

Completing the engineering and computer science transfer pathway: Transfer students' post-matriculation experiences through a four-year institution

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Mrs. Amy Richardson P.E., Virginia Tech Department of Engineering Education

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Dr. Dustin Michael Grote, Virginia Tech

Dustin M. Grote holds a PhD from Virginia Tech in Higher Education Research and Policy and currently serves as a Postdoctoral Research Associate in Engineering Education at Virginia Tech. He is currently involved in several NSF-funded projects spanning undergraduate and graduate STEM education. His interdisciplinary research agenda includes graduate funding in STEM, transdisciplinary, experiential and adaptive lifelong learning, undergraduate education policies, systems thinking, organizational change, broadening participation in engineering, improving community college transfer pathways in engineering, curricular complexity in engineering, and assessment and evaluation in higher education contexts. Prior to pursuing a Ph.D., Dustin served as a Director of Admissions at Community College of Denver and in Outreach and Access Initiatives for the Colorado Department of Higher Education. Beyond academia Dustin enjoys spending time outdoors hiking, mountain biking, skiing and playing sports with his wife, kids, and dog.

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Dr. Walter Lee is an associate professor in the Department of Engineering Education and the director for research in the Center for the Enhancement of Engineering Diversity (CEED), both at Virginia Tech. His research broadly focuses on inclusion, diversity, and educational equity—particularly as it relates to students from groups that are historically marginalized or underrepresented in engineering. Lee received his Ph.D. in engineering education from Virginia Tech, his M.S. in industrial & systems engineering from Virginia Tech, and his B.S. in industrial engineering from Clemson University.

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Janice L. Hall is a Postdoctoral Associate in the School of Universal Computing, Construction and Engineering Education (SUCCEED) at Florida International University. She is also a member of the inaugural cohort for the ASEE 2021 Engineering Fellows (eFellows) Postdoctoral Fellowship Program. Her

research centers on broadening the participation of women and minorities in the engineering workforce. She holds a B.S. in Biological Engineering and an M.S. in Biomedical Engineering, both from Mississippi State University. As a 2015 recipient of the National Science Foundation's Graduate Research Fellowship Program, Hall obtained her Ph.D. in Engineering Education from Virginia Tech.

Hannah Glisson

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In this session we will think about the latter stages of a transfer student's journey. Much research has focused on pre-transfer and the first semester post-transfer, but in this session we will think about students' experiences beyond that initial semester.

We will be drawing on a set of interviews with transfer students who participated in an NSF-funded S-STEM program.

The project is a collaboration between Virginia Tech, Northern Virginia Community College, and Virginia Western Community College



Introductions



Who do we have in the room?

We will begin with introductions in the room so that we can tailor the conversation appropriately. We'd like to get a sense of the mix between practitioners and researchers as well as the different contexts that are typically investigated (e.g., CC versus bachelor's-granting institutions, etc.).

Introductions



Bev Watford
PI



David Knight
Co-PI



Walter Lee
Co-PI



Dustin Grote
Postdoc



Janice Hall
Postdoc



Amy Richardson
GRA & NOVA Faculty



Hannah Glisson
GRA

We have a big team that brings together individuals with a research focus as well as with a practitioner focus—and both are key for the project's success.

Project Overview

Aiming to build an efficient pathway to a BS degree

NOVA/VWCC – up to \$6,000/year for 2 years; Associate’s Degree

VT– up to \$10,000/year for 2 years; Completion of BS degree

120 students have been in the program

54 at VT currently, 5 interning, 6 graduated from VT, 1 in grad school

Example structural impacts

Institutional learning across partners

VT has changed its transfer student matriculation policy

We will begin by providing an overarching summary of this S-STEM program. This program is focused on building an efficient pathway to a bachelor’s degree in engineering or computer science. We straddle grants across a student’s entire transfer pathway to degree, where they receive a scholarship to support their time financially both at the community college and at Virginia Tech.

