THE SPARK GIVING RISE TO GREAT IDEAS

2018-19

Every great idea starts somewhere—a flicker of light that goes on to shine brightly. 4-VA at Mason provides the ignition, bringing oxygen to that spark and making it glow.

Learn more about some of the concepts that we've brought to light.





The Spark: Giving Rise to Great Ideas



4-VA at Mason is tasked with finding great ideas and opportunities to innovate education design, support statewide collaborative research, increase access to degree completion, and make education more affordable. It's a challenge, but we're committed to getting it done, and done right.

The good news is that the time spent poring through proposals and reaching out to faculty and colleagues to identify great ideas in education design and research has proven fruitful. Although still a relatively new effort, 4-VA at Mason has a lot to show.

Within these pages, you'll learn more about 4-VA at Mason grants that

Identified biomarkers to help track the diagnosis and progression of Idiopathic Pulmonary

- Fibrosis as well as the efficacy of medical treatment for this difficult-to-diagnose and difficult-to-treat lung condition;
- Saved students taking an astronomy course hundreds of dollars on textbooks, which were often outdated as soon as they
 were printed, and instead offered a vast array of engaging videos, digital activities, and resources reflecting the latest in
 science through a course redesign using Open Educational Resources;
- Developed language courses shared between schools that helped reduce faculty costs and expanded learning opportunities for students;
- Supported nontraditional students successfully as they found their way to degree completion; and
- Provided the latest in information technology systems, allowing students and faculty access to a robust platform to share educational resources.

There is much more to come. As we continue to build our relationships around the state, 4-VA will soon welcome two new schools into the fold, the College of William and Mary and Virginia Military Institute. They will join us, along with James Madison University, Old Dominion University, the University of Virginia, Virginia Commonwealth University, and Virginia Tech. We're confident that our growing group of education and research leaders will be a vibrant source of fruitful projects in the years to come.

The stories we share in *The Spark* feature just a sampling of the hundreds of students, faculty, and Virginia citizens benefiting from our work at 4-VA. To learn more, we encourage you to visit our website at 4va.gmu.edu, or scroll through our Facebook page at facebook.com/4VAMason. There you'll see the myriad projects undertaken at Mason as well as at our partner schools. Follow us as we bring many more great ideas to light.

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THE SPARK

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Information Technology: Turning Up the Lights

he largest single 4-VA at Mason expenditure annually supports information technology (IT) services, which significantly bolster three of our four "foundational pillars"—course sharing, degree completion, and collaborative research. Central to this support is maintaining the telepresence room on campus and purchasing Webex capabilities, both of which are integral to keeping students and faculty connected. With this, the research and education light is always on.

Each semester, a number of classes are taught in the telepresence room in Merten Hall on Mason's Fairfax Campus, offering faculty and students an immersive experience featuring three large screens with visuals of the host class, instructor, and written course work. During the past year, the IT team also updated several of the other distance-learning rooms on campus to a higher quality system. Recent expenditures expanded seating in one room from six to 24. An additional space, which also sat six, now accommodates 12 to 18 people.

Currently, there are almost 1,000 active Webex users on campus. The use of Webex technology greatly expands options for students—from students accessing guest speakers to maintaining course work when weather conditions result in class cancellations.

"Keeping connected is critically important as we grow our offerings and provide more opportunities for students," says Susan Kehoe, director of academic strategies for Information Technology Services. "This technology brings a wide range of possibilities to Mason."

4-VA at Mason: A Bright History with a Brilliant Future

-VA—a unique state-funded partnership connecting Mason and five other Virginia universities—was created to improve efficiencies in higher education design and promote collaborations that leverage the strengths of each partner university. 4-VA provides the financial resources necessary to support technology assets to improve alliances and relationships, which break down silos statewide. 4-VA also supports faculty throughout the system to develop programs and pedagogies that advance educational design and research.

Over the past decade, 4-VA at Mason has awarded more than 100 collaborative research grants, providing rich research opportunities for faculty and students resulting in fruitful and concrete benefits for Virginia and its citizens. Dozens of courses were redesigned, creating more engaging and targeted learning materials, which saved students hundreds of thousands of dollars; dozens of other courses were shared among campuses in the 4-VA system, increasing access to classes for students and sparing partner schools the cost of new course development; and the pathway to degree completion was lit for thousands of students.

Launched in 2010 at the four founding schools—Mason, James Madison University, Virginia Tech, and the University of Virginia—4-VA was established upon the recommendation of the Governor's Higher Education Commission and the Governor's Commission on Economic Development and Job Creation. Old Dominion University joined the collaborative in 2014, and Virginia Commonwealth University came on board in 2017.



4-VA grants are offered in four broad areas:

- Collaborative Research—Boosts research competitiveness at Mason and partner schools by providing funding for faculty to engage in pilot research focused on 4-VA goal areas that could be used as a springboard for subsequent major federal grants. Collaboration with a researcher at a 4-VA partner institution and providing research opportunities for students are integral to the program.
- Course Redesign—Encourages the development of innovative course redesign integrating Open Educational Resources into the curriculum. The goal of this effort is to provide lively, current, digital resources that can reduce or eliminate textbook costs for students, improve teaching and learning outcomes, and build faculty community as teams work together to create dynamic course material.
- Course Sharing—Utilizes interactive video conferencing technologies throughout the 4-VA system to share courses among the campuses. This program opens up a wide range of classes for students at each campus without the expenses associated with launching a new course at each school.
- Degree Completion—Funds programs that guide students to their degree; assists traditionally underserved populations, including veterans, adult learners, and first-generation college attendees; supports students transferring from community college to a fouryear degree program; and builds partnerships with area business, industry, and government leaders to identify potential jobs of the future and develops and subsequently integrates corresponding skill sets into the curriculum.

Investments with Value: Seeing the Light



Thanks to careful deliberation and judicious due diligence, thoughtfully funded 4-VA projects produce big results for our faculty, students, and communities throughout Virginia. By working together across disciplines and around the state, we break down silos and build up collaboration, creating cost savings along the way. Here's a closer look at 4-VA at Mason expenditures by fiscal year.

*Operations expenditures include salary, copying, printing, mailing and shipping, computer hardware and software, and travel.

**Special Projects and Initiatives include Innovations in Teaching and Learning General Education Summit, Aspiring Scientists Summer Internship Program, The Simon Initiative, ADVANCE, and Center for Teaching and Faculty Excellence.

COLLABORATION PARTNERS

- James Madison University
- Old Dominion University
- O University of Virginia
- Virginia Commonwealth University
- Virginia Tech
- Aramark
- + Aspiring Scientists Summer Internship Program
- Governor's School
- Inova Health System
- National Institute for Learning Outcomes Assessment
- Noyce Scholars for Advanced Placement and International Baccalaureate High School Curriculum
- + Rural and Diverse Student Scholars
- + Smithsonian-Mason School of Conservation
- + Sodexo
- + State Council of Higher Education for Virginia
- + STEM support for Virginia's high schools, community colleges, and four-year colleges
- + Thomas Jefferson High School for Science and Technology
- Virginia Assessment Group
- + Virginia Cooperative Extension Service
- + Virginia Department of Education
- Virginia Farmers
- + Virginia Food Aggregators and Distributors
- + Virginia Office of the Governor
- + Virginia Working Landscapes Program

Collaborative Research Grants: Fueling the Fire

ollaborative research grants awarded this year at Mason have provided the spark for important groundbreaking research, newfound partnerships, and productive joint ventures. Through 4-VA, the strengths of each partner university were brought together, creating exciting results.



Thanks to 4-VA at Mason, significant steps forward were made in the field of biodetection by pairing Mason's Center for Simulation and Modeling with Old Dominion University's Virginia Modeling, Analysis, and Simulation Center; and together, the Roy Rosenzweig Center for History and New Media at Mason, the University of Virginia music archives, and Virginia Tech's history department literally made beautiful music. 4-VA at Mason also introduced Mason's National Center for Biodefense and Infectious Diseases to Virginia Commonwealth University's chemical and proteomics mass spectrometry core facility, resulting in another great match.

Since the genesis of 4-VA at Mason in 2010, faculty and students in our partnership around the state leveraged the resources and assets of each school, creating significant research of consequence and cost savings for Virginia's taxpayers.

A New Model for Teaching Communication Skills

Responsible for planning, supervising, assessing, and improving the communication courses that meet the general education requirement at Mason, Melissa Broeckelman-Post recognized she needed to put some serious analytical insight into best practices for this course from materials and methodologies to delivery methods and student results. But how to pull off this important yet complex analysis while juggling an already full schedule? The answer was found in a grant from 4-VA at Mason.

Armed with the financial support to hire a cadre of PhD students to produce the "in-the-weeds" analysis, Broeckelman-Post had both the necessary numbers and the path to develop and deliver a course that met the needs of the students and produced a blueprint for a pedagogical win in one short year. The research focused on pre- and post-course student surveys that considered communication apprehension, interpersonal communication competence, and



"We were facing a Mason Core course with enrollment topping 4,000 students, a rotating group of 50 to 60 instructors, and reduced classroom

availability. However, we wanted to maintain quality and consistent course delivery. We knew we needed to delve deep into teaching structures to create a positive educational experience while maintaining or improving success rates."

-Lead principal investigator Melissa Broeckelman-Post, the Basic Communication Course director, associate professor in the Department of Communication, and senior scholar in the Center for the Advancement of Well-Being at Mason



The 4-VA at Mason communication team: (left to right) Katherine Hyatt Hawkins, Andie Malterud, Anthony Arciero, Melissa Broeckelman-Post, and Briana Stewart. Photo by Elizabeth Gillooly

engagement. Additionally, the analysis considered grades, attendance records, and a detailed review of more than 300 explanatory speeches, a required five- to seven-minute presentation by all students. Four expert coders evaluated the presentations for five different elements—introduction, body, conclusion, overall impression, and delivery.

Next, this analysis was applied to the three different delivery versions of the course: face-to-face, fully online, and a pilot version that is based on a lecture/lab/speech lab format. The results pointed to the newer version of the class. In this version, Broeckelman-Post delivers an online media-rich introduction, which includes content overviews, readings, TED talks, model speeches, video analysis, and pre-class activities. The introduction is then followed by a small group interactive face-to-face lab with discussions, interviews, and group work presentations.

This not only assured complete and thorough content delivery, but it also saved precious classroom space. The new version was then pilot tested in six sections of the course. After seeing the results, this version has been implemented for 100 sections this academic year.

The bonus came in the final element of the course adding individualized coaching sessions in the new Communication Center for all students enrolled in the course. In the Communication Center, which is funded by the cost savings from moving the first hour of the course online, students meet with student communication coaches to get feedback on outlines, video record and practice presentations, practice interviews, work on developing group presentations, and more. Most of the coaches are members of Mason's nationally renowned forensics and debate teams, graduate students who also teach the course, and students who have demonstrated outstanding communication and feedback skills and are able to share their advanced training with those students just getting started.

The Communication Center is a one-stop shop for valuable one-on-one coaching sessions for students as they prepare presentations. The center, open every day between 10 a.m. and 5 p.m., books more than 300 appointments each week.

"The bottom line of this effort is that we've produced a course pathway that provides the best possible outcomes for our undergraduate students, while supporting our instructors with a rich resource of teaching tools and techniques," says Broeckelman-Post. "What's more, we've streamlined the course and saved some money, which we then were able to use to create our first-of-its-kind on-campus Communication Center. We are very proud that we were able to deliver this terrific outcome for all students—thanks to our 4-VA at Mason grant."



Monique van Hoek and student researcher Alex II. Photo by Elizabeth Gillooly

Critical Post-translational Modifications of the *Francisella* Proteome

The science would not be easy. There were going to be long days and nights in the lab, countless tests to run and techniques to be tweaked. But the end game was intriguing—identify opportunities to affect modifications in the *Francisella* proteome, a bacterium categorized as a Class A bioterrorism agent. Unlike its cousin, the more well-researched *E. coli* bacteria, many aspects of the *Francisella* proteome are not fully understood. Due to its potentially virulent nature, it is important to research and document the biochemistry of this organism in order to develop new therapies or vaccines.

"We started this project because we understood the pivotal role of acetylation in eukaryotic cells. We decided to focus on this area of *Francisella* biology that no one has previously explored. Acetylation is a 'post-translational modification' to proteins and can act like a switch to turn proteins off or on. Prior to this project, we researched another post-translational modification called 'prenylation' in *Francisella*. Given our long-standing interest in how *Francisella* bacteria regulates its biochemistry and physiology, we hypothesized that acetylation would also be an important regulator of protein function."



-Lead principal investigator Monique van Hoek, professor in the School of Systems Biology with a joint appointment to the National Center for Biodefense and Infectious Diseases at Mason

As Monique van Hoek explains, not only did the research produce results, the grant also had a positive effect on students in her lab and faculty at Virginia Commonwealth University (VCU). "Real lives were changed—two great students graduated and went on to get good jobs," says van Hoek. The first student, Ekaterina (Kate) Marakosova, was a PhD student at Mason who began the project with van Hoek working with the more virulent forms of *Francisella*. "Kate started on this project with me and developed techniques to identify protein acetylation. Kate has since gotten her doctorate and gone on to get a great job at the [U.S.] Food and Drug Administration," says van Hoek.

"Alex Ii is now working as a laboratory technician with me," says van Hoek. "In May, Alex defended her master's degree on another aspect of this project, 'Acetylation as a Regulatory Mechanism of Chitinase Activity in *Francisella tularensis* subsp. *novidica*."

She also notes that her collaborator at VCU, Kristina Nelson, points to the project in furthering her own research. Nelson received a 4-VA complementary grant for her part in the project. "With the complementary funding, we were able to purchase standards and columns in order to ensure that the instrument was operating at peak performance to give the best data possible," says Nelson. "It was fascinating to be able to visualize the changes in the protein acetylation profile."

"The new collaboration with Kristina was certainly another positive outcome of the 4-VA grant," says van Hoek.

In addition to furthering the education and professional tracks of those on the project, the research was fruitful. The team has identified multiple *Francisella* proteins that are acetylated and look to be important in *Francisella's* ability to infect hosts. To share the research, a poster was presented at the American Society for Microbiology meeting on biofilms and the manuscript has been submitted for potential publication.

While van Hoek notes there is still much more to investigate with regard to the *Francisella* bacterium, which causes human disease in the United States and Europe, she credits the 4-VA at Mason grant for delivering these important results and making such positive effects on the people and the science. van Hoek continues to study important questions of *Francisella* biology, such as which proteins are secreted by this bacterium and how they are exported. In fact, van Hoek and Nelson are at work on another 4-VA collaborative research project on this very subject titled "Secreted Proteins of *Francisella*— A New Understanding."

High Throughput Bee Pathogen Survey

It is generally recognized that bee habitat loss and degradation, increased use of agrochemicals, invasive pathogens, competition from alien species, and poor management practices are contributing factors to species loss. Scientists are now scrambling to probe deeper into possible ways to combat the loss. One unknown element is the role played by the interaction of the species in shared habitats and flower resources. It is supposed that each species will be affected by different degrees because of differences in bee social organization, foraging and nesting behavior, genetic diversity, and other traits. But the hard science does not exist yet. To take a closer look, Haw Chuan Lim and his Mason team of graduate and



"We saw an opportunity to utilize bioinformatics and genomics capabilities at the Mason SciTech Campus and the field lab possibilities of the Virginia Working Landscapes program to determine if disease incidence and epidemiological patterns in native bees (bumble and mason bees) are driven by increased contact with honey bees. This information is important for apiarists and bee conservationists as we look for ways to fight the precipitous declines in bee populations."

-Lead principal investigator Haw Chuan Lim, assistant professor, Department of Biology

undergraduate students, armed with a 4-VA at Mason grant, conducted groundbreaking research to learn more.

In what may be the only study of its kind, the team was in the unique position not only to access but to develop state-of-the-art research techniques as they closely investigated extracted RNA and DNA from three bee species in Northern Virginia. Together, they harnessed the bioinformatics and genomics capabilities at the Mason Science and Technology (SciTech) campus while developing their own sequence capture probe-set to enable a comprehensive survey of pathogens and microparasites. They collaborated closely with Mason's Rebecca Forkner and University of Virginia's (UVA) T'ai Roulston. Both Forkner and Roulston have many years of experience in pollinator biology, using the Virginia Working Landscapes



Lambrecht inspects a captured bee sample for lab work



Lambrecht with PI Lim. Photos by Elizabeth Gillooly

(VWL) program—the sites of the bee collection—and UVA's Blandy Experimental Farm.

The 4-VA at Mason team collected more than 300 bees from 10 VWL sites across Northern Virginia, freezing and preserving each specimen using liquid nitrogen, and bringing them to the lab on the SciTech Campus, where they were stored in a -80 degrees Celsius freezer.

Bees were split into two groups. Eighty-seven bumble bees, 52 honey bees, and 27 mason bees were tested for four DNA pathogens, while 47 bumble bees, 60 honey bees, and 30 mason bees were tested for six RNA pathogens.

Collecting the baseline values and knowing the diversity and strain variation of pathogens provided valuable information for the future of the bees, including

- Identifying if a pathogen is responsible when bees in the region show signs of a particular disease
- Allowing scientists to target pathogens of interest and to conduct *in vivo* studies of the mechanisms of infection, as well as the immune responses of bees
- Understanding whether managed bees (honey bees) are transmitting diseases to native bees will inform management practices (e.g., keeping apiaries further away from native vegetation)

While the research is ongoing, Lim also sees many valuable offshoots of this project for use in various upper division biology courses at Mason, and perhaps as a part of the bioinformatics concentration.

Explains Lim, "Our results will be very relevant to the basic understanding of pollinator ecology and management and conservation of bee populations. I foresee future funding from federal grant resources and private conservation organizations. Some of this lab work hasn't been done before and it's already opened up more research opportunities."

Peer Victimization in the Preschool Years: Associations with Attachment Style and School Adjustment



supported Garner (right) in her research on the project. Photo by Elizabeth Gillooly

Experts have long recognized the complex interrelationship of a preschoolers' attachment to their caregivers and successful adjustment to school. Without a positive introduction and adaptation to the school setting, preschoolers may fall victim to bullying. Those behaviors can have a significant effect on young students far into the future.

For more than a dozen years, preschool peer victimization has been the research focus for 4-VA at Mason grant winner Pamela Garner. Recognizing there is much to be understood about creating constructive introductions in the school setting, Garner was also keenly aware of a key flaw in the data used in the benchmark research—it is predominantly limited to students who are economically advantaged. However, Garner had access to an existing comprehensive data set that, if properly analyzed, could produce numbers to answer some important questions. Garner argued that this data could allow a deeper look into prosocial behavior, social problem-solving and friendshipbuilding skills, and other forms of peer-related social competence broken out by income level. Many hurdles stood in the way, including access to advanced statistical models and the resources necessary to code and score the data. Notwithstanding those challenges, she saw an opportunity to look closer at the data by collaborating with researchers from other 4-VA institutions. One such researcher, Julie Dunsmore, a faculty member at Virginia Tech, provided a perfect partner for a collaborative research grant. Garner says, "I was very familiar with her work, and she was familiar with mine. We had published something together many years ago, but I've been wanting to work with Julie again. She has vast statistical expertise and has done some very sophisticated modeling of data. The 4-VA at Mason grant was just the ticket to enter into this collaboration."

"The long-term outcome of this research includes a richer understanding of ways to improve or assess students' social-behavioral competencies and teacher practices that support them," says Garner. "Over time, we hope this understanding will improve student academic achievement and successful progression through school."

The consequences of their work could be dramatic, as positive peer interactions and relationships at this early stage can impact a wide range of consequences much later in life— everything from forming positive health habits to attaining higher education to interactions with the criminal justice system.

Garner, Dunsmore, and their teams of students at Mason and Virginia Tech agree: The research was a heavy lift, but they are proud to be part of this important work. Says Garner, "This was great work, and it was great to be able to work with Julie again. I'm confident this will lead to more collaboration—and a growing friendship—between us."

"We wanted to take a closer and more comprehensive look at a data set and ask more complex questions about associations in parenting, peer victimization, and school adjustment among low-income preschoolers."

-Lead principal investigator Pamela Garner, a professor of childhood studies in the School of Integrative Studies

Prognostic Noninvasive Biomarker Investigation of Induced Sputum and Peripheral Blood in Idiopathic Pulmonary Fibrosis



"With our collaborators at Northern Virginia's Inova Health System and in the math department at 4-VA partner school Old Dominion University, we thought we might have the opportunity to identify the difficult-to-diagnose Idiopathic Pulmonary Fibrosis (IPF) disease and track the progression of the ailment and efficacy of the treatment."

-Lead principal investigator Geraldine Grant, associate professor in the Department of Biology

Like any cutting-edge research team, the undergraduate and graduate students assembled in Geraldine Grant's molecular and cell biology lab at George Mason University's Science and Technology Campus knew that for their project to be successful they needed a few things to break their way. Specifically, for their 4-VA at Mason grant, they would need a lot of science, a touch of luck, a drop of art, and more than a little bit of help from their friends.

Their goal was ambitious: Identify biomarkers that would help track the diagnosis and progression of Idiopathic Pulmonary Fibrosis (IPF) as well as the efficacy, if even detected, of medical treatment. The goal would be a tall order for the team studying this lung condition, which affects more than 200,000 people in the United States alone.

IPF is a progressive, fatal lung disease that is survived by few patients three-to-five years after diagnosis. With IPF, patients experience severe scarring (fibrosis) of the lungs for an unknown reason. Over time, the scarring gets worse and it becomes difficult for the patient to take in a deep breath and inhale enough oxygen to fill the lungs.



The Grant Lab IPF Team: From left to right, Geraldine Grant, Charlotte Nigg, Jorge Fernandez Davila, Honoria Riley, Ganit Pricer, Michelle Devlin, and Luis Rodriguez. Photo provided by Grant Lab

Luis Rodriguez, a long-time member of Grant's lab team and part of the initial group that wrote the 4-VA at Mason proposal, says, "Diagnosing IPF is a difficult task. Most of the time, diagnosis is simply a continuing series of elimination testing. Doctors back into the diagnosis because it was determined that it's not A, B, or C." What's more, Rodriguez points out that the disease can present in a number of different ways, and the only standard for diagnosis confirmation is a sample from the lungs. However, the sampling procedure puts the patient at critical risk.

Tackling the diagnosis was just a part of the Grant lab challenge. Treating the disease can also prove problematic, as it can progress slowly or rapidly, and the efficacies of treatment are difficult to determine. With few therapeutic options, little to no systematic tracking of treatment, and a wide range of patient responses to said treatment, the work was cut out for Grant's team.

First, they needed a reliable stockpile of data. Their objective was to get a large sample of patients suffering with the disease to extract RNA. The next step was to correlate the RNA with the current status of each patient's disease, which included precise measurements of two important criteria: how they breathe in and out, and how far they can walk in six minutes.

That's when they called on their first partner in the grant project, Northern Virginia's Inova Health System and Steve Nathan. Inova has long been a recognized care and treatment center for IPF and has a history of successful lung transplants for IPF patients. Through Inova, the Grant team wanted to build the necessary dataset to track, if possible, the measurements of disease progression. Nathan and the clinic agreed. They were in.



With a base of 40 patients in Nathan's province, the team got to work—monitoring, measuring, and capturing data. The process was long and tedious, and they encountered their share of difficulties. One such roadblock meant refining mitochondria sensors in the patient blood samples measuring changes in oxygen that, in turn, captured the progression of the disease and the effectiveness of the treatment. Their perseverance paid off, however, with a statistically significant, reliable data set—which, Rodriguez points out, continues to grow and provide valuable information.

Their next task was to analyze that data in a meaningful and productive way. That's when they called in their second partner, Norou Diawara of the math department at 4-VA partner school Old Dominion University. Diawara has vast experience and expertise in the field of biostatistics, which fit the bill for the project.

All efforts paid off with noteworthy results, as the research identified gene signatures that indicated which patients

responded to treatment and which did not, a giant leap forward in their medicine.

Rodriguez notes that the initial grant has spawned a cadre of further opportunities, including Mason's Office of Student Scholarship, Creative Activities, and Research undergraduate students continuing the analysis of the data set, and proposals submitted to the National Institutes of Health and to the National Science Foundation for a grant on the biology of mitochondria. The project has also been featured in several poster presentations. One such notable presentation was at the Pulmonary Fibrosis Foundation Summit, a convocation of the leaders of research and treatment of pulmonary fibrosis, where the poster ranked in the top 10.

"The 4-VA grant got this ball rolling," says Rodriguez. "We've progressed a long way from the start of this effort. However, I can see this initial research continuing to produce important results for years to come."

ReSounding the Archives

George Mason University, Virginia Tech (VT), and the University of Virginia (UVA) are each recognized and valued for their unique strengths and assets. Consequently, it is not surprising to conclude that when these three institutions collaborate on a project, the results are impressive. Such was the case for a 4-VA project entitled "ReSounding the Archives" (RtA).



The Mason RtA Team: From left to right, Jessica Dauterive, Crystal Golden, Estrella Hong, Linda Monson, Faith Ellen Lam, James Stevens, Nicole Springer, and Kelly Schrum. Photo by Elizabeth Gillooly

This effort was designed to take full advantage of a distinctive set of circumstances that combined history, music, and digital humanities with the ability to access music prior to 1924 without copyright restrictions. It all began with Mason's Kelly Schrum, who identified the genesis of the project during the 100th anniversary of World War I when she saw the opportunities the newly digitized music presented.

"In this project, each institution was able to contribute an integral element: UVA had the sheet music in their archives and created a research class around the project; Mason had the performers, digital history education specialists, and website developers; and VT also contributed sheet music, research, and performers," says Schrum.

Schrum recalls the early days of the project: "We drew on our connections with [Virginia] Tech and UVA everyone we discussed the idea with got really enthused about bringing historical sheet music to life. It developed organically based on each institution's resources and strengths, but we knew we were onto something good when the energy of the project traveled to all potential contributors, from musicians and archivists to librarians and students."



RESOUNDING THE ARCHIVES

Schrum concedes, however, that even though the energy and enthusiasm were high, the devil is in the collaboration details. "Getting everything synched between campuses can be a challenge, and even coordinating within our own large institution takes work," she says.

But as the weeks went on, progress was made. Students researched in the archives and worked to contextualize their pieces as the performers rehearsed and studied the music within its historical context.

The effort culminated on a spring evening in Charlottesville when the team of researchers, performers (musicians and singers), videographers, archivists, librarians, faculty, and more joined together in UVA's Colonnade Club Garden Room to present 17 pieces of World War I-era music.



"ReSounding the Archives was created to do exactly that—to 're-sound' the archives by bringing digitized historical sheet music, which existed only as

images and text, to life by combining it with the music it represents through studio and live performance."

—Lead principal investigator Kelly Schrum, associate professor in the Higher Education Program at George Mason University and former director of educational projects at the Roy Rosenzweig Center for History and New Media



From "K-K-K Katy" to "Over There" to "Oh How I Hate to Get Up in the Morning," the Colonnade Room sprang to life—circa 1918.

Following the performance, the RtA team began work on phase two of the project, resoundingthearchives.org, which formatted the collection for use as a lasting, sustainable digital resource for K-12 teachers throughout the state to promote teaching history through music.

The website contains each piece of sheet music and includes various entry points for educators, students, and researchers, including live and studio recordings of each song, the digitized sheet music, student essays contextualizing the pieces, and the transcribed lyrics. Each piece of music is available with full metadata and all recordings are also available for download, offered under a Creative Commons license that makes them available for use in classrooms, digital projects, or even for remixing.

"The website is endlessly extendable," says Schrum. She sees opportunities to expand the project to include Civil War music and political songs.

Shrum says, "This 4-VA at Mason grant gave us the opportunity to bring this important work to life. We had these great ideas, but the grant provided us the opportunity to collaborate and make it happen. This project is a model of what can be done across institutions and disciplines." ReSounding the Archives: Mason lead PI Kelly Schrum (left) and co-PI Nicole Springer. Photo by Elizabeth Gillooly

Reflections from the RtA Partners

- Elizabeth Ozment, whose class of music students at UVA provided the research for the project, had this to say:
 "ReSounding the Archives' has built bridges between our institutions. It has brought us together in ways I could never have imagined! This has been incredible for me to see and hear all this wonderful music."
- Linda Monson, director of the Reva and Sid Dewberry Family School of Music at Mason, says, "It's been a delight to be able to bring this music to life. We played a role in 13 of the songs, but this is just the beginning.... We are looking forward to continuing to work with UVA and [Virginia] Tech as we move forward on this project. A huge thank you to all who have been part of this."
- Winston Barham, music collections librarian at UVA, summed it up this way: "This has been one of my greatest delights—to work on a project holistically, from music development to website development."
- Trudy Becker, senior instructor in history at Virginia Tech says, "We all got to do something really exceptional together and we got to immerse ourselves in our special collections library and integrate it into a history lesson."

Scalable Molecular Dynamics

Of the 21 iterations of the definition of the word "scale" in the Oxford Dictionary, one is particularly applicable to the 4-VA at Mason grant project "Scalable Molecular Dynamics": "the full range of different levels of people or things." This definition illustrates both the scope of the research and the collaborators involved in the effort.

While orchestrating a variety of other projects and programs, lead principal investigator Estela Blaisten-Barojas took on one more when she applied for and received the 4-VA at Mason grant. This study is central to finding innovative solutions for environmental pollution, health care, sustainable energy resources, global warming, and ways of fighting terrorism, crucial to both Virginia's and the nation's competitiveness in science and engineering.

To launch and deliver "Scalable Molecular Dynamics," a full-throttled balancing act was necessary. Blaisten-Barojas called on her colleagues, Robert Handler from the Mechanical Engineering Department at the Volgenau School of Engineering and Eric Weisel, executive director at the Virginia Modeling, Analysis, and Simulation Center (VMASC) at Old Dominion University, a 4-VA partner school. Then, she added a number of talented Mason students to her 4-VA team, including Gideon Gogovi, Scott Hopkins, and James Andrews. Each brought countless hours of research to the project, enhancing both the collective mission and their personal portfolios.

Once the project got going, the full-range definition of scalability was set in motion. In fact, the simulations were so complex that they reached the maximum allowed in Argo, Mason's centralized research computing cluster.

The team's research identified several interesting and notable characteristics regarding the structure and



Left, Scalable Molecular Dynamics team member Gideon Gogovi; right, Blaisten-Barojas consults with team member James Andrews. Photos by Elizabeth Gillooly



"We saw the ability to undertake a serious study of predictive computational and simulation-based approaches in chemical

and materials sciences combined with engineering approaches. We knew that we could do much of the work here at Mason's Center for Simulation and Modeling, but to really maximize the study, we saw the value in partnering with Eric Weisel, executive director of the Virginia Modeling, Analysis, and Simulation Center at Old Dominion University."

-Estela Blaisten-Barojas, CSM director

energetics of the polymer polyacrylamide in implicit and explicit solvents. As team members studied the chain shape and the diversity of coiling and twists of the polymer in the various solvents, the researchers noted closely the changes in shape from an elongated spaghetti string to a more football-like object. Importantly, based on what they learned, the team was able to make several scaling-up predictions about how big structures can grow. This new understanding is valuable for efficiently controlling the performance of devices based on molecular components.

That new information was the basis for two conference presentations—a talk and a poster at the American Chemical Society Mid-Atlantic Research Meeting and two journal papers that have been submitted for publication.

Blaisten-Barojas notes that although the research, results, and dissemination have been gratifying, it was the newfound relationship with the VMASC that exemplified "the full range of different levels of people and things" concept. "This is a very important first step," Blaisten-Barojas says. "We now know who they are, and they know who we are. I know that if they see possibilities in some of their initiatives, they will knock on our door first and we will do the same."



Virginia Colloquium on the Rhetoric of Health and Medicine

Just as the nation is grappling with myriad issues in health care, concerned scholars studying the rhetoric of health and medicine in Virginia were particularly interested in what role they could play in moving and improving their field within the commonwealth.

When Heidi Lawrence saw the opportunity to use a 4-VA at Mason grant to achieve that goal, she jumped at the chance to take the important first step in generating collegiality in the field among the Virginia partner schools.

Lawrence used the grant to coordinate a first-of-its-kind statewide symposium, The Virginia Colloquium on the Rhetoric of Health and Medicine.

The project's goal was three pronged: to provide students and faculty with mentoring and academic opportunities; to look closely at what role the group could collectively play in improving health care for populations across the state utilizing their humanistic approach; and to explore possibilities for pursuing funded research in the future.

The colloquium was hosted at Mason and featured a keynote address by internationally renowned health and medical communication expert Kirk St. Amant of Louisiana Tech University, presentations from four graduate students, a lightning round collaboration session, and a concluding panel presentation on pursuing further research. Among the attendees were student and faculty representatives from Mason, James Madison University, Virginia Tech, University of Mary Washington, and University of Detroit Mercy.

"If not for the 4-VA at Mason grant, we would never have been able to begin this important work," says Lawrence. "We owe our foundation and progress to 4-VA—100 percent."

"We know our discipline is growing in Virginia, with programs at Virginia Tech, Old Dominion, and James Madison, as well has here at Mason. But we did not want to grow these programs in silos. We recognized that by working together, it would be better for our collective student and faculty bodies as well as help advance critical medical communications and messaging issues at the state level."





Complementary Grants: Shining a Light on Partnerships

o bolster the Collaborative Research Grants program, 4-VA at Mason also offers complementary grants to faculty members interested in joining the team of a lead principal investigator at another 4-VA institution. These grants—up to \$5,000—provide funding to allow Mason faculty to play a role in 4-VA primary research at a partner school.

One such recent grant funded a multi-tiered, multifaceted, and multi-year program through which Mason, along with James Madison University, University of Virginia,



and Virginia Tech, identified opportunities to create a sustainable food system supporting Virginia's farmers, food processors, and food delivery systems serving 4-VA universities. Another grant brought together stakeholders in the field of higher education assessment for an innovative and interactive program attracting assessment professionals from 50 organizations, the largest 4-VA event to date.

Thanks to the 4-VA spark, these complementary grants often go on to forge relationships and connections that burn long into the future.

2017–18

USING TOPOGRAPHIC COATINGS TO REDUCE BACTERIA

MASON LEAD: Monique van Hoek, professor, College of Science, and researcher in the School of Systems Biology and the National Center for Biodefense and Infection Diseases

The objective of this project was to test whether the colloidal topographical surface affects the ability of *Burkholderia* and *Pseudomonas* bacteria to form biofilms on these surfaces. One of the outcomes of this project is that new techniques were used to develop a protocol for testing biofilm formation on solid discs.

COLLABORATOR: Virginia Tech

TURN MUSHROOMS INTO STORMWATER TREATMENT TOOLS

MASON LEAD: Changwoo Ahn, professor of environmental science

In this study, the principal investigator carried out a comparative test to monitor the effect of fungal amendment on the stormwater treatment performance of a bioretention system. The project benefits STEM education by supporting the

Mason's Changwoo Ahn conducting field research.



research of graduate and undergraduate students as well as providing scientific results to fill knowledge gaps in stormwater treatment education.

COLLABORATORS: Old Dominion University, Virginia Commonwealth University, and Virginia Tech

USING DEBATE TO IMPROVE STUDENT LEARNING AND FACULTY ENGAGEMENT IN EDUCATION AND EXCEPTIONAL EDUCATION ACROSS THE COMMONWEALTH

MASON LEAD: Fredrick Brigham, professor, College of Education and Human Development

This project designed, implemented, and assessed the use of debate pedagogy in exceptional education classes. Funds were used to support students and faculty as they designed and implemented curriculum and executed data analysis and reporting.

COLLABORATOR: James Madison University

USING NOVEL TECHNIQUES TO REVEAL THE EFFECTS OF HