be able to properly inform the transfer students about which credits are transferrable. This would assist transfer students in obtaining a four-year degree without a significant increase to time-to-degree.

The transfer process is far more complicated than creating articulation agreements between two-year and four-year colleges. Community colleges need to properly advise their students of the steps to successful transfer. Four-year institutions must make it a priority to effectively transition transfer students into their colleges and universities. Academic workshops, orientation programs and student activities directed at transfer students all can improve the success of transfer students. NACME Partner Universities have several of these programs implemented already, which may be linked to their success with their transfer students.

State and federal policies that mandate community colleges to implement services for students who are considering transferring would increase the number of successful transfers each year. Successful transfer begins at the community college level with students learning about the possibility of transferring to a four-year university. Recently a new crop of federal programs to promote the transfer of credit among community colleges and four-year universities have been

in the works. One such plan was announced July of 2009 by President Obama as the American Graduation Initiative ([www.thewhitehouse.gov](http://www.thewhitehouse.gov)).

## Next Steps

This study examined the success of URM community college transfer students in four-year engineering schools. Since NACME's Partner Universities are all four-year schools, these data are one sided and only looked at students who had transferred. Future research is needed on community college students who have not yet transferred to determine which programs and how these programs influence transfer from the community college to engineering schools.

Looking at students before they transfer and the programs that affect them would further explain the success of community college transfers. Community colleges that have some sort of articulation agreement with NACME Partner and Affiliate Universities should be targeted when attempting to answer these questions. Examining transfer programs at the community college level would help to identify best practices at the two-year colleges in regards to successful transfer. It would also assist two-year colleges in creating more transparent transfer policies with four-year engineering programs.

Clear transfer policies should also focus on more data collection of community college transfer students within engineering. Data collection should look at cohorts of students and include academic records from high schools, community colleges, four-year colleges and beyond, time to a Bachelor of Science degree in engineering, demographic information and programs that students have participated in both at the community college and four-year college that may have influenced both their transfer to a four-year university and their success once there.

This data would help to answer the following questions:

- Why do NACME transfer students have higher GPAs than traditional NACME Scholars?
- What are the differences between transfer students who have indicated a desire to transfer from the very beginning of their community college experience versus those who learned about it later on?
- Are the outcomes related to subsequent education different for students who get "two-year" technical terminal degrees in engineering technologies? Often these students are

not eligible for transfer to four-year engineering programs because many of their credits are considered “vocational” and are not counted towards their bachelor’s degrees. How can these students be put back on track for bachelor’s degrees in engineering?

- Do retention rates in four-year engineering programs differ for transfer students who had received their associate’s degrees compared to those that did not complete a community college degree?
- What are the key differences in transfer success among students of different racial/ethnic groups?
- How can four-year engineering programs target more URMs from community colleges?
- Which articulation agreements or transfer programs are the most successful and why?

Articulation agreements are critical to the success of community college transfers who go on to pursue engineering degrees. Community college enrollment is growing, especially for URMs, and this pool needs to be tapped for four-year engineering degrees. URM community college students need to be made more aware of the opportunities to transfer to four-year engineering programs. This can be done through their community colleges, outreach from the four-year engineering programs, and/or outside sources that highlight the transfer process. Additional research is needed to get the perspective of the community colleges and of more of our NACME universities in order to effectively promote the transfer and success of African American, Latino and American Indian women and men in four-year engineering programs.

