



Building a Better Transfer Community: Improving engagement and advising of prospective transfer students

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Abstract

The College of Engineering at NC State has consistently admitted 200-300 transfer students each academic year over the past decade. These students ultimately make up about one quarter of the graduating class in the College of Engineering each year. During this time, annual reports from the College of Engineering regularly reported that approximately 50% of engineering transfer students transferred from one of the 58 institutions in the North Carolina Community College (NC CC) system. This data was extracted from the Office of Admissions database, which reports only the last institution attended, as listed by the transfer applicant.

Over the summer/fall 2013 (n=259) and summer/fall 2014 (n=293) transfer cohorts, we collected data on all institutions attended by admitted transfers students and learned that 70% of transfer students each year have previously enrolled at a NC CC. Yet, very few resources were devoted specifically to educating and recruiting prospective transfer students from NC CC's. Instead, students and advisors have historically relied almost entirely on information provided on the NC State website. On these websites, transfer requirements and engineering curricula are provided along with a NC CC equivalency worksheet to assist with course selection prior to transfer.

The College of Engineering has been the beneficiary of strong 3+2 dual degree and 2+2 partnerships (TPT's) with institutions like Elon University, Meredith College and the University of North Carolina at Wilmington. Students transferring from these institutions are provided high-quality advising and enjoy a high acceptance rate due to the strong communication pathways between the College of Engineering and the pre-engineering advisors at these partner institutions. The students at the local North Carolina Community College, Wake Technical Community College, also benefit from accurate, high-quality advising due in large part to the diligence of their pre-engineering advisor who is able to attend advising meetings and stay in regular contact with Engineering Academic Affairs.

Inspired by the success of these strong relationships with our TPT partners and motivated by NC State's strategic plan to expand the proportion of transfer students, the College of Engineering teamed with the College of Education at NC State. We established initiatives aimed directly at NC CC's and their communities: 1) to disseminate accurate information regarding engineering at NC State and 2) to develop a valuable network of higher education institutions in North Carolina. In addition to promoting the transfer of high quality students into engineering at NC State, our goal was to improve their retention and performance. In this paper, we detail the strategies we employed to achieve these goals, including programming and publications created by the College of Engineering, targeted solely to NC CC students and advisors. We describe key components of the efforts, share feedback from our NC CC colleagues and transfer students, and discuss best practices for other institutions seeking to create or strengthen their ties with community colleges.

Background and motivation

American students are more and more utilizing the community college system as a stepping stone to access four-year institutions. While students seeking a variety of bachelor's degrees begin at community college, the pathway has become a particularly viable means for students pursuing STEM degrees. In fact, a 2005 study estimated that 20% of engineering degree holders began their academic careers with at least 10 credit hours from community college.¹ Mattis and Sislin delved deeper into this statistic, estimating that 40% of graduates of bachelor's and master's engineering programs across 1999 and 2000 had attended a community college at some point in their careers.¹ Moreover, the NSF reports that more than half of all awardees of bachelor's degrees in science, engineering, and health from 2001-2007 had enrolled at a community college along the way.²

Over the past decade, annual reports from the College of Engineering at NC State have been consistent with these national data, regularly reporting that approximately 50% of engineering transfer students transferred from one of the 58 institutions in the North Carolina Community College (NC CC) system. This data was extracted from the NC State Office of Admissions database. Limitations existed, however, as the access offered to the College of Engineering (COE) restricted queries to reporting only the last institution a student attended, as listed by the applicant. In an effort to more fully understand the composition of College of Engineering transfer students, we conducted an investigation of the summer/fall 2013 (n=259) and summer/fall 2014 (n=293) transfer cohorts. Upon matriculation, we recorded all institutions attended by transfers students, on an individual admissions file basis, and learned that 71% of transfer students in 2013 and 64% of transfer students in 2014 had previously enrolled at a NC CC.

We found that transfer students would often enroll at NC State as a non-degree studies (NDS) student during the semester immediately prior to transferring. As such, students would list their most recent institution as NC State. Therefore, in admissions database queries, these students would be designated as transfers from a four-year institution. Given that transfer students typically make up approximately one quarter of the graduating class in COE each year, a significant portion of NC CC transfers were being overlooked in annual report data, and consequently, in services and programming.

Students choose the community college pathway for a number of reasons. For students unsure of their academic goals, starting at community college offers the opportunity to explore various fields without incurring significant debt. Those who are quite sure that they plan to seek an engineering degree may fear the "cost bubble" due to reports on nightly news or online media. While engineering degrees are not often associated with not justifying their cost in lifelong earning analyses, community college tuition still offers significant savings. Table 1 shows tuition rates for NC State and NC CC's for the 2014-2015 academic year. Several engineering programs charge engineering student fees as high as \$5,000.³ While still considered a reasonable rate, NC State has recently requested an increase in the engineering student fee from \$90 in 2014 to \$500 in 2015 and ultimately to \$1,000 in 2016.³ Depending on engineering major, freshman and sophomore classes may be taken at a community college at a reduced cost with no engineering student fee and little to no effect on overall time toward degree.

Table 1. Tuition Rates for NC State and NC CC's.

	NC State	NC CC		
	(12 - 18 hrs)	per hr	12 hrs	16 hrs
NC Resident	\$3,019.00	\$72.00	\$864.00	\$1,152.00
Nonresident	\$10,646.00	\$264.00	\$3,168.00	\$4,224.00

An introductory chemistry class at NC State is typically around 200 students. This same class at a NC CC may be 30 students. A commuter student may need to allot 30 minutes to park, ride and then walk to class at NC State. Meanwhile, a NC CC student may need only allot 5 minutes to park and walk to class. Class and institution size may also be motivators in a student's decision of where to enroll.

Proximity is another factor for students deciding between four-year institutions and a NC CC. Only a handful of North Carolina institutions offer Accreditation Board for Engineering and Technology (ABET) accredited engineering degrees. The nearest engineering program may be an hour's drive away or more for some rural students. For students pursuing an NC State engineering degree, the travel time could be as much as three to four hours from the farthest points in North Carolina. Alternatively, North Carolina's 58 Community Colleges serve all 100 counties. This convenience allows students with constraints such as dependents at home, work and/or financial commitments, and/or ethnic, religious, or family obligations, to remain home longer.

Students are not the only beneficiaries of the community college path. Four-year institutions need students to take advantage of community colleges for a variety of reasons. Various reports conclude that the American educational system must produce more scientists and engineers to meet current and anticipated demand.⁴⁵⁶⁷⁸ This goal is not reasonable without help from community colleges. NC State's student population is just over 34,000 students. The NC CC system serves more than 800,000 students.⁹ With the burden of teaching foundational courses assumed by NC CC's, North Carolina's engineering institutions can focus their efforts on discipline-specific endeavors. While the overall goal is to increase the number of graduates in engineering across the state and country, a larger candidate pool will also undoubtedly result in the best candidate pool for NC State's College of Engineering.

With an increase in applications also comes improved diversity.¹ As mentioned earlier, students choose the community college pathway for various reasons. By encouraging this pathway, NC State can gain access to rural applicants, applicants with varied socioeconomic circumstances, and applicants with an array of religious, ethnic, and racial backgrounds. In fact, enrollment trends show that community colleges serve as entry points for many Latina high school students who want to eventually attend four-year institutions.¹⁰ Overall, enrollment at community college in the past two decades has increased for African Americans by 16% and by 143% for Latinos.¹¹ A 2008 study reports that while U.S. Census Bureau documents show that the non-white population in North Carolina was 29.7% of the total population, enrollment by non-whites at NC CC's in the 2005-2006 academic year was 36% of total enrollment.⁹ Moreover, 44% of all

African Americans undergraduates in North Carolina, 49% of all Latino undergraduates in North Carolina and 51% of all Native American undergraduates in North Carolina, attend NC CC's.¹² Being more cognizant of this population allows NC State access to an extremely diverse applicant pool.

The Department of Defense has also chimed in on the need for a more "homegrown," diverse workforce. The DOD reports that much of the diversity in graduating STEM bachelor's programs is derived from foreign nationals. In their report, "Road Map for National Security: Imperative for Change," the DOD argues that the United States suffers from a deficit in high-quality human capital in the form of STEM professionals. This dearth of American citizens from diverse backgrounds undermines national security.¹³

Meeting demand, capitalizing on diversity, and protecting national security are a few reasons why four-year institutions must lean on community colleges. A final, yet significant pitch for community colleges is the reduced cost to the taxpayer. According to an American Institutes for Research article in 2011, taxpayers subsidized most degrees from public institution by more than \$60,000 each.¹⁴ North Carolina's constitution mandates that "The General Assembly shall provide that the benefits of The University of North Carolina and other public institutions of higher education, as far as practicable, be extended to the people of the State free of expense." Despite rising tuition, UNC System schools, and particularly NC State, are regularly identified as best values by Kiplinger, U.S. News and World Report, and The Princeton Review, meaning that the North Carolina state taxpayer makes significant contributions to student tuition.¹⁵⁻¹⁷ The state taxpayers also subsidize NC CC students; in 2009-2010, in-state tuition covered 29% (\$1,600) of the cost of a full-time equivalent student (\$5,500).¹⁶ Because many students receive tuition waivers, it is estimated that state taxpayers cover \$4,200 per full-time equivalent.¹⁶ Despite these waivers and a strong commitment by the state taxpayer, NC CC's offer a viable means to realize significant savings.

NC State is cognizant of the NC CC pathway and its benefits to the student and to the university. In 2010, Chancellor Randy Woodson charged a steering committee with developing a new strategic plan for the university. This work resulted in "The Pathway to the Future: NC State's 2011 Strategic Plan," which was endorsed by the Board of Trustees and continues to serve as a guide for decision-making within the university through 2020.¹⁷ The plan includes five primary goals with three to seven strategies offered to help achieve each goal. The following goals and associated strategies are directly linked to community college transfer students:

Goal #1: Enhance the success of our students through educational innovation.
Associated strategy: Enroll a greater percentage of external undergraduate transfer students.

Goal #2: Enhance organizational excellence by creating a culture of constant improvement.
Associated strategy: Encourage diversity and inclusion.

Goal #5: Enhance local and global engagement through focused strategic partnerships.

Associated strategy: Enhance active and sustainable partnerships, locally, regionally, and globally.

NC State's 2020 Enrollment plan details an initiative to "Develop recruiting, orientation, and student support programs designed especially for transfer students."²⁰ The College of Engineering's strategic plan aligns with the university's in its goal to strengthen educational partnerships. Moreover, the college intends to be recognized internationally for its scholarship in "quality and diversity of students".²¹

The North Carolina state legislature works to promote the NC CC pathway to UNC-system schools through the North Carolina Comprehensive Articulation Agreement (CAA). Originally established in 1996, the CAA seeks to facilitate smooth transfer of students from the NC CC system to NC public universities. While the agreement does not guarantee acceptance to the student's top choice institution or program, it does offer the student the assurance of acceptance to one of the UNC-system institutions. North Carolina values this pathway and has demonstrated its commitment to maintaining an efficient mechanism whereby students may transfer by revising the CAA in 2014. After observing the obstacles faced by students, NC CC's and UNC-system schools over the past two decades, the legislature charged a committee with optimizing the plan in 2014.

While strategic plans, enrollment plans and articulation agreements are significant first steps in the evolution of effective transfer programs, they are insufficient alone. Various analyses of articulation agreements highlight that the primary questions raised include "should the agreements focus on the transfer of particular courses, a block of courses, or an entire program?"¹ Four-year engineering institutions argue that engineering courses evolve with technology, making standard articulation of such courses problematic. Even if non-engineering courses are the primary focus of articulation (ex. general education courses), community colleges and four-year institutions are constantly updating requirements. In North Carolina, all 58 NC CC's are permitted to maintain different general education programs. All 16 UNC-system institutions maintain different general education programs. Prospective transfer students are forced to hedge their bets when selecting courses in hopes that their selections will apply at the institution to which they are finally admitted.

Moreover, Kisker argues that too much emphasis is placed on interinstitutional collaborations (i.e. articulation agreements) rather than on active, collaborative partnerships.²² This concern begets yet another concern: often times primary faculty/administrators take ownership of transfer missions, making the individual indispensable to the functioning of the program.¹ Therefore, as workshop attendees at a two-year and four-year assessment meeting concluded, "articulation agreements are necessary, but not sufficient, for seamless transfers of community college students".¹ Instead, institutions must collaborate to enact effective and sustainable transfer programming.

Approach

With these limitations and recommendations in mind, the College of Engineering teamed with the College of Education at NC State to develop initiatives targeting and leveraging NC CC's

role within North Carolina communities. The central objectives were to increase the awareness and understanding of engineering among North Carolina residents and develop a valuable network of institutions of higher education in North Carolina to promote the transfer of high quality students into engineering at NC State. These overarching objectives would inherently address many of the concerns and associated advantages presented in the literature reviewed above.

As a starting point, we assessed successful, established 3+2 dual degree and 2+2 partnerships (TPT's) offered within the College of Engineering at NC State. In particular, NC State has very successful TPT collaborations with Elon University, Meredith College and the University of North Carolina at Wilmington. The overall acceptance rate of students transferring into COE was 34% in 2014 (858 applicants). Meanwhile, students transferring from these TPT partner institutions enjoy high acceptance rates (average acceptance = 77%), as shown in Table 2. We reasoned that the success of these transfer students stemmed from high-quality advising and extremely strong communication between COE and the advisors at these partner institutions. Likewise, we see similar success with transfer applicants from Wake Technical Community College, located just 10 miles from NC State. In fact, the WTCC pre-engineering advisor makes an effort to attend COE advising meetings several times each semester. She also feels very comfortable reaching out to COE Academic Affairs by phone or email any time a question arises.

Table 2. Total applicants and acceptance rates for highly successful dual degree partners and for all transfer applicants to the College of Engineering for fall 2014.

	<u>Applicants</u>	<u>Acceptance Rate</u>
Elon University	11	82%
Meredith College	5	80%
UNC-Wilmington	33	70%
All Transfers	858	34%

COE and the College of Education envisioned creating and strengthening the lines of communication 1) from COE to NC CC pre-engineering advisors and 2) from NC CC pre-engineering advisors to the local and regional communities, including prospective students. In doing so, NC State would benefit from the resulting direct interactions with the local and regional communities and engineering transfer students.

The College of Education's Department of Leadership, Policy, Adult and Higher Education has connections with NC CC's across the state. Meanwhile, COE transfer admissions has some interactions with a number of pre-engineering advisors at NC CC's. Using these contacts, a list of key professionals closely tied to engineering transfer from their home NC CC's was generated. These individuals were invited to attend a workshop, "Effectively advising pre-engineering NC community college transfer students," held on NC State's campus in the Golden LEAF Biomanufacturing Training and Education Center, a center on NC State's campus that partners with the NC CC system. Event speakers included the Associate Dean of Academic Affairs for COE, the Associate Director of Admissions from NC State, the Coordinator of Transfer Admissions from COE, the Coordinator of Advising for COE, the Director of Women

in Engineering, the Director of Minority Engineering Programs, and a panel of NC CC engineering transfer students consisting of students in their first, second or third year at NC State. In addition to structured presentations, time was allotted for open discussion on how advising is administered at the various institutions, concerns about NC State’s tuition surcharge, when students might contact the College of Engineering directly, career opportunities for engineering students, minors for transfer students, the effect of AP credit on transfer, how transfer credit from other non-NC CC institutions is handled, admission to highly competitive engineering programs, the CAA, engineering outreach, improvements in communication, reverse articulation, and summer offerings to reduce time at NC State.

The workshop, in combination with the revised CAA, provided the impetus for the production of a chart detailing the maximum/minimum credit hours a NC CC transfer student could expect to complete at each institution. Specifically, if a prospective transfer student exhausted all possible courses at the NC CC level, how many hours would remain at NC State to earn an engineering degree? Table 3 shows the total hours in NC State’s on-campus engineering programs as well as the maximum credit hours that can be completed at a NC CC and the remaining NC State credit hours.

Table 3. Summary of maximum credit hours possible at the NC CC level and the remaining NC State credit hours for NC State’s on-campus engineering programs.

	Credit hours required for NC State degree	Credit hours available at NC CC	NC State credit hours remaining
Aerospace Engineering	127	61	69
Biological Engineering	124	61	66
Biomedical Engineering	127	59	71
Civil Engineering	126	70	59
Chemical Engineering	125	69	56
Computer Engineering	122	54	68
Computer Science	120	61	59
Electrical Engineering	122	54	68
Environmental Engineering	127	64	66
Industrial Engineering	124	55	72
Mechanical Engineering	125	61	67
Materials Science & Engineering	126	61	65
Nuclear Engineering	123	63	63
Paper Science & Engineering	128	69	59
Textile Engineering	126	60	69

Workshop attendees were impressed with the significant portion of an engineering degree that could be completed at a NC CC. But, because total credit hours are not necessarily representative of semester hours remaining due to pre-requisite structures of engineering courses, flow charts were also developed to illustrate to advisors and prospective students the minimum

semesters remaining at NC State. An example flow chart can be found in Figure 1. In this way, students could plan for work experiences, minors or other interests.

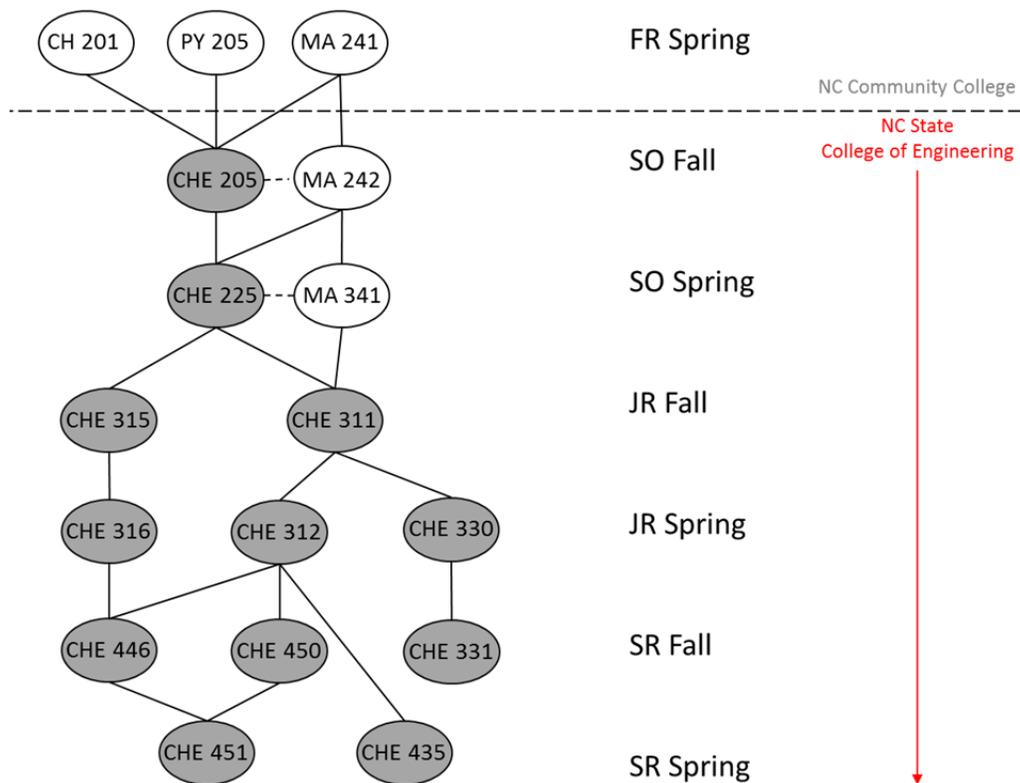


Figure 1. Chemical Engineering Prerequisite Structure. This diagram shows the prerequisite structure of chemical engineering courses at NC State and the shortest possible time frame for completing those courses. Grayed courses are only available at NC State. The remaining courses may be taken at NC State or a NC CC.

The second primary product of this work was the first official publication of the “Engineering North Carolina Community College Transfer Guide.” Included in the publication are explicit details on the transfer course requirements, using color codes to indicate course numbers at NC State and course numbers at NC CC’s. All degree options as well as concentrations and locations, since NC State offers two site-based engineering programs in Asheville, NC and Havelock, NC, are provided. Then, to assist students in planning one, two, three or four semesters at the NC CC level, additional course options (using NC CC course numbers) for each of NC State’s 18 engineering programs is listed, including all NC CC courses that can be taken to fulfill NC State general education requirements. Finally, the guide addresses frequently asked questions in the areas of transfer requirements (ex. how is transfer GPA calculated?), transfer credit (ex. how long will I be at NC State?), attending NC State as a non-degree student (ex. can I start at NC State before officially transferring into an engineering program?), and CAA (ex.

what is the fine print of the CAA?). Transfer guides were distributed to workshop attendees and are regularly distributed to prospective transfer student who visit the College of Engineering.

Results

We learned that sending a “save-the-date” flyer by email was useful in allowing time for advisors to reserve the time and travel approvals necessary to attend. While initial correspondences regarding the “Effectively advising pre-engineering NC community college transfer students” workshop were somewhat limited, we found that news spread rapidly through the NC CC advisor network immediately following the “save-the-date.” It was clear that no one advisor was fully connected with more than a handful of other advisors, but we started to receive requests to attend from many professionals not in original invitations. Based on this feedback, we concluded that the “save-the-date” flyer and email invitation publicized the event sufficiently and no other publication strategies were necessary.

Faculty and advisors from 10 NC community colleges attended the workshop (Figure 2): Central Piedmont Community College, College of the Albemarle, Durham Technical Community College, Forsyth Technical Community College, Johnston Community College, Pamlico Community College, Pitt Community College, Stanly Community College, Wake Technical Community College and Wilkes Community College. Interestingly, these NC CC’s represent a wide range of frequency of transfer students. For example, the top NC CC’s from which students transferred in 2014 were WTCC (71 students), Forsyth CC (13 students), JCC (13 students) and DTCC (9 students). Meanwhile, CPCC, College of Albemarle and Pitt CC each transferred three to four students in 2014. Finally, no students transferred from Pamlico CC, Stanly CC, or Wilkes CC in 2014.

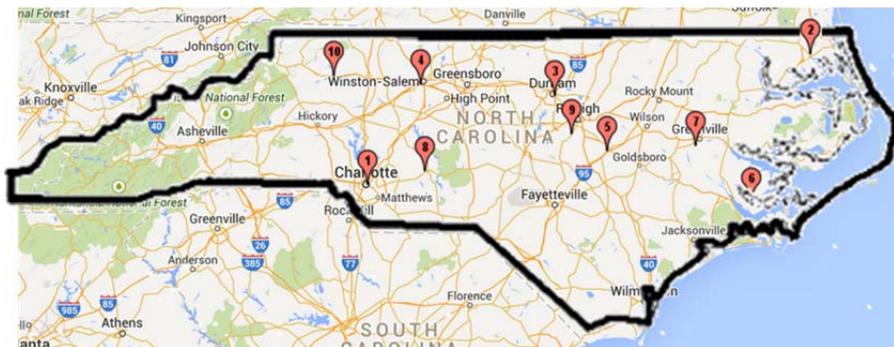


Figure 2. Map of North Carolina showing the North Carolina Community Colleges represented at the “Effectively advising pre-engineering transfer students” workshop.²²

Comments from workshop attendees included “Great conference. Thanks for putting it on!” and “Thank you for hosting a great and informative session.” This feedback helped us to understand that an informative website, while crucial in efforts to help advisors remain informed, is almost secondary to direct communication with COE.

In addition to disseminating important information, the workshop allowed for critical feedback to improve the transfer advising process from the NC CC side. The College of Engineering, with the help of the College of Education, has since acted upon a number of these suggestions.

- NC community colleges are interested in how many of their students transfer into COE at NC State each year. The College of Engineering performed an analysis of summer/fall 2013 transfer students and summer/fall 2014 transfer students (Table 4). This type of analysis will be provided on a yearly basis as part of the College of Engineering’s goal to maintain open and accurate communication channels with NC community college colleagues.

Table 4. Summary of 2013 and 2014 transfer student cohorts’ experiences at NC Community Colleges.

	Cohort	
	2013	2014
Total Admitted Transfer Students	281	272
NC community colleges most attended by transfer cohort - # students	Wake Technical CC – 77 Durham Technical CC – 18 Central Piedmont CC – 13	Wake Technical CC – 71 Forsyth Technical CC – 13 Johnston CC – 13 Durham Technical CC – 9
NC community colleges represented in transfer cohort	> 25	> 35

- The NC community college advisors called attention to the fact that the College of Engineering does not offer programming directly aimed at prospective transfer students during open house events. These include both the NC State University Open House and the College of Engineering Open House. The advisors argued that such programming and/or promotional materials would effectively communicate that transfer students were a priority for COE recruiting. This, in turn, would lend credence to the viability of the transfer pathway. In response, COE featured two information sessions directed specifically to transfer students at the 2014 NC State University Open House. Future open houses will continue to include transfer-oriented programming and openly display the “Engineering North Carolina Community College Transfer Guide.”
- Workshop attendees articulated the value of a platform by which all engineering advisors (NC community college and NC State) could share best practices, post important information, ask questions, etc. In response to this request, COE has investigated two modes of communication. Initially, the “NCCC Advisors” mailing list (engr-nccc@lists.ncsu.edu) was generated. This listserv operates in a normal fashion where certain individuals oversee postings. In this way, the listserv would offer somewhat limited communication, primarily from COE to NC CC’s.

While certainly an improvement on the haphazard email communication among and between advising professionals, this platform lacked the robustness desired. Therefore, COE Academic Affairs has worked directly with COE Information Technology and Engineering Computer Services (ITECS) to establish an orgsync group, “NC Community College Pre-Engineering,” to which all advisors and prospective students may subscribe. Orgsync improves upon the listserv by allowing two-way communication. Further, content can be tailored to different subgroups (ex. prospective students versus advisors). The site features events, news, contacts, etc. Finally, an added advantage is the opportunity to share files. As an example, the first document uploaded was a summary of the frequency of institutions represented in the most recent two cohorts of admitted transfer students.

As part of the announcements to subgroups, NC CC advisors recommended directing invitations specifically to prospective transfer students rather than general announcements. In this way, NC CC students could be included in engineering events at NC State such as E-Day (Engineer’s Day) and E-Week to help them feel more connected to the campus.

- Finally, by simply putting faces with names at the workshop, we started the process of developing a valuable network of institutions of higher education in North Carolina to promote the transfer of high quality students into engineering at NC State. Attendees, including those from NC State, now have a set of contacts across the state with the common goal of encouraging and assisting students in the goal of pursuing engineering.

During the open discussion portion of the workshop, attendees were encouraged to share advising strategies as well as ask questions about NC State policies that can be tricky for transfer students. For example, scenarios were offered illustrating the advantage of students in some disciplines starting in the summer prior to officially transferring (NC State accepts only fall transfers). Depending on course offerings, this small step could reduce a student’s time by as much as an entire year. We also covered NC State’s tuition surcharge. Transfer students are frequently excluded from surcharge fees so long as their NC State course work is consistent with their declared engineering program. This information is helpful to a prospective student budgeting for their entire degree early on. As we see with freshmen, transfer applications to specific engineering programs can rise and fall with current events. This sometimes unpredictable increase in demand can drive competition. Advisors from COE offered resources to help students explore all 18 different engineering programs, much like we do for our own freshmen choosing between programs. This “tool-kit” can now be used by the pre-engineering advisors across the state to encourage consideration of several engineering programs in the development of a student’s future career plans. Further, prospective students educated in the potential afforded by any engineering degree aid in increasing the awareness of engineering among North Carolina residents, an overarching objective of this work.

A major component of this work was to create the first ever NC Community College Engineering Transfer Guide (the guide can be found online at www.engr.ncsu.edu/academics/undergrad/admission/transfer-admission). While the Office of

Admissions website and the College of Engineering's website maintain accurate information, no official COE literature (ex. pamphlets, flyers, etc.) had ever been created solely for NC CC engineering transfer students. Over 800 engineering transfer applications are received each year and a significant portion is from students with NC CC course work. Clearly this guide not only acknowledges this important group of applicants, but also empowers them in the admissions process. The guide is currently distributed to prospective transfer students who visit COE, to small groups from NC CC's visiting campus, and to NC CC advisors for circulation among their students. We learned that prospective applicants were not the only beneficiaries of the "one-stop" resource. Also empowered were the NC CC advisors as well as internal NC State COE advisors with less regular contact with prospective transfer students. By generating a non-human resource, we aimed to avoid the pitfall of tying success solely to the individuals dedicated to the cause. Feedback from NC CC advisors has suggested that the guide has been the most helpful resource offered by the College of Engineering through this work, including the workshop, listserv/orgsync site, networking opportunities, etc.

An additional, unforeseen advantage of the guide is its role in advising current NC State engineering students in summer school. Many students ask if it is possible to go to their home county to attend NC CC over the summer. The guide assists all advisors in selecting appropriate courses for the student's engineering curriculum.

NC State's Chancellor agrees that the guide has been of particular importance, writing in a note to COE Academic Affairs, "You and your team are doing a great job helping our students. I love the 'Transfer Guide.'"

Roadblocks and Recommendations

An initial goal of this proposal was to offer NC community college advising workshops every regular semester. The College of Engineering maintains strong relationships with local NC community college professionals from which a large majority of transfer students originate. Further, beyond Wake Technical Community College and Durham Technical Community College, most other NC community colleges send less than ten transfer students to NC State's College of Engineering annually. Therefore, biannual workshop offerings would not appeal to distant NC community college professionals who assist only a handful of prospective NC State engineering transfer students each year. While the decision to host only one workshop annually was not initially made based on this logic, the workshop attendees and the 2013 and 2014 data support this modification moving forward. Institutions seeking to duplicate these efforts would be encouraged to evaluate frequency of transfer and travel limitations in determining the best timing of workshops and when/if teleconferencing might be more appropriate. In the case of NC CC's, a "save-the-date" was sufficient in publicizing the workshop. By first reaching out with this type of announcement, workshop planners leave themselves ample time for more active promotion, should it be required. Regarding workshop content, we recommend reaching out to offices of admission as well as other individuals frequently in contact with prospective students and recent transfers. Using these professionals helped to identify common questions and issues in addition to avoiding the misuse of time on material easily understood from material available electronically. Some workshop time should also be left unplanned. As we have detailed, a

number of suggestions and concerns were raised during the “open” portions of the workshop. Flexibility is key.

While we have described the success of the transfer guide, potential pitfalls should be avoided. For example, in the case described here, the CAA was updated almost concurrently with the publication of the guides. Therefore, some material was immediately outdated. Disclaimers were included that the final authority can be found online, as these resources are updated regularly. But, four-year institutions should be aware of the timing of potential updates to articulation agreements outside of their direct control. This reality cautions against very large printings; several hundred should probably be the maximum, with the plan to update every two years. Care should also be taken to avoid offering names of professionals since movement is not uncommon in higher education administration. Instead, where possible, generic addresses are most appropriate so that a student finding this information can rely on it the day after printing or even several years later. Distribution is the final step in the cycle and is critical in reducing dependence on individuals at the college and university levels. We recommend offering several guides to all community colleges in your system as well as in offices at the four-year institution. In responding to inquiries, all COE Academic Affairs professionals are encouraged to direct students to the guide rather than simply offering the answer. In this way, current and prospective students, much like in all areas of education, can become self-reliant.

Conclusions

The community college system already plays a significant role in educating engineers across the United State and has enormous potential as we enter the twenty-first century. The community college era has arrived and four-year engineering institutions will benefit most by taking an active approach in establishing and strengthening partnerships. Students, future employers, taxpayers, community colleges, engineering institutions, and the general public all profit when clear, consistent and comprehensive agreements are formally instituted and subsequently executed through accessible networking, programming, and publications.

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