

Board 87: Work in Progress: The 2TO4 Project - Facilitated Transition from 2-Year to 4-Year Electrical and Computer Engineering Studies

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Dr. Miguel Velez-Reyes is the George W. Edwards/El Paso Electric Distinguished Professor in Engineering and Chair of the Electrical and Computer Engineering Department at the University of Texas at El Paso (UTEP). Dr. Velez-Reyes is a first generation in college student who received the BSEE degree from the University of Puerto Rico at Mayagüez (UPRM), in 1985, and the MSEE, the Electrical Eng. D., and the PhD degrees from the Massachusetts Institute of Technology (MIT) in 1988, 1988, and 1992 respectively. He is a leading researcher and educator in multi/hyperspectral remote sensing, and sensor and signal analytics for non-intrusive monitoring. His work is presented in over 160 publications in journals, book chapters, and conference proceedings, and has supervised over 55 post-doctoral, doctoral and master students. Dr. Velez-Reyes has been principal investigator or co-principal investigator in grants and contracts totaling over \$25M. He chairs the SPIE Conference on Algorithms, Technologies and Applications for Multispectral and Hyperspectral Imaging. His technical achievements and service to the community have been recognized with the distinction of Fellow of SPIE (The International Society for Optics and Photonics) for his contributions to hyperspectral image processing, and Fellow of the Academy of Arts and Sciences of Puerto Rico. In 1997, he was one of 60 recipients from across the United States and its territories of the Presidential Early Career Award for Scientists and Engineers (PECASE) from the White House. He received the IEEE Walter Fee Outstanding Young Engineer Award in 1999. In addition to being ECE department chair, he is engaged in important leadership roles as UTEP Campus Coordinator for the NOAA Center for Earth Systems Science and Remote Sensing Technology led by City College of New York and was interim director of the UTEP Regional Cyber for Energy Security Center. He was a member of the faculty at the Electrical and Computer Engineering in the University of Puerto Rico at Mayaguez (UPRM) from 1992 to 2012. He was the Founding Director of the University of Puerto Rico at Mayaguez (UPRM) Institute for Research in Integrative Systems and Engineering (IRISE) and was Associate Director of the NSF Engineering Research Center for Subsurface Sensing and Imaging Systems (CenSSIS) led by Northeastern University. He was also UPRM campus coordinator for the Center for Power Electronic Systems (CPES) a NSF ERC led by Virginia Tech. He was director of the UPRM Tropical Center for Earth and Space Studies (TCESS), a NASA University Research Center,

and Director of the UPRM Laboratory for Applied Remote Sensing and Image Processing (LARSIP). Dr. Velez-Reyes is a strong advocate on promoting access to excellent higher education to all students particularly those from socioeconomically disadvantage backgrounds and underrepresented populations. He is a board member of the Inclusive Engineering Consortium and is actively engaged in initiatives that promote diversity equity and inclusion in engineering education. He has held faculty research-internship positions with Air Force Research Laboratories, and NASA Goddard Space Flight Center. Furthermore, he is a member of the Eta Kappa Nu, Sigma Xi, Tau Beta Pi, and Phi Kappa Phi honor societies. He is a life member of SHPE and SACNAS, and Senior Member of IEEE. He is a member of ASEE, and AGU.

Dr. Barry J. Sullivan, Electrical & Computer Engineering Department Heads Assn

Barry J. Sullivan is Director of Program Development for the Inclusive Engineering Consortium. His 40-year career includes significant experience as a researcher, educator, and executive in industry, academia, and the non-profit sector. He has developed

Dr. Bruk T Berhane, Florida International University

Dr. Bruk T. Berhane received his bachelor's degree in electrical engineering from the University of Maryland in 2003. He then completed a master's degree in engineering management at George Washington University in 2007. In 2016, he earned a Ph

Michelle Klein, Electrical and Computer Engineering Dept. Heads Assoc.

Dr. Kathy Ann Gullie,

Gullie Consultants Services LLC, Owner, Dr. Kathy A. Gullie Ph.D. Dr. Kathy Gullie and her associates at Gullie Consultant Services LLC have been in education, assessment, program development and evaluation in New York State for over 30 years. A form

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Abstract

The IEC is a nonprofit organization that enables collective efforts through equitable partnerships between its 21 MSI core members, 14 PWI affiliate members and 7 corporate members. The IEC 2TO4 Project builds on its Pathways to Success program to support students who begin their studies at a community college or other 2-year institution by providing financial support (scholarships, internships, academic year stipends), mentoring and other personalized transition support, professional guidance, and community engagement.

