The First-Generation Experience

Improvement Science Practices Can Help Educators Enact Meaningful Change

First2 Institutional Team Updates

NEURON

Science, Technology & Research in West Virginia

Volume 18 Issue 2

SPECIAL ISSUE

The First2 Network

How this group is working to support rural, first-generation and other underrepresented STEM students in West Virginia

NEURON

Science, Technology & Research in West Virginia

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35 WV STaR Division

VOLUME 18 ISSUE 2

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COVER PHOTO
Courtesy of Dr. Erica Harvey and Sarah Riley

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ABOUT
STaR Division: Science, Technology & Research at the West Virginia Higher Education Policy Commission provides strategic leadership for the development of competitive academic research opportunities in science, technology, engineering and mathematics (STEM).

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GUEST DIRECTOR'S CORNER

First2 Network Program Coordinator

Changing the tide

I have always had a passion for working to improve outcomes for underrepresented and nontraditional student groups in higher education. As the program coordinator for the First2 Network (First2), this passion is realized using improvement science - a form of disciplined inquiry that seeks to continuously improve practices that yield positive outcomes for rural, first-generation and other underrepresented student groups in STEM. First2 is funded by the National Science Foundation (NSF) to learn about the barriers that impede rural, first-generation and other underrepresented STEM student success. In the role of program coordinator, I have the pleasure of interacting with STEM faculty and administrators in higher education across multiple institutions in the state of West Virginia and beyond to move the needle in terms of the retention and matriculation of rural, first-generation STEM students.

With less than one third of working-aged West Virginians holding an associate degree or higher, it is more important now than ever to mobilize resources into studying how we can change the system for our rural, first-generation and other underrepresented students in higher education. First2 is leading the way in terms of focusing efforts on rural, first-generation and other underrepresented students in STEM. I invite you to join us as we plan, do, study, and act upon promising practices that will change the tide for this population of students, resulting in higher graduation rates and a more equipped workforce.

Jade Irving

First2 Network Program Coordinator
STaR Division: Science, Technology & Research,
West Virginia Higher Education
Policy Commission

FIRST2 NETWORK

At a Glance

first2network.org

What?	Who?	How?
Double number of STEM graduates in West Virginia in 10 years *(change 30% degree completion to 60%)*	Rural, first-generation and other underrepresented groups	An alliance between High Rocks, STaR Division, Green Bank Observatory, Fairmont State University, and West Virginia University thanks to National Science Foundation funding.*

Partner Institutions and Organizations

University of Charleston; West Virginia University; Blue Ridge Community and Technical College; Marshall University; Fairmont State University; West Virginia University Institute of Technology

Solvay, Toyota West Virginia, MATRIC, Chemours, Green Bank Observatory, SRI Education, Education Alliance, Bristol's Promise, Generation West Virginia, Coalfield Development Corporation, NSF INCLUDES National Network, West Virginia Department of Education, Appalachian Regional Commission, National Science Foundation, Health Sciences & Technology Academy, WV-INBRE, NASA West Virginia Space Grant Consortium, West Virginia Academy of Science, High Rocks, West Virginia Science Teachers Association; STaR Division: Science, Technology & Research

Statewide Engagement *(February 2022)*

210 *students*

170 *faculty*

107 *other partners*

** Funding from the National Science Foundation under the following: Award Number: HRD-1834595 with Principal Investigator Sarah Riley of High Rocks Educational Corporation; Award Number: HRD-1834586 with Principal Investigator Dr. Juliana Serafin of STaR Division: Science, Technology & Research at the West Virginia Higher Education Policy Commission; Award Number: HRD-1834601 with Principal Investigator Sue Ann Heatherly of Green Bank Observatory; Award Number: HRD-1834575 with Principal Investigator Dr. Erica Harvey of Fairmont State University; Award Number: HRD-1834569 with Principal Investigator Dr. Gay Stewart of West Virginia University*

The First-Generation Experience

First2 Network students and alums detail the ups-and-downs of self-reliant college lives and their hopes for the future

By Angela Sundstrom

First-generation (first-gen) college students face numerous obstacles on their journey to a degree. Imposter syndrome. Financial burdens. Overwhelming personal responsibility. Their path through college is just more complicated than classmates who have a blueprint to follow. Students with parents or guardians who already earned degrees often have more support when it comes to managing elements such as scholarships, curriculum and housing. That is how the First2 Network (First2) came to be.

First2 began in 2016 and was awarded National Science Foundation funding in 2018. The network's goal is to improve the graduation rate of rural, first-generation and other underrepresented STEM students in West Virginia. This includes providing a sense of belonging while also teaching skills that might have been overlooked, such as composing professional emails.

The knowledge gap for first-gen students related to tasks many others take for granted is very real. Things such as filing the FAFSA or being aware of the hours needed to complete an academic program can be overwhelming.

"When I was an undergrad, I felt a little bit inferior," said **Tyler Davis**, a 2017 first-generation graduate of Fairmont State University. "It seems like everybody else is just so much more than me."

Davis began reading the university's Academic Catalog - all the requirements, every hour needed, every course necessary to complete a program.

"I just started putting in a ton of effort on my own, trying to figure these things out," Davis said.

"My parents are from the Bahamas so they never went through an American school system," said **Alisha Joseph**, a current first-generation student at Marshall University.