Guaranteed Admissions Agreement

College of Engineering and Virginia Community College System

1. Completed a transferable engineering or science Associate's Degree in May of the year they plan on beginning at Virginia Tech

2. Achieved a cumulative grade point average of not less than 3.2 (in a 4.0 system) on Associate's Degree, as determined by the Virginia Tech Undergraduate Admissions Office



From a state policy context, we have a guaranteed admissions agreement in place that explains why we encourage students to earn the Associate's Degree as part of the program. If students meet both of these criteria as a community college students within Virginia, they are guaranteed admission into the Virginia Tech College of Engineering, which provides a student with a sense of "insurance" if they elect to follow the transfer pathway.



Project Overview



In addition to the scholarship support, we have some important programmatic elements built into the program to support students.

1. We have sought to build and nurture a cohort mentality, which is very different from the ways in which CC students, in particular, have traditionally moved through their programs. This approach has built a strong, supportive community among students that remains cohesive throughout students' time at community college and into their time at Virginia Tech.

Project Overview



2. We bring the VT-NETS students to Blacksburg at multiple time points when students are enrolled at their community college. During these visits student meet with other transfer students, meet Virginia Tech students and faculty, see campus facilities, and meet with admissions. The overnight visit serves as another mechanism for further building the cohort.

Project Overview



3. We engage in intrusive, individualized advising, where we bring together both community college faculty and professional academic advisors at VT from a student's first year in the program at the community college. A key aspect of this advising is to make sure students are enrolled in the correct courses so that they may qualify for the guaranteed admission into Virginia Tech. Beyond helping students align with the articulation agreement, this advising seeks to make sure students are enrolled in the right courses that can actually transfer for specific classes at Virginia Tech in an effort to minimize credit loss, which we know is a critical goal to minimize students' time to degree.

Project Overview



4. Prior to COVID-19, VT-NETS students had the opportunity to study abroad as a part of the program through VT's Rising Sophomore Abroad Program, where the S-STEM grant funded their participation. Students enrolled in a class offered at the CC but led by a VT faculty member. In addition to getting an inside view on what classes were like at VT and in addition to the benefits that are well documented in the literature pertaining to study abroad, the study abroad program enabled VT-NETS students to connect with their future VT peers and build relationships with faculty members.

Project Overview



5. Prior to beginning classes at Virginia Tech, VT-NETS students had the opportunity to engage in an undergraduate research experience on campus during the summer before they began classes. Like the RSAP experience, beyond all of the known benefits of undergraduate research, this opportunity gave the VT-NETS students a chance to transition to Blacksburg and build their networks before having to begin classes---it was a paid experience, and so students had a healthy source of income through their engagement in the program.

Once students transfer to VT there are cohort dinners each semester. In addition, students have direct access to student support services through the grant.

The pandemic changed some of our plans:

- university visits transitioned to virtual meetings
- Study Abroad and Undergraduate Research were halted.
- In person meetings post-transfer transitioned to virtual meetings



Pause for Questions



What questions do you have about the
programmatic elements?

More details in the forthcoming chapter:

Grote, D. M., Richardson, A. J., Glisson, H. E., Knight, D. B., Lee, W. C., & Watford, B. A. (2022). Engineering the community college transfer path: Examining the influence of pre-transfer programs on coursework transfer. In C. Cutler White & A. B. Clayton (Eds.), *Expanding community college opportunities: Access, transfer, and completion*. *New Directions for Community Colleges*, 198, pp. _____. John Wiley & Sons, Inc.

We want to take a moment to see if members of the audience have any additional logistical questions about the programmatic elements.

Taking the Conversation Forward

All of these interventions were designed to make the transition: a) happen, and b) happen more smoothly.

Once students were enrolled in VT for a year, we wanted to understand how students were doing. Our focus here focuses on the post-transition time period.

Transfer Student Capital Framework

Background	Experiences at Sending Institution	Transfer Student Capital	Experiences at Receiving Institution	Educational Outcomes
Gender Ethnicity Parent Education Socio-Economic Status based on Parental Income or Financial Aid Award Motivations for Transfer Reasons for Transfer Degree Aspiration	Transfer GPA Transfer Credits Associates Degree	Perspective from Experience at Sending Institution on Learning & Study Skills Course Learning Perceptions of Transfer Process Academic Advising/Counseling Experience with Faculty	University GPA Social Adjustment Transfer Stigma Psychological Adjustment Financial Mediators Academic Advising/Counseling Experience with Faculty	Academic Achievement Engineering Degree Attainment

Adapted from: Ogilvie, A. M., Knight, D. B., Borrego, M. J., Fuentes, A. A., Nava, P. A., & Taylor, V. E. (2017, June). Board# 113. *Understanding and Diversifying Transfer Student Pathways to Engineering Degrees: An Update on Project Findings*. In 2017 ASEE Annual Conference & Exposition.