The 2TO4 network of community colleges (CCs) consists of 20 sub-networks built around the 20 4-year HBCUs, HSIs and TCUs that form most of the core membership of IEC. Generally, a small number (1-3) of CCs located near a core member educate a few students who transfer to the local 4-year MSI ECE program. Some IEC core members have well-developed relationships with their local CCs and see much larger numbers of transfer students. The vision of 2TO4 is to double the total number of students following this pathway to their BS degree in ECE by sharing promising practices and providing robust transition support infrastructure and increased financial support for those CC students who should have MSIs on their radar as they complete their associate degrees. Participating CCs become members of IEC and engage in equitable partnerships with 4-year MSIs and PWIs, industry and DoD labs to implement the various building blocks of 2TO4.

During the first year of this multi-year effort, a base version of 2TO4 was created. Program leadership connected with DoDSTEM and the other CC programs it funds, defining the parameters of 2TO4 1.0 (formalizing the relationship between MSI core members and their key local CCs), and began working through institutional challenges with the 60+ program partners. Regular meetings were scheduled, and a general communication infrastructure was rolled out. The first cohort of more than two dozen student participants was selected along with individual faculty and staff who create and deliver student support resources. A key element of 2TO4 is students supporting other students. Since all students were new to the program, a significant fraction of the first cohort includes students who have already transferred to their chosen 4-year school. Their experiences provide valuable insights on what works and what does not, and their stories are well received by their more junior peers. During the second year of the project, both the number of participating students is increasing substantially, and the support infrastructure and programs are expanding. In addition, project resources are being actively made available to facilitate the success of all transfer students at IEC core MSI members.

In this first project phase, assessment is focused on the extent to which each programmatic component is implemented with fidelity and the program has built the necessary capacity to support students. Formative feedback from each participant is collected and student progress is tracked. Key to this stage of the project is building trust and equitable partnerships, along with making necessary programmatic changes. There is a lot for each partner to learn from the other program partners.

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Introduction

The IEC - a non-profit organization that has at its core Electrical and Computer Engineering (ECE) programs at 15 Historically Black Colleges and Universities (HBCUs), 4 Hispanic Serving Institutions (HSIs), and 2 Tribal Colleges and Universities (TCUs) – is building, implementing, and supporting a consortium of community colleges with the goal of at least doubling the number of community college (CC) students transferring into its 4-year partner institutions or other 4-year schools, always based on what is best for each student. According to research, the 2-year to 4-year pathway through 4-year engineering programs at Minority Serving Institutions (MSIs) is underdeveloped and underutilized at present. Each of the 20 IEC MSI 4-year programs has historically had limited relationships with local community colleges to support transitions from 2-year to 4-year engineering degree programs. The number of community college students from the local communities served well by IEC core member institutions remains relatively small. IEC core members are among the largest overall producers of minority engineers, and they can do the same for students who start their studies at 2-year schools. With these programs as the hubs, the IEC is working on greatly expanding its membership to include, as equitable partners, the key community colleges whose students are pursuing BS degrees in IEC MSI ECE programs and provide the backbone organization for a nationwide network of community colleges uniquely able to support the vision of a diverse and sustainable talent pool in electrical and computer engineering.

The 2to4 program's purpose is to create a clear, informed pathway to an engineering degree and career for community college students. The program focuses on identifying and reducing any barriers or roadblocks that cloud this vision and to enable students to take full advantage of all learning opportunities open to them, both inside and outside the classroom. A variety of existing efforts, especially those developed or being developed within IEC, are being leveraged for maximum impact. At the highest level, this vision centers on engineering and educational teams creating the scaffolding at the interface between 2- and 4-year schools that reaches well into both types of institutions to prepare and support students through each stage of their educational journey.