Lacking confidence is something Joseph believes is an issue for many first-gen students. "I want to push the freshmen to be a little bit more talkative, a little bit more vocal about their education, because it's one thing that I wish I did more often," Joseph said. "You sit and struggle in silence, but it's hurting nobody but you."

Hesitating to ask for help when things become too overwhelming is also a burden first-gen students need to overcome.

"Trying to be super self-sufficient and self-reliant instead of just asking questions added more pressure," said **Hannah Petronek**, a 2021 first-generation graduate from West Virginia University. "Financial pressure was the biggest one for me. It was like, 'Okay, how can I support myself fully throughout college and not have to rely on any family members?' That added a lot of stress when it came to getting good grades and applying to scholarships."

As if things weren't daunting enough, the COVID-19 pandemic was yet another obstacle to overcome.

> **"You sit and struggle in silence, but it's hurting nobody but you."**
>
> **- Alisha Joseph**

"I knew nothing of college because my parents didn't go. It was like a whole new atmosphere and then being sent back home, it was really bad," said **Gabby Broski**, current first-generation student at Fairmont State University. "I was disconnected from friends. We didn't get to see our professors face-to-face. I feel, especially with first-generation and underrepresented students who might not have that help back home, it was very difficult. I'm just glad we're back and able to recuperate."

With some sense of normality returning, first-gen students might feel the pressure even more. Davis often found himself thinking of an eight word phrase every time he began doubting himself: you deserve to be here; you know this. First-gen students deserve their places in higher education and they are far from alone in their journey.

Growing up in West Virginia's northern panhandle, **Gabby Broski**, 21, always loved science, but was unsure how to chart that fascination into a future career.

"Ever since being a child, I always wanted to help people but I never really knew what to do," said Broski.

A poor experience in high school chemistry left her deflated. She decided to explore more hand-on ways to gain science experience, specifically in healthcare by joining the Health Science and Technology Academy (HSTA). She attended summer camps where she witnessed an open heart surgery, visited a cadaver lab, and even interned at a nephrology clinic. The program not only allowed Broski to broaden her knowledge, but to make connections.

Broski is now a senior majoring in forensics at Fairmont State University. The broad base of science classes in that program appealed to Broski as it allowed her to study many specialties instead of focusing on only one.

"At the time, I was thinking more medical school rather than PA (physician assistant) so I decided to make myself look different because I feel like everyone else would be going with chemistry or biology," Broski said.

Upon entering college, Broski knew she needed a HSTA replacement. She found that through the First2 Network's summer immersive experience, one of the first offered. Broski met professors and felt better equipped to handle college courses. She also fell in love with the lab.

"Most of my peers are now doing either their first or second year of research, whereas this is my fourth year," Broski said. "I've done research every single year."

Broski founded the First2 club on Fairmont State's campus, serving as a leader and mentor while tutoring younger students. She wants to emphasize the importance of choosing a major based on interest, not only earning potential. Feeling motivated to do the work day after day is what is most important.

"If you're not passionate, you're going to burn out," Broski said. "You're not going to want to expand your knowledge and I feel like you'll just be very limited in yourself. I don't like that. I want to continue learning, opening my mind to different ideas and philosophies."

Sometimes you just learn to love numbers. **Tyler Davis**, 28 from Pocahontas County, W.Va., did despite a hesitancy to lean into his analytical side while growing up.

"When I was in high school, I hated math," Davis said. "I wasn't that good at it. It was kind of cool to not like math, right?"

That initial aversion does not have to decide a career, though. By senior year, Davis realized he could qualify for scholarships by improving his scores. Thanks to dedicated math teachers and a newfound determination, he did just that and discovered a new interest in data and analytics.

Davis earned his bachelor's degree in mathematics from Fairmont State University in 2017. He wasn't keen on research or teaching so he explored other paths to utilizing his degree. He chose data science and analytics.

"In this field, it's really like trying to be creative in a scientific way," Davis said.

Davis is currently based in North Carolina working on the Data Science Analytics team at iRobot, most known for creating the Roomba vacuum. He previously worked as a data analyst at Aetna and JPMorgan Chase.

A typical day involves coding, including visualizations or building slides for a stakeholder, while also documenting problems and troubleshooting technical issues. An often overlooked portion is the business side, attending strategy meetings to understand what is key for the company.

"It feels good to know that people value what you're doing, and that what you're doing is making an impact on the business," Davis said. "Getting to apply those algorithms and methods, to like see it in real life, is really cool."

Davis was involved in the early formation of the First2 Network and has served as a mentor since graduating. The focus on student voice was appealing. He said it is an honor to give back to those in a position he once found himself.

"I think it's been great to be able to pass along what I've figured out along the way, to help make it a little bit easier for the students going through the same thing that I went through as a first-gen."

Not many undergraduates can say they contributed to major criminal justice investigations. **Alisha Joseph** can and it's exactly why she chose cyber forensics.

"I volunteer for an organization called OSIX, the Open Source Intelligence Exchange," Joseph said. "The purpose of OSIX is to help save human trafficking victims. So, it's kind of using my technical knowledge to locate victims, which is something that I really felt passionate about." Joseph is also interning with Zero Trafficking, a non-profit organization committed to fighting human trafficking around the world.

Joseph, 21 from Martinsburg, W.Va., will graduate from Marshall University in December with a bachelor's degree in cyber forensics and security. She hopes to become a digital forensics analyst. This role typically involves recovering digital data like deleted calls, messages, email, and more from a smartphone. It also can involve security like learning how to hack a network for vulnerabilities.

Cyber forensics degrees open the door to a variety of positions, even IT service desks. The "Cyber Swiss Army Knife" of degrees, Joseph joked. She hopes to work within a team on intelligence initiatives.

"You have to talk to people and collaborate in order to be a digital forensics analyst. You're going to bounce ideas off of people, you're going communicate with other people about the work you're doing."

Joseph was introduced to the First2 Network as an incoming freshman in the 2019 summer immersion experience. She has since been a student director at Marshall, serving as a mentor to her peers, and taking advantage of the opportunities First2 offers.

"Collaborating and being seen as an equal to industry professionals was something very new to me. I also feel like First2 evolved my skills as a leader to be understanding of different perspectives."

Sometimes a graduate student's favorite lab is field work.

"I was just in the forest all day inoculating trees, which was fantastic," said **Hannah Petronek**, 24.

Petronek, from Wheeling, W.Va., earned her bachelor's degree in biochemistry at West Virginia University (WVU) in May 2021. She then took a gap year and returned to WVU in 2022 to begin the master's program in plant pathology.

Petronek is in the same research lab she was as an undergraduate working on almost the same research project. Besides inoculating trees, she spends time working with her own fungal culture collection. Mycology is what drew her to specialize in plant pathology.

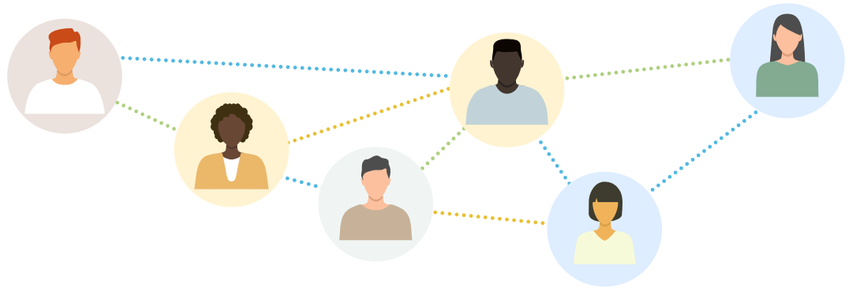
"I think, for me, it's the aspect of I get to work both outside and at the bench in the lab," Petronek said. "It makes me feel more connected to the science, being able to be upfront and close with it in nature, as well as working on it diligently in the lab."

Petronek was awarded a 2022 Graduate Research Fellowship from the National Science Foundation which includes a three-year annual stipend of $34,000 and access to professional development opportunities. Upon graduating, she hopes to work in either a private research lab or for the government, such as the U.S. Forest Service or the U.S. Department of Agriculture.

As a first-generation college student, Petronek was connected with early leaders of the First2 Network. She completed the summer immersive experience at Green Bank Observatory that nurtured her confidence in a scientific setting.

"Being able to ask questions and not feel like shameful or guilty for not understanding how certain things were… those small things really helped me because I was able to start doing research my freshman year of college, which obviously accelerated my pathway to where I am now."

Petronek also emphasizes the need for more first-gen students to "toot their own horns" when it comes to accomplishments. Self-sufficiency, something many first-gen students have in abundance, should occasionally turn towards self-reflection and appreciation for just how far you have come.



Improvement Science Practices Can Help Educators Enact Meaningful Change

By Angela Sundstrom

First2 Network (First2) is helping West Virginia's higher education institutions improve their systems so more first-generation college students graduate with degrees in science, technology, engineering and mathematics (STEM), leading to high-demand, high-wage jobs.

The West Virginia Science & Technology Plan shows that the state's job growth is in the high tech sector including computer systems, software and data processing, aerospace parts manufacturing, engineering and technical consulting. Those industries will need workers. First2 is encouraging educators to embrace improvement science methods to support that future workforce.

"Improvement science allows small and large colleges and universities who participate in First2 to try and then assess high impact practices - practices that we know can result in greater success for our STEM students - and to study the results of the interventions together, across institutions," said **Sue Ann Heatherly**, senior education officer at Green Bank Observatory and principal investigator for First2. "This makes it possible to enact meaningful changes in the way we do business quicker and better by expanding beyond just one STEM department or institution."

This is accomplished through a Plan, Do, Study, Act (PDSA) cycle. The First2 Network utilizes this method and hopes to teach others to use it as well.