We have studied and researched those interventions and written about them previously—we will go into logistical details of each in the first part of the session. All were designed around helping students get into VT and successfully make the transition. Now that we've had multiple cohorts go through that process, we ran follow-up interviews with them to see how things were going and to ask them for their perspectives on the transfer process retrospectively.

Consistent with previous work, Transfer Student Capital was used to develop interview protocol and analyze transcripts.



Group Discussion



What happens to transfer students on
your campuses once they matriculate?

We will engage the audience here to get them thinking about their own contexts.

Data and Methods



Interview protocol explored three primary areas of the transfer process:

1. Integration into university community
2. Advantages and barriers to transfer
3. Transfer student status

We conducted semi-structured interviews with vertical transfer students during Summer 2021. Interviews ranged in time from 25 min to 85 min. Students were asked questions about transfer information sources, preparation, and perception.

Interview Participants

Selected Students:

- Participated in VT-NETS at Community College and VT
- Accepted to College of Engineering
- At least two semesters at VT
- Note: all students eligible for financial aid

Demographic Data

		Number of Participants	Percentage of Participants
Gender	Female	6	33%
	Male	12	67%
Race/ethnicity	Asian	4	22%
	Black	0	0%
	Hispanic, Latino, or Spanish Origin	2	11%
	White	10	56%
Engineering Discipline	Biomedical	1	6%
	Chemical	1	6%
	Civil	1	6%
	Computer	1	6%
	Computer Science	3	17%
	Electrical	3	17%
	Industrial Systems	1	6%
	Material Science	1	6%
	Mechanical	4	22%
	Ocean	1	6%
	Undecided	1	6%
Community College	Northern Virginia	10	56%
	Virginia Western	8	44%

This slide characterizes the interview sample (n=18 students). We were able to recruit a nice range of disciplines and CC pathways. Only a small percentage of the Black and Hispanic/Latinx/Spanish origin students agreed to participate in the interviews. All of the students were eligible for financial aid as a requirement of being enrolled in VT-NETS.



Themes



- Connection and cohort extremely important to integration
- Identifying as transfer student
 - Transactional
 - Social
- Benefits of transfer other than costs
- Benefits of co-curricular support

Themes from the interviews

Connection and cohort extremely important to integration

Those of us who came to Virginia Tech from Northern Virginia Community College used to have a bond, because every week we met. But when we got here, I thought that would keep up that bond, like the friendship, but it's gone away entirely. It is not as reliable as it used to be, and I understand that because we are pursuing different disciplines within engineering.

I found a lot of new friends, a lot of great resources. A lot of great connections. I found so many nice people who've been helping me in so many different ways, specifically in my academic life.

Students indicated that it was difficult to find connections in the Fall of 2020 and spring of 2021 during their online classes. Those who did make connections found them very helpful. Students indicated that they were excited for in person classes this year. They were going to prioritize finding study groups and co-curricular activities.

Some of the important implications of the first quote, in particular, is the reality that once students are in different departments, they are going through very different experiences, which was even more the case during the time of COVID-19.

Themes from the interviews

Identifying as transfer student

- Transactional
- Social

Transactional

Yes [I still feel like a transfer student], because I do not have to take any pathway courses.

Social

Yeah, I do [still feel like a transfer student], I probably identify more with my community college than I do Virginia Tech. At my community college there were 20 people in a class, and 4 out of my 5 professors my last year at community college, all taught at Tech..... I just felt really close, but then when I got to Tech I couldn't get that personal bond with the professors I guess just because it was so many people.

Students indicated that they still felt like a transfer student either transactionally due to the course waivers in the transfer agreement and socially due to smaller atmosphere at CC. Students mentioned that they had a hard time disentangling their CC education with that of VT. One student said “I cannot think of VT without thinking of NOVA.” In this way they will always feel like a transfer student.

It is worth noting that transfer students in close geographic proximity to VT prior to transfer stated that they have always felt like a Hokie and were not intimidated with the relocation. This was not true of transfer students who were not familiar with VT and its surroundings.

Themes from the interviews

Benefits of transfer other than costs

I think one thing with transfer students is that they can adapt pretty quickly to different situations. Because you're basically changing your complete life in the middle of like your college experience.

[At community college] I was in class with single moms and struggling dads and janitors and all these people from, different backgrounds.... it gave me the motivation just to push harder and want to help people later in life so you know without that if I would have just gone straight to Tech I would have never seen all these real people out here you know struggling trying their best....

I interviewed with the head partner of the firm [for a full-time job] and I told him about the insight I learned from helping all these people from all walks of life, and ultimately, he said that was the reason I got the job was because I met all these people in the community college.

Students appreciated the diversity that CC offers and sees that exposure as a benefit from those that did not transfer. Others mentioned that students at CC were more focused and really wanted to be there. Those classmates provided motivation and drive that carried over to VT.

Themes from the interviews

Benefits of co-curricular support

Study Abroad

One of the opportunities was being able to travel abroad. It was awesome, I love that so much because I was able to know more engineering stuff globally, you get to see other places. [You make] a lot of connections with other engineering firms in other countries. It gives you an outside idea of more engineering stuff instead of just being local.

Summer Research

Well, the thing that was super helpful, invaluable, was getting that summer research because I was able to learn the campus because my lab was on campus ... I met people that were on campus so those were friends I had.... I learned everything I did about the campus then when school started, I wasn't some new person there I already knew everything. With my other friends from community college, I was able to be like a guide for them.

Students specifically mentioned Summer Research and Study Abroad as being helpful in easing the transfer process. Both opportunities allowed students to make connections with current VT students and faculty before transfer. Students mentioned the relationships born out of the co-curricular activities provided resources and comfort during their first semester.

Lessons Learned

Advice: When working across sectors, have each sector describe their institutional processes/contexts from the get-go, particularly with respect to identifying constraints that either: a) can't be changed, or b) need to be changed.

Integrating what we learn/sustainability:

- Institutional learning across partners has been tremendous
- Improved advising structure for engineering transfer at NOVA
- Students are advised more effectively for how to transfer to VT
- Better alignment between curriculum
- Leveraging VT-wide programs like transfer peer mentoring
- New enrollment management policy for transfers for VT engineering
- Transfer student graduation rate now a key metric for VT COE strategic plan

We offer some advice to others who are seeking to build this kind of inter-institutional partnership here.

Additionally, some of what we learned through the program is captured here as well.

Recommendations

- Community college faculty advising with “insider knowledge”
- Broader impact of student initiatives
- Reserve undergraduate research opportunities for transfer students

- We recommend involving and educating community college faculty advisors in the transfer process and the coursework transfer process at the 4-year institution. Students participating in the VT-NETS program perceived that they had a significant advantage in navigating the transfer of coursework process compared to their peers who were not in the program.
- We recommend leveraging and integrating community college students into existing student engagement, advising, and support programming at the 4-year institution pre-transfer. These programs help students feel a part of the university environment prior to transfer so they can move past the mechanics

of transfer and focus on integrating (networking, co-curricular, housing, etc.).

- The timing of transfer student acceptance and applications for summer undergraduate research do not align. Students indicated that since their GPA resets at VT, they were not competitive for internships. Having an opportunity to compete for undergraduate research would allow transfer students to gain experience to be more competitive or internships.



Group Discussion



1. What different meanings does the label "transfer student" tend to carry with it?
2. What are other ideas from your own campuses to support this pathway?

We will engage the audience here to get them thinking about their own contexts.

Our Future Research

- What are the experiences of students who do not transfer?
- What is possible *with* versus *without* a large grant?
- What is still hard even with a large grant?
- What are counter-narratives about the transfer pathway?

We have lots of burning questions still. In addition to having conducted research on all of the ideas in the previous slides, these are some of our burning questions of where we want to go next.

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