## Appendix A – NACME Partner Universities

	INSTITUTION	CITY	ST	Year Started
1	Bucknell University	Lewisburg	PA	2004-05
2	California State University, Los Angeles	Los Angeles	CA	2004-05
3	California State University, Sacramento	Sacramento	CA	2004-05
4	Cornell University	Ithaca	NY	2005-06
5	Drexel University	Philadelphia	PA	1996-97
6	Fairfield University	Fairfield	CT	2006-07
7	Florida A&M University	Tallahassee	FL	2009-10
8	Florida International University	Miami	FL	2003-04
9	Georgia Institute of Technology	Atlanta	GA	2003-04
10	Illinois Institute of Technology	Chicago	IL	2008-09
11	Kansas State University	Manhattan	KS	2005-06
12	Kettering University	Flint	MI	2005-06
13	Louisiana State University	Baton Rouge	LA	2006-07
14	Michigan Technological University	Houghton	MI	2005-06
15	Milwaukee School of Engineering	Milwaukee	WI	2007-08
16	Missouri University of Science and Technology	Rolla	MO	2003-04
17	Morgan State University	Baltimore`	MD	2009-10
18	New Jersey Institute of Technology	Newark	NJ	2004-05
19	North Carolina A&T State University	Greensboro	NC	2003-04
20	Northern Arizona University	Flagstaff	AZ	2005-06
21	Polytechnic Institute of New York University	New York	NY	2004-05
22	Polytechnic University of Puerto Rico	San Juan	PR	2005-06
23	Prairie View A&M University	Prairie View	TX	2005-06
24	Purdue University	West Lafayette	IN	2005-06
25	Rochester Institute of Technology	Rochester	NY	2005-06
26	Rose-Hulman Institute of Technology	Terre Haute	IN	2007-08
27	Stevens Institute of Technology	Hoboken	NJ	2006-07
28	Syracuse University	Syracuse	NY	2006-07
29	Tennessee Technological University	Cookeville	TN	2004-05
30	The City College of New York	New York	NY	2003-04
31	Tuskegee University	Tuskegee	AL	2005-06
32	University of Akron	Akron	OH	2004-05
33	University of Alaska, Anchorage	Anchorage	AK	2009-10
34	University of Bridgeport	Bridgeport	CT	2004-05
35	University of California, San Diego	La Jolla	CA	2003-04
36	University of Central Florida	Orlando	FL	2003-04
37	University of Colorado – Boulder	Boulder	CO	2004-05
38	University of Houston	Houston	TX	2005-06
39	University of Illinois, Urbana-Champaign	Urbana Champaign	IL	2009-10
40	University of Kentucky	Lexington	KY	2008-09
41	University of Maryland, Baltimore County	Baltimore	MD	2004-05
42	University of Maryland, College Park	College Park	MD	2009-10
43	University of Missouri, Columbia	Columbia	MO	2009-10
44	University of Southern California	Los Angeles	CA	2005-06
45	University of Texas, El Paso	El Paso	TX	2004-05
46	University of Texas, San Antonio	San Antonio	TX	2003-04
47	University of Washington	Seattle	WA	2003-04
48	Virginia Polytechnic Institute and State University	Blacksburg	VA	2003-04
49	West Virginia University	Morgantown	WV	2009-10

## Appendix B - Interview Protocol

### Student Protocols

#### Background:

1. What is your current major?
2. When is your expected graduation date?
3. When did you enter INSTITUTION?
4. Which school did you attend prior to attending INSTITUTION?

#### Recruiting programs:

5. Did you plan on transferring to a four-year school when you entered TWO YEAR INSTITUTION? If not, when and why did you decide to transfer?
6. Why did you go to community college first?
7. How did you hear about the program at INSTITUTION that you are enrolled in?
8. What other programs did you apply to when you were transferring?
9. Did you participate in any Bridge, 2-4 programs or similar programs?

#### Ease of transfer:

10. How was your transfer process? Applying, transferring your credits, adjusting
11. Do you feel like your community college experience prepared you for the engineering program that you are now in?
12. Do you feel as though you are doing as well as the students you started at INSTITUTION as freshmen? Explain.

#### Academic supports:

13. What academic supports are provided to you as a community college transfer? (i.e.: tutoring, mentoring, special programs)
14. Are there other academic supports provided in the engineering school?
15. What other supports would you suggest that the university offer students transferring from a two-year college?

#### Concluding questions

16. Is there anything else that you would like to share with me about the community college transfer experience that we have not covered?
17. Do you have any questions for me?

### Faculty and Administrator Protocols

#### Background

1. What is your title?
2. How long have you been working at university?
3. What is your role in the engineering department?
4. What is your role with the transfer students?

#### Community College Transfers

5. How familiar are you with the transfer process at your university?
  - a. Is there an articulation agreement with any of the community colleges in the area?
  - b. Is there a program that helps to recruit community college transfers?
6. Do you know if transfers have a problem getting their credit to transfer over?

#### Academic Support

7. Do you think that there are one or two programs for engineering students that are particularly useful for transfer students?
8. Do community college transfers need more attention than students that start at the university as freshmen?
9. Within the programs for engineering students, which programs do you think have been the most successful with retaining transfer students?
  - a. Minority students?

## References

- AACC (American Association of Community Colleges). (2008). AACC CC Stats. Washington, DC: American Association of Community Colleges.
- Adelman, C. (1988). Transfer Rates and the Going Mythologies: A Look at Community College Patterns. *Change*. 20 (1), 38-41.
- Anderson, G.M., Sun, J.C., & Alfonso, M. (2006). Effectiveness of Statewide Articulation Agreements on the Probability of Transfer: A Preliminary Policy Analysis. *Review of Higher Education*. 29 (3), 261-291.
- Brazziel, W. F., & Brazziel, M. E. (1994). Minority Science and Engineering Doctorate Recipients with Junior and Community College Backgrounds. *Community College Journal of Research and Practice*. 18 (1), 71-80.
- Carlan, P. E., & Byxbe, F. R. (2000). Community Colleges Under the Microscope: An Analysis of Performance Predictors for Native and Transfer Students. *Community College Review*, 28 (2), 27-42.
- Davies, T. G., & Casey, K. L. (1998). Student Perceptions of the Transfer Process: Strengths, Weaknesses, and Recommendations for Improvement. *Journal of Applied Research in the Community College*, 5, 101-110.
- Dougherty, K. J., & Reid, M. (2007). *Fifty States of Achieving the Dream: State Policies to Enhance Access to and Success in Community Colleges Across the United States*. New York, NY: Columbia University.
- ECS (Education Commission of the States). (2001). *ECS StateNotes*. Denver, Colo: Education Commission of the States.
- Frehill, L., DiFabio, N. & Hill, S. (2008). *Confronting the "New" American Dilemma. Underrepresented Minorities in Engineering: A Data-Based Look at Diversity*. White Plains, NY: National Action Council for Minorities in Engineering.
- Harbin, C. E. (1997) A Survey of Transfer Students at Four-Year Institutions Serving a California Community College. *Community College Review*, 25 (2 ), 21-40.
- Mattis, M. C., & Sislin, J. (2005). *Enhancing the community college pathway to engineering careers*. Washington, D.C.: National Academies Press.
- Tsapogas, J. (2004). *The Role of Community Colleges in the Education of Recent Science and Engineering Graduates*. Arlington, VA: National Science Foundation.
- NACME (National Action Council for Minorities in Engineering). (2009). Database. White Plains, NY.
- NACME (National Action Council for Minorities in Engineering). (2009). *Crafting a Solution: Beyond the Dream National Roundtable*. White Plains, NY.
- NBSC (National Bureau of Statistics of China). (2006). *China Statistical Yearbook 2006*. Univ of Michigan Center for Chinese.
- NCES (National Center for Education Statistics). (2008). *Community Colleges: Special Supplement to the Condition of Education 2008*. NCES 2008033. Washington, DC: U.S. Department of Education.
- NCES (National Center for Education Statistics). (2007). *Digest of Education Statistics, 2002*. NCES 20003060. Washington, DC: U.S. Department of Education.
- NSB (National Science Board) (U.S.). (2008). *Science and engineering indicators 2008*. [Washington, D.C.]: National Science Foundation, National Science Board.

- NSB (National Science Board) (2002). *Science and engineering indicators – 2002*, (Report No. NSB-02-1). Arlington, VA: Author
- National Science Foundation (U.S.). (2007). *National Survey of Recent College Graduates, 2006*. Arlington, VA: SRS website.
- National Science Foundation (1996). Women, minorities, and persons with disabilities in science and engineering: 1996, (report No. NSF 96-311). Arlington, VA: Author.
- Santiago, D. (2008). The Conditions of Latinos in Education: 2008 Factbook. Washington, DC: *¡Excelencia!* In Education.
- Townsend, B. K. (1995). Community College Transfer Students: A Case Study of Survival. *Review of Higher Education*, 18, 175-193.
- Traveling the Transfer Path: Student Experiences at City College of San Francisco*. (1998) San Francisco: City College of San Francisco.





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