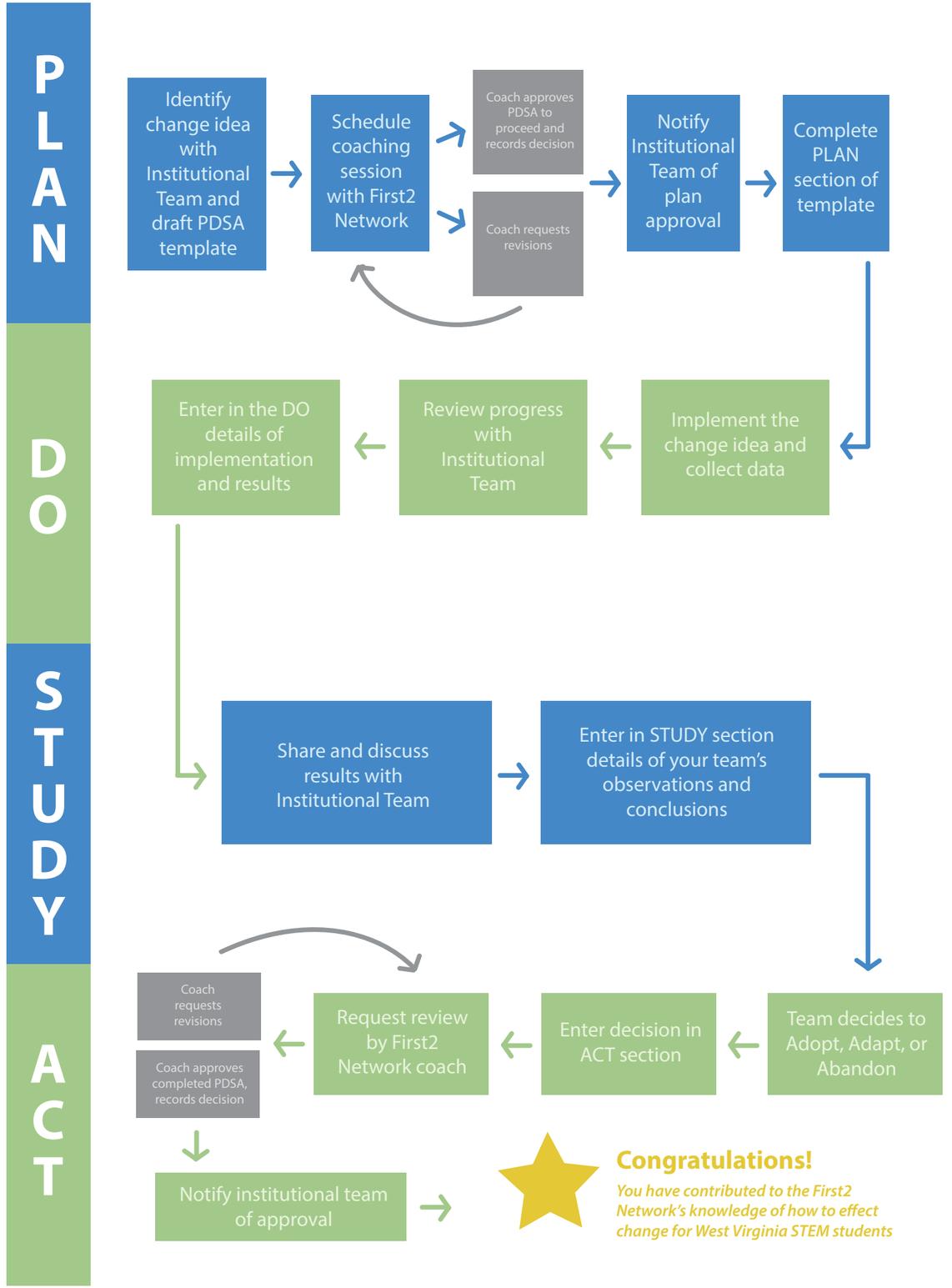
- *Plan:* Educators plan specific changes in educational programs or practices and identify ways to measure impacts
- *Do:* Educators do the program or practice and collect the data on how the processes worked and which outcomes were achieved or not
- *Study:* Educators analyze the data and interpret how well the practice or program worked
- *Act:* Educators decide whether to adopt, adapt or abandon the practice or program

SRI Education, a California-based research institute, provides technical assistance to First2. SRI's **Louise Yarnall** explains that thoroughly tested research like improvement science methods offer the chance to improve classroom interactions and fulfill the educational goals of students and the educational mission of educators.

"What we are doing here is trying to get folks to plan these PDSA cycle activities," Yarnall said.

PDSA Cycles are based on four "drivers"—or the big ideas—that First2 educators believe will support first-generation students: (1) supporting their academic achievement, (2) building their sense of belonging in STEM programs, (3) helping them understand their STEM career opportunities, and (4) incorporating first-generation students into postsecondary leadership as co-creators of new practices and programs. Based on these drivers, First2 has identified more than a dozen high-quality change ideas that show early evidence of positive impact on first-generation students' success in STEM majors.

In 2018, 38.3 percent of first-time, full-time bachelor degrees at four year public institutions in West Virginia graduated on time, according to the West Virginia Higher Education Data Portal. Implementing methods such as those used in improvement science could see that number rise in the coming years. With the demand for STEM jobs projected to remain steady, learning these methods for the benefit of students is a worthwhile investment.



Fairmont State University

Students and faculty alike benefit from multiple research and social activities throughout the year

Below: Fairmont State STEM majors enjoying the opening week SciTech Social meeting faculty and learning about STEM clubs.

Fairmont State University's (Fairmont State) First2 institutional team of nearly 30 faculty, staff, administrative and student members met four times over Summer 2022 and twice in Fall 2022 to plan and carry out improvement science initiatives aimed at STEM student success, including a two-week summer immersion research program, First2 campus club activities, a SciTech Social event and a Falcon Fresh Start program.

Fairmont State's First2 Campus Club meets biweekly, led by First2 Student Directors Alyssa Pettry and Gabby Broski with support from Faculty Advisor Kristy Henson. The institutional team and campus club also include 13 students serving as First2 Student Scholars for 2022-23. Club members support each other in finding and carrying out research, provide academic support and peer mentoring activities in addition to social activities. Club members led an initiative to staff a First2 vendor booth at the West Virginia Science Teachers Association conference October 27-29.

The summer immersive experience at Fairmont State, held July 10-23, hosted seven summer interns, led by four undergraduate summer mentors and three faculty research mentors. Institutional team members met with the interns during a first-day orientation and introduction session. The team was proud to note that all seven interns continued involvement with First2 as scholars this fall.

A SciTech Social was held during the first week of fall classes and featured icebreaker faculty bingo cards, food and yard games. Around 100 faculty and students attended.

Fairmont State's $749,693 S-STEM program called, "Bridging the STEM Gap in Appalachia: Engaging with students to iteratively improve faculty practices in support of student success," has six scholars this year, four of whom are also in First2 and are being mentored by faculty members heavily involved.

Fairmont State partnered with Stockmeier Urethanes and Chemours to pilot industry-informed, course-based undergraduate research projects in an honors lab section of the first-year chemistry course this fall that included three First2 immersion participants and was taught by Dr. Kayla Lantz. Students studied: polymer density and molecular weight analysis with Chemours; IR and UV pigment fading and metal leaching from urethane-coated rubber mulch, both with Stockmeier; and lead extraction from jewelry with Samantha O'Brien.

Marshall University

Educators team up to support students who struggled when the pandemic upended college life

Many freshmen are now entering college after an unconventional and disrupted high school experience due to the COVID-19 pandemic. **Marshall University** recognized this and now offers workshops during the first two weeks of the semester to review the basic concepts that students are expected to know upon arrival in introductory math and chemistry courses. These subjects are highly dependent upon pre-requisite learning.

This program is now in its second year. During the first year, the workshops were called COVID Catch-Up, but the new official name is HErd REady. These workshops are in-person and free to students. They are facilitated by engaging and encouraging faculty members who have also distinguished themselves as great teachers.

Sessions typically involve: faculty reviewing basic concepts relevant to the course; students reviewing what was covered in class and identification of gaps in pre-requisite knowledge which faculty then address; faculty showing students how to effectively highlight a textbook, take lecture notes, prepare for class, and study for exams; students solving problems relevant to the day's lecture in small groups as a way of understanding the material and building connections with classmates; and students having the opportunity to begin their homework so that they can ask questions.

Subject-specific topics covered include knowing how to study, knowing how to take notes and addressing test anxiety. The program also makes sure that students have the course materials they need to succeed in the course and offers opportunities to connect with classmates.

Below: Students participating in Marshall's MATH HErd REady workshop take a break to make origami dominoes for a chain reaction to celebrate the last day of the workshop.

University of Charleston

Focusing on a sense of belonging is just as important as academics when it comes to student success

Below: 2022 Immersive Bridge Program at the University of Charleston. Left to right and top to bottom - Grace Estep, Emily Hissom, Ituria Kelley, Christian Moore, Jenny Bunner, Dr. Heather Arnett, Professor Karen Kail and Dr. Aida Jiménez.

The academic year at the **University of Charleston (UC)** started with a new iteration of the summer immersive bridge program. This year, First2 Network (First2) student interns engaged in the research inquiry camp over the first week of school. Faculty and mentors used the week before classes to settle the students and initiate projects and concerns, such as housing or financial aid.

The second week became a pilot to integrate both the immersive camp and the regular first week orientation and on-campus integration activities. Mentors were utilized as guides to help reduce anxiety and ensure attendance. The group also believe this helped to encourage and develop early friendships on campus and broaden a sense of community.

"I was so scared and upset these first days and it was really helpful to have people I knew around me all the time," said intern Jenny Bunner.

In addition, the UC campus classes focus on continuing the mission of improving sense of belonging and reducing anxiety, specifically math anxiety. Two of the core STEM courses - chemistry and computer science - have included additional workshops in their courses, supported by math bootcamp, "Rock your STEM." This is ongoing work that they hope will both support student success in these and co-requisite courses as well as feelings of belonging in the STEM community.

The UC First2 Club was also very active this semester. The brand new leadership - from executive board to scholars and directors - worked hard on engaging and presenting in the Fall Virtual Convening as well as new initiatives, including focusing a PDSA on sense of belongingness. They have also hosted a variety of community support events like bonfires and movies to engage in conversations about class, life and mental health. This year also allowed the switch to completely in-person events, which has been a large boost to morale and engagement.

West Virginia University

Utilizing improvement science benefits faculty and students

During academic year 2022-2023, the **West Virginia University (WVU)** Institutional Team has several Plan, Do, Study, Acts (PDSAs) running. Several PDSAs are advanced research projects that are expected to lead to peer-reviewed publications in the areas of STEM education, mentoring or undergraduate research. Dr. Rita Rio and the First2 student club officers are running a PDSA on how involvement in and attending the First2 student club affects belongingness in STEM. Club directors and co-chairs are running an additional book club PDSA where, weekly, they will read one chapter of the book, "Your Time to Thrive: End Burnout, Increase Well-Being, and Unlock Your Full Potential with the New Science of Microsteps," and get together to discuss their takeaways. Another PDSA involves creating a workshop to improve training of mentors who support students in research. This PDSA was informed by First2 students who were discouraged from continuing in research because of inexperienced mentors. A fourth PDSA will study the 2019-2022 summer immersion and will track the persistence of students who participated. The fifth and sixth PDSAs foster connections between students and WVU faculty and staff. Creation of an email listserv that includes names and email addresses of any WVU student who participated in one or more First2 opportunities was created. Biweekly, students on this listserv are emailed a list of opportunities of potential interest to them. Opportunities include upcoming career fairs, abstract submission dates for symposia at WVU and beyond, paid summer internship and research programs in academia and government, institutional events of interest such as tutoring, pre-health presentations, first-gen celebrations, and online study resources. The sixth PDSA is based on the "embedded student" project that was piloted with First2 students during the pandemic when access to research labs was limited. Currently, "embedded reporting" is offered as extra credit to any student enrolled in WVU's preparatory chemistry course. Students provide weekly, anonymized feedback on their learning to chemistry instructors through reporting. This project provides instructors with formative feedback on their students' learning and provides students with a chance to think about and improve their learning. Students have submitted over 1,000 embedded reports and instructors have been active in making changes to their classes and the overall tone of reports and prep chem classes is overwhelmingly positive. Reporting spotlights the value of students' perceptions of instructor beneficence.

Below: Dr. Cinthia Pacheco, one of the WVU Institutional Team members (bottom right) with the students who participated in the WVU Summer Immersion 2022. From top to bottom and left to right: Oscar Enriquez, Gabriella Grazette, Vanessa Haigley, Laya Chennuru, Anabella Falcao, Emma Walker, Leah Ann Ward, Sarah Warder, Rachel Morris, Quinn Dugger, Nathaniel Evans, Brenden Ingling, Ava Wilson and Rachel King.

WVU Tech

West Virginia University
Institute of Technology

Social gatherings and research opportunities offer STEM students a chance to connect

Below: Students enjoy the Fall 2022 STEM Bingo Night with WVU Tech First2 Network Club

The **West Virginia University Institute of Technology (WVU Tech)** First2 Network Club has been working all over the Beckley campus to provide more resources to help science, technology, engineering, and mathematics (STEM) students succeed.

The club has strived to promote events that increase students' sense of belonging. This fall semester, they hosted a STEM Bingo Night that attracted 32 students and five faculty to engage over food and games. The event was a chance for students to interact with STEM faculty in a more casual setting than the classroom. The resulting surveys all reported positive feedback and increased feelings of belonging.

A pumpkin painting event was also hosted as part of the WVU Tech Fall Fest. Considering the group ran out of pumpkins due to interest, they counted that as a success. Students were able to connect with one another while enjoying the festive fall season.

In addition to outreach activities, students in the WVU Tech First2 Club continue to engage in faculty research projects. One computer science student is studying access control lists (ACL) and attributed-based access control (ABAC) to see how they can make it easier for people to switch from ACL to ABAC. A forensics major is using Polycam, a mobile application on Apple and Android, for 3D modeling in crime scene reconstruction. This student compares LIDAR (Light and Laser Detection and Ranging) and measurement technology within the app to real life triangulation as well as more finely tuned scanner technology used in the field.

The most notable event the WVU Tech First2 Club took part in was hosting a summer immersion program in July 2022. This program was a computer science-focused summer camp meant to introduce rising freshmen to research and transition them into their college experience. The freshmen, or summer interns, spent two weeks at the WVU Tech campus and worked together to solve problems using Python and research the fundamentals of cybersecurity. Based on the feedback from participants, the program vastly increased their knowledge of research and helped ease their transition to college.

Blue Ridge

Blue Ridge Community and
Technical College

The only community and technical college in the network looks to grow and expand research opportunities for STEM students

Below: Blue Ridge Community and Technical College students during their experience at ROCKWOOL

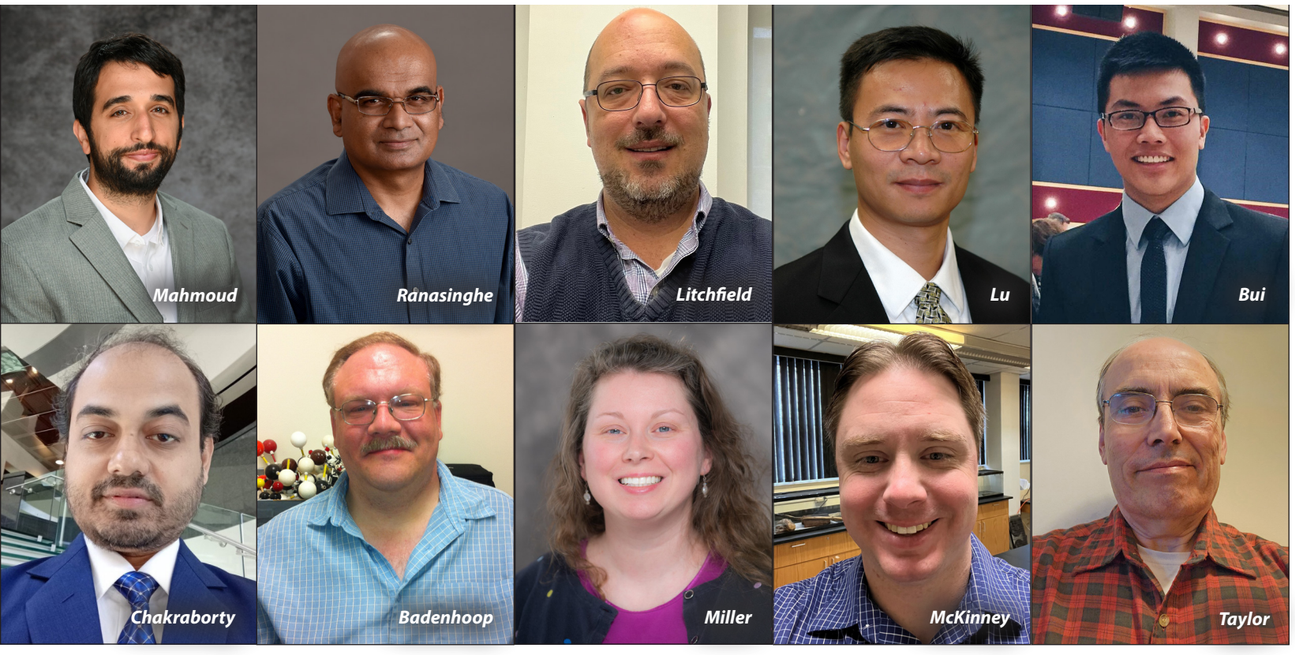
New to First2 Network (First2) this year, **Blue Ridge Community and Technical College (Blue Ridge)** is the first community and technical college in West Virginia to sign a memorandum of understanding with the organization. First2 activities are initiated by students and faculty in the Division of Information Technology. Dean Janet Branch, Associate Dean Kim Graves, Chair Don Heumphreus and Student Directors Deanna Inglert and Andrew Knoeller form the core leadership team.

Blue Ridge held its first summer immersion experience in July 2022. Interns worked on an applied research project with ROCKWOOL, a local industry partner for the club, regarding process efficiency. ROCKWOOL, located in Ranson, W.Va., is a manufacturer of stone wool insulation. The plant opened in 2021. At their one year mark, ROCKWOOL was interested in knowing if the machines in their "cold end" - consisting of baggers, stackers and conveyers - were running at capacity. Under the supervision of faculty, mentors and ROCKWOOL staff, the Blue Ridge First2 Club interns collected and coded data, analyzed the results and gave a report and presentation to ROCKWOOL executives on the final day of the camp.

The First2 driven STEM Club also began running at Blue Ridge in Fall 2022 and continues to ramp up. Students from a variety of programs and interests have joined and are planning and exploring various activities.

Students and faculty with interests in cybersecurity organized and attended a field trip to the National Cryptologic Museum. The Defense Advanced Research Projects Agency (DARPA) vehicle on display there was a big hit. A number of STEM Club students with an interest in eSports are planning an eSport tournament.

Faculty at eight West Virginia Colleges and Universities Awarded State Grants to Upgrade STEM Equipment and Enhance Instruction



Faculty at eight West Virginia colleges and universities soon will receive $166,000 in state grants to purchase scientific equipment and enhance student opportunities and research on their campuses.

The Science, Technology & Research (STaR) division of the West Virginia Higher Education Policy Commission (Commission) awarded two Innovation Grants and seven Instrumentation Grants to purchase modern instrumentation and enhance study in science, technology, engineering, and mathematics (STEM). Innovation Grants fund scientific equipment, curriculum improvements, minor renovations, and classroom instruction. Instrumentation Grants purchase scientific equipment for advanced undergraduate teaching laboratories and research to encourage students to pursue STEM careers.

"STaR is pleased to assist our higher education institutions with the purchase of crucial scientific equipment that will help undergraduate students prepare for their careers," said Dr. Juliana Serafin, senior director of STaR. "This equipment is also critical for research at these institutions."

Instrumentation and Innovation Grants are primarily supported by the Research Challenge Fund, established by the West Virginia Legislature in 2004 to build research capacity and competitiveness at the state's colleges and universities. It is managed by STaR and matching funds are usually provided by the college or university to increase the size of the award.

Innovation Grant Awards

Drs. Stuart Cantlay and Joseph Horzempa, Department of Biomedical Sciences at West Liberty University, were awarded $26,400 for "Enhancing the Teaching of Epi-fluorescence Microscopy." They will use the funds to upgrade an existing microscope into a fully automated one. In addition to the microscope being used for research and teaching, students trained in these techniques will learn valuable skills for employment in STEM fields.

Drs. Nathan Galinsky, Sihe Zhang and Bernhard Bettig, engineering faculty at West Virginia University Institute of Technology (WVU Tech), were awarded $20,000 for "Process Control Teaching System: Development of Process Control Curriculum." Process controls use mathematical principles and inputs/outputs to a process to help generate a desired product or result in a safe, reliable manner. The process control teaching system can be used throughout engineering curriculum and in high school summer programs to help demonstrate industrial processes to prospective engineering students.

Instrumentation Grant Awards

Drs. Luke Huggins, Bruce Anthony, Melanie Sal, Caleb Gibson and Matthew Reid, faculty in the Department of Biology at West Virginia Wesleyan College, were awarded $20,000 for a "Fluorescence Deconvolution Microscope." They will purchase a portable microscope and image analysis system designed for producing quality fluorescence micrographs. The microscope and software will provide a robust and easy-to-use system designed to perform 2D and 3D deconvolution of cells to train students on state-of-the-art equipment not usually available at small primary undergraduate institutions.

Drs. Eyas Mahmoud and Mahinda Ranasinghe, from the Departments of Chemical Engineering and Chemistry at West Virginia State University, received $8,200 for "Acquisition of Reactor." The chemical reactor will be used in the chemical engineering and organic teaching laboratories as well as to conduct student research in fuels and value-added chemicals production and organic synthesis of natural products.

Drs. Charan Litchfield, Mingyu Lu, Thang Bui and Somenath Chakraborty, all from the Departments of Electrical and Computer Engineers or Computer Science and Information Systems at West Virginia University Institute of Technology (WVU Tech), were awarded $19,700 for "An Experimental Testbed of Internet of Things." They will build an experimental testbed of Internet of Things based on the radio frequency identification technology that would include 10 programmable wireless nodes and 40 RFID. WVU Tech students and Raleigh County Schools students will use the testbed.

Dr. Jay Badenhoop, professor of chemistry at WVU Potomac State College, was awarded $12,900 for "Chemistry Lab Modernization through Instrumentation." A Perkin-Elmer Fourier Transform Infrared (FTIR) Spectrometer with software and laptop will be purchased. The spectrometer will greatly enhance the quality of the laboratory experience, and the training of PSC students.

Dr. Jamie Miller, assistant professor of biology at Fairmont State University, was awarded $20,000 for "Increasing Educational and Research Capabilities with Multi-Mode Microplate Reader." She will purchase a multi-mode plate reader instrument to replace an outdated instrument. The multi-mode capabilities afford flexibility and utilization across a broad range of applications.

Dr. Matthew McKinney, assistant professor in the Department of Health, Science, Technology, and Mathematics at Alderson Broaddus University, was awarded $19,200 for "ABU Water Quality Equipment." He will purchase a multiparameter sonde for use in classroom instruction, as well as in student-driven undergraduate research projects focusing on biomonitoring and water quality.

Dr. John Taylor, assistant professor of chemistry at the University of Charleston, received $20,000 for "Acquisition of a Fourier Transform Infrared Spectrometer (FT-IR) for the Teaching of Spectroscopic Fundamentals and Undergraduate Research." He will purchase a Perkin Elmer Spectrum Two Fourier transform infrared spectrometer so that students can identify infrared active chemical compounds and functional groups, learn about spectroscopic fundamentals, and apply the technology to undergraduate research projects.

Commentary

Training mentors to engage undergraduate students in research

Pacheco (left) with graduate student Carinna Ferguson

Providing undergraduate students with a transformative learning experience through research has been one of my goals since I decided to pursue a career in academia. Early in college, I was exposed to research, which had an enormous impact on my career and on the choices I have made after graduating. As a first-generation college student, it was the participation in research that gave me a sense of belonging and a certainty in a career in science. Looking back, I can see how the positive experience I had while doing research correlates with the quality of mentorship I received. My mentor would balance a rigorous teaching of techniques and scientific procedures with an appreciation to my small accomplishments and a respectful approach to my difficulties. In addition, my mentor included me in a community that would support me and provide me with opportunities to grow.

The recognition of undergraduate research as a positive experience that contributes to students' academic performance, persistence and retention has pushed higher education institutions to create opportunities for students to engage in research experiences. However, positive outcomes for students correlate with a high-quality mentorship. Therefore, institutions need to also focus on the research mentors and on how to support them to provide the kind of experience that will help students to succeed.

In my current role as an undergraduate research program director, I have come across issues that arise from the mentor-mentee relationship, which most of the time make students drop from their research experience. Additionally, a survey performed with students participating in the First2 Network showed that a significant number of students mentioned difficulties in the relationship with their mentors as the primary reason to not continue in their projects. These observations have led me to develop a training for undergraduate research mentors. For this endeavor, I have recently joined forces with Carinna Ferguson, a WVU doctoral candidate in learning sciences and human development who is investigating the experiences of faculty engaging in mentorship in undergraduate research. According to Carinna, there is a gap in the literature regarding how mentors perceive their role in mentorship which she aims to begin addressing by understanding mentors and mentees narratives.

We know that there is currently no formal guideline regarding what an effective mentorship entails. There are rather best practices that are shared by mentors who have successful mentoring outcomes. Therefore, through our training, we hope to share resources and tools that will help mentors navigate their experience. The training is advertised and open to faculty, graduate students, post docs and researchers from higher education institutions throughout West Virginia. We hope that afterwards we can start a community of mentors that can support each other during their mentoring journey.

Dr. Cinthia Pacheco *is the assistant director of the Office of Undergraduate Research at West Virginia University where she currently directs the Research Apprenticeship Program (RAP). She has a degree in dentistry and a Ph.D. in biological sciences. Throughout her career she has mentored several undergraduate students and directed different programs that engage undergraduates in research. She is an active participant in the First2 Network where she serves as the WVU Institutional Team Liaison.*

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