Most of the resources of the 2to4 Program are dedicated to financially supporting students on the community college pathway to obtaining a BS degree in electrical and/or computer engineering. The key activity is the identification of recipients of tuition grants and stipends, including:

- Publicizing the opportunity for grants and stipends among IEC consortium members;
- Collecting applications from potential candidates;
- Reviewing student applications and interviewing candidates; and
- Selecting recipients and engaging them in the 2to4 network.

In addition, activities to build a community of scholars and provide support for students beyond their financial needs have proceeded, including:

- Conducting Professional Growth webinars on essential skills development;
- Bringing IEC 2to4 scholars together for virtual meetings to share academic and intern experiences;
- Creating the Student Ambassador Program for peer mentoring and community college outreach; and

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- Developing opportunities for students to solidify their ECE knowledge while simultaneously enabling other students to enjoy a more engaging learning environment.

In addition to directly supporting students, this project also includes a research component to better understand the barriers and opportunities that impact the successful transition of students from 2-year to 4-year institutions. Data collection for this study is now in its initial phase, with IRB approval having recently been secured. Details on all aspects of this project are described in the following sections. Additional background on this project can be found at Connor, K. A., & Berhane, B. T., & Chouikha, M. F., & Velez-Reyes, M., & Sullivan, B. J., & Klein, M., & Lagunas, Y., & Muskett, M., & Nastiuk, A., & Alvarado, S., & Hibbler, E. (2023, June), *Board 84: The 2TO4 Project - Facilitated Transition from 2-Year to 4-Year Engineering Studies (WIP)* Paper presented at 2023 ASEE Annual Conference & Exposition, Baltimore, Maryland. 10.18260/1-2--42971

Activities

The project has completed its first year and is now halfway through its second. A wide variety of activities, key cornerstones for reaching capacity, have been executed and are in place (see Table 1). The initial months of the first year were spent on planning and preparation. Implementation of activities began as early as the third month of the first year and continue. In addition, tuition support, student ambassadors, continuous improvement research and graduation of scholars who have been supported by the program, have occurred. A timeline for Year 1 and Year 2 activities and milestones is laid out in the table below.

Table 1: Overview and Evaluation of Timeline and Related Activities

2to4 Milestones/Timeframe	Year 1-2	Status
Leadership Team		Fall 2021-Fall 2023
Kickoff Meeting to review proposed plans	September 2022	Completed
Co-create/refine governance/conflict resolution plan & shared decision making	September 2022 – Present	Completed and On Going
Convene Steering Committee	October 2022 – Present	Completed and On Going
Create/refine on-boarding materials for Steering Committee	September 2022 – Present	Completed and On Going
Recruit/onboard new members	Spring 2023 – Present	On Going
Program Management		Status
Schedule and host Kickoff Meeting	September 2023	Completed
Monitor budget and manage subawards	September 2022 – Present	On going

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Co-create meeting schedules for Leadership Team/Steering Committee	September 2023 – Present	Implemented and ongoing
Co-create communication/networking plan	September 2022 – Present	On Going
IEC Website: Create 2to4 landing page	Nov – Dec 2022	Completed
Program Webinars	December 2022 – Present	On-going/bi monthly
Tuition Support		
Create/refine criteria for selecting student recipients	September 2022 – Present	On-going
Select student recipients	November 2022 – Present	Completed and On Going
Distribute tuition awards	January – June 2023	Completed and On Going
Student Ambassador Program		Status
Create/refine criteria for selecting student ambassadors	September 2023 – Present	On going
Select student ambassadors	November 2023 – Present	Completed and On going
Train and supervise ambassadors / Professional Growth Series (educational workshops) development	January 2023 – Present	In Progress
Pathways to Success Expansion		Status
Develop/refine plan for expansion to CCs	January 2023 – Present	On Going
Implement peer mentoring for transition support	January 2023 – Present	On Going
Implement summer intern program	June 2023	In Planning
Scholar Meetings: August, September, October, and November. and December 2023	Summer 2023 – Present	Ongoing
Continuous Improvement Research		Status
Conduct CC outreach and recruiting	September 2023 – Present	Implemented and On Going
Develop and disseminate best practices	September 2023 – Present	Implemented and On Going
Collect and evaluate 2-year to 4-year transition support	Year 2 of the grant	In progress

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- There were 26 2to4 project students registered for Fall 2023. More students are registered for the January 2024 semester. The program is adding at least 9 students for this cohort. Three (3) students from the original cohort will be finished with their undergraduate studies and graduate in May 2024.
- Current new applicants are in the review process for Tallahassee Community College, Nashville State, VSU, San Jacinto, UMES, and Morgan State. Students can apply any time in their pathway, but usually at the end of their community college studies.
- A new webinar series began in Fall 2023 to introduce thought leaders with creative new ideas on how to best help students transfer from 2-year to 4-year programs. More on this series is addressed below.
- Student webinar/support meetings occurred from Fall 2022 through the present date. These meetings are designed to support students as they travel through the college entrance system. More on this series is addressed below
- During Year 2, the program proposed to provide tuition and stipend support to 40 Scholars and increase student engagement with Inclusive Engineering Foundation Professional Growth Series Webinars. The program is creating a transition support workbook for incoming and transitioning students. While all such webinars to date have been delivered by industry, the program will soon be including sessions from our academic members to expand opportunities for undergraduate research.
- Project personnel are reaching out to students' parents to get family buy-in for the program. To build a sense of community among students, periodic IEC 2to4 Scholar Meetings are held, gathering groups of students in an online meeting to share their experiences. Students are also encouraged to document their experiences in the program by journaling and creating a portfolio. A handbook describing these activities and setting expectations for students is being developed.
- Marketing strategies are being developed and refined to involve more colleges and students. Included in plans to support improved recruitment are plans for more communication with student CC advisors, the development of focus group research, events that will share videos of present grant-supported pathways as well as new research on collective impact of those involved. Community colleges are also being added as IEC members, starting with Montgomery College, with a goal of offering membership to participating schools.
- Additionally, plans include promoting the IEC 2to4 program through community college associations such as American Association of Community Colleges (AACC), American Association for Women in Community Colleges (AAWCC), National Community College Hispanic Council (NCCHC), Hispanic Association of Colleges and Universities (HACU), Two-Year College Division at the American Society for Engineering Education, College advising associations. A collaboration with the 50K Coalition has been initiated, and collaborations with GEM and IEEE/HKN are being explored.

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The Student Recruitment Process

The first cohort of students was recruited during the 2022-2023 academic year, with 26 students awarded financial support. This support includes 20 students with Tuition/Stipend and 6 awarded a stipend only. Table 2 below summarizes the recruitment process for the first cohort. Note that there was no initial applicant interview. Rather, a conversation was held to get to know the students better and understand their need for various types of support. This was the beginning of building a productive working relationship.

Table 2: Student Recruitment Overview

Student	Number
Applicants	68
Applicant Conversations	30
Scholarships awarded	26
2to4 Transitions	10
Interviews Fall 2023	14

- Overall, 68 applications were received by the IEC from students wishing to apply for the scholarship program. Program staff spoke with 30 of the 68 applicants to answer questions and support students through the application process.
- Overall, 10 2to4 transitions took place during the first year.

Table 3 provides an overview of the students accepted into the program thus far. It should be noted that all 26 students attended a community college at some point. All have or are expected to complete their AS degree. The table includes the demographics of those students receiving support.

Table 3: Identity of Student Scholars

Gender	n	%	Major/Proposed Degree	n**	%
Female	10	41	Electrical Engineering	14	64
Male	16	59	Electrical Engineering Technology	1	5
Ethnicity	n*	%*	Computer Engineering	2	9
Hispanic/Latino	8	30	Computer Science	5	22
Not Hispanic/Latino	18	70	Tuition and/or Stipend	n	
American Indian/Alaskan Native	1	4	Tuition/Stipend	20	
Black	11	39	Stipend Only	6	
White	11	39	Waiting on confirmation/under review	2	
Two or More Races	1	4	Pending Interviews	n	
Asian	1	4	Students	9	
Family College Background	n	%			

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First Generation College Student	11	41	
Not First Gen College Student	16	59	
Community College Students	4	15	
4-Year College Students	22	85	

**Multiple answers allowed; **not all have elected a major*

- Of the student scholars, 41% identified as females and 59% identified as males. Thirty-nine percent of scholars were black, 39% were white and 30% were Hispanic.
- 41% were first generation students and were the first in their family to go to college.

Table 4 shows the number of students enrolled in each program category for the Fall 2023 term.

Table 4: Current Student Placement: Registered Student Data for the Fall 2023

Program Type	Number	Colleges involved
Community College	4	San Jacinto Community College
2 to 4 Transition	9	Delaware Technical Community College to UMES Montgomery College to Howard University Nashville State Community College to TSU El Paso Community College to Univ. of Texas – El Paso Montgomery College to Univ. of the District of Columbia SIPI to Arizona State University Nashville State Community College to Tennessee State U. El Paso Community College to Univ. of Texas – El Paso Nashville State Community College to Tennessee State U.
4-year Scholar	21	UMES Howard University Tennessee State University Prairie View A&M Tuskegee University UDC UTEP Arizona State University

Table 5 lists the schools attended by students added to the program for the Spring 2024 term. The table shows both the school they are attending in Spring 2024 and the community college they attended previously.

Table 5: New Student Acceptance for Spring 2024

Current School	Community College
FAMU - FSU	Tallahassee Community College
Tallahassee Community College	Tallahassee Community College

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University of Maryland Eastern Shore	Prince Georges Community College
Prairie View A&M University	Lone Star College
Prairie View A&M University	Collin College
Morgan State University	Montgomery College
Virginia State University	Reynolds Community College
Prairie View A&M University	Lone Star College-Kingwood
San Jacinto Community College	San Jacinto Community College
Tennessee State University	Benedict College
Houston Community College	Houston Community College
Florida State University	Tallahassee Community College
Tennessee State University	Metropolitan Community College

- In Year Two, 23 students returned from the first cohort and 13 new students joined the program. The grant is now supporting 39 students and with more students to be interviewed and reviewed, the goal of 40 students will be reached during the Spring 2024 term.

Student Webinar/Support Series

A wide variety of topics are addressed in the regular monthly student meetings, actually held a few times each month to accommodate the challenges of student work and study schedules. Topics addressed include starting a new semester, finding resources on campus, and study tips. There are also continuations of discussions that began during initial conversations with students, including:

- How did you choose electrical/computer engineering? Any practicing EE or CpE will recognize the responses from students. Some had their curiosity piqued while helping their parents wire houses. Many took things apart to see how they worked, and electrical devices are convenient and small enough for young hands. Many were given opportunities to learn coding, which they found very enjoyable. A few had the good fortune to have engineering classes in high school and mentors who encouraged them to study electrical engineering. Some found EE through their interest in music.
- What are some devices and/or services you find around your home that were likely made by an electrical or computer engineer? This list is very large. Many find it truly incredible how ubiquitous electrical and computer engineering are in our modern world.
- What are some of the big societal issues/opportunities/challenges that you have a passion to address? Some feel the increasing reliance on technology can lead to issues such as digital addiction and mental health problems. Society should address these challenges by promoting healthy technology usage and raise awareness about potential negative impacts and provide resources for mental health support for all users, especially adolescents. Some are deeply committed to the widespread adoption of electric vehicles (EVs) as a transformative solution. The imperative to mitigate climate change and reduce our dependence on fossil fuels underscores the urgent need for sustainable transportation

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alternatives. Sustainability and security are common interests. One student is intrigued by the idea of creating tools for artists to explore, express and create the art they want. Some want to make new devices to improve people's health. A few want to be part of the next step of the semiconductor industry.

Some examples of past and planned *Professional Growth Series* webinars for 2to4 Student Scholars, include:

- Make Over Your Resume: What Companies Want to See: Qualcomm
- Navigating the Internship Experience: Tektronix
- LinkedIn: Tektronix
- Intellectual Property and Invention: TBD

Talking About Community College Transfer (T³): Re-conceptualizing engineering transfer to broaden participation in engineering.

The goals and mission of the IEC overlap, or at least intersect, with many other organizations, one of which is the 50K Coalition. Our two organizations have engaged in an active dialog throughout our existences. Cooperation increased when we both received funding to address the transition of students from 2-year (community college) institutions to 4-year institutions with the goal of obtaining a BS engineering degree after they complete their AS degree. IEC funding came from DoDSTEM to facilitate the transfer of students from 2-year to 4-year programs in electrical and computer engineering, focused on historically minoritized students for whom an HBCU, HSI, TCU is an attractive choice for post-secondary education. 50K Coalition funding from the Clark Foundation is specifically aimed at enhancing the diversity of the engineering workforce in the U.S. by supporting the Coalition's objective to increase the number of engineering degrees awarded to underrepresented minorities and women to 50,000 annually by 2025. This strategic funding is allocated for improving operational capabilities, technology, and communication infrastructures, and for the planning, implementation, and scaling of effective diversity programs. Additionally, it focuses on developing a sustainable model for long-term growth and impact within the engineering sector. The work of the 50K Coalition Community College Linkage Action Network Group was a strategy identified by 50K members and fully supported by Clark. In subsequent conversations post funding, a greater interest in this pathway space was shared by Clark.

The community college pathway to an engineering degree has the potential to dramatically impact the number and quality of graduates from historically minoritized communities. In the 2019 National Academic Press Report 'Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce,' {National Academies of Sciences, Engineering, and Medicine. 2019. Minority Serving Institutions: America's Underutilized Resource for Strengthening the STEM Workforce, Washington, DC: The National Academies Press. Doi: <https://doi.org/10.17226/25257>.} Box 3-4 (P58) highlights 'The Critical Importance of 2-Year Institutions and STEM Education. 2-year schools are significantly more diverse than 4-year schools, and, particularly, enroll a higher percentage of Black males than 4-year schools. The 2-year to 4-year pathway is, generally, a poorly understood route to an engineering degree.

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One of the barriers we both identified is the poor communication between people doing great work on both sides of the 2-year to 4-year transition. ASEE does have a positive impact on this communication because it includes sessions dedicated to both types of institutions at its annual and regional meetings, for example. Unfortunately, community colleges and minority serving institutions do not broadly participate. In the spirit of the kind of Asset Driven Equitable Partnerships we know are essential to almost everything we do, we decided to jointly sponsor a new series of seminars that introduce thought leaders from community colleges, 4-year institutions, and non-profit organizations that have been leaders in increasing minority engagement in engineering through community college pathways. Sessions are virtual, relatively informal, and approximately one hour in length. Links to information on future sessions and recordings of past sessions can be found on the IEC website. (iec.org) The hosts are (names to be added). In the first three sessions, we heard from a broad range of constituencies.

Session 1: ‘How North Carolina A&T State University has worked with community colleges to expand access to engineering.’ Gregory Monty, Ph. D., Center for Energy Research and Technology (CERT), NCAT. Greg described a variety of transfer programs from North Carolina community colleges, including the Steps4Growth program for developing workforce in the area of clean energy. In addition to the Good Jobs Challenged funded STEPs4GROWTH, he addressed an NSF project on the transitions of students as they enter higher ed (what makes a successful transition) and a DoE project for the nuclear energy sector with additional skill building and jobs at national labs. The latter had a variety of partners including IEC members and Growth Sector (more on that in the second session). There are a lot of promising practices discussed in this session. See <https://ncbce.org/steps4growth/>

Session 2: Reaching for the Overlooked Engineering Student - Strategies for Engaging Community College Students through Innovative Math, Internship and Wrap-Around Opportunities,’ Gabe Hanzo-Sello, National STEM Director, Growth Sector. Gabe described the organization's programs across 30 community colleges and universities nationally. (See <https://www.growthsector.org/>)

Session 3: ‘Revolutionizing Transfer: A Holistic and Programmatic Approach for Transfer (HPAT) that Eliminated the Visible and Invisible Barriers to Student Success,’ Doris Espiritu, Ph.D., Center for Excellence for Engineering & Computer Science, Senior Advisor to the Provost, City Colleges of Chicago. Doris described the amazing success they have had at Wright College with their HPAT program that addresses academic, social and financial barriers, starting from an intense Bridge program prior to engineering studies, followed by a cohort-based infrastructure that supports students through their successful transfer to excellent engineering programs mostly at Illinois public universities. Students who follow the program are guaranteed admission to one or more 4-year schools.

References:

Espiritu, D. J., & Todorovic, R. (2020, June), Increasing Diversity and Student Success in Engineering and Computer Science through Contextualized Practices Paper presented at 2020 ASEE Virtual Annual Conference Content Access, Virtual On line . 10.18260/1-2--34817
Espiritu, D. J., & Todorovic, R., & Depaola, N. (2021, July), Revolutionizing Transfer: A Novel and Holistic Programmatic Model that Eliminated the Visible and Invisible Barriers to Student

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Success Paper presented at 2021 ASEE Virtual Annual Conference Content Access, Virtual Conference. <https://peer.asee.org/37688>.

Espiritu, D., & Todorovic, R., & O'Connell, B. (2022, August), Building Bridges into Engineering and Computer Science: Outcomes, Impacts and Lessons Learned Paper presented at 2022 ASEE Annual Conference & Exposition, Minneapolis, MN. 10.18260/1-2—41965

Research Progress

Dr. Bruk Berhane (lead researcher for the IEC2to4 project) and his research team of graduate students are in their initial phase of data collection for this study. In this phase, he and his team are attempting to collect ten years of data on transfer, retention, and graduation data from all four-year schools associated with the IEC. To date, only Florida A&M University has supplied a data set, although both North Carolina A&T State University as well as Morgan State University have indicated that they should be able to supply this data. Dr. Berhane is also reaching out to his own university, Florida International University (FIU) to request this data. As for the other universities in the IEC, Dr. Berhane’s team will be focusing on reaching out to them individually to remind them of the data being requested.

In addition, Dr. Berhane’s team was able to utilize the Integrated Postsecondary Education Data System (IPEDS) from the Department of Education to obtain several years’ worth of information on community college student enrollment in engineering majors and A.S. degree completion in engineering for community colleges that are in close proximity to many of the IEC member institutions. Because IPEDS data is publicly available, it did not require an official data request to specific institutions.

Finally, Dr. Berhane’s team has reached out to all IEC member institutions as well as feeder community colleges to recruit them to participate in focus groups. These focus groups, also part of the initial data collection phase, are designed to identify current trends, opportunities, and challenges associated with the transfer process. The tables below indicate the institutions that have already participated in a focus group as well as institutions that have expressed interest in being a part of the study but have not yet participated in a focus group.

Table 6. Four Year Institutions That Have or Will Participate in Focus Groups

Four-Year IEC Institutions that Have Already Participated in a Focus Group	Four-Year IEC Institutions that Have Expressed Interest in Participation
Morgan State University	Alabama A&M University
North Carolina A&T State University	Florida A&M University
Prairie View A&M University	Florida International University
Southern University and A&M College	
Tuskegee University	
University of the District of Columbia	

Table 7. Community Colleges That Have or Will Participate in Focus Groups

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Community Colleges that Have Already Participated in a Focus Group	Community Colleges that Have Expressed Interest in Participation
Tallahassee Community College (feeder to Florida A&M University)	Baltimore City Community College (feeder to Morgan State University)
Wor-Wic Community College (feeder to the University of Maryland Eastern Shore)	Baton Rouge Community College (feeder to Southern University and A&M College)
	Community College of Baltimore County (feeder to Morgan State University)
	Houston Community College (feeder to Prairie View A&M University)
	Montgomery College (feeder to Morgan State University and Howard University)
	Prince George's Community College (feeder to Morgan State University and Howard University)
	Tidewater Community College (feeder to Norfolk State University and Hampton University)
	University of the District of Columbia Community College (feeder to the University of the District of Columbia)
	Virginia Peninsula Community College (feeder to Norfolk State University and Hampton University)

Conclusion

At this point, the project has focused on identifying recipients of tuition grants and stipends, as well as initiation of the research component of the project following IRB approval. The number of students supported continues to grow, with nearly 40 students from more than a dozen institutions now identified to receive financial support toward their goal of earning a 4-year engineering degree. The anticipated impact on increasing the number of students succeeding in transitioning from a community college and earning an engineering degree from a 4-year institution will be realized if present trends continue. Similarly, the impact of research on effective support for these students will be felt as the project progresses. At this point, only 3 students have obtained their BS degrees and moved on to the workplace or grad school. Two received only stipend support for a single term because they had exceptional mentoring skills and were able to help younger students. One is in grad school and one is a systems engineer at the NSA. One we supported with both a stipend and a scholarship, obtained his dream job as an electronics engineer with the FAA after his nearly 16 year educational journey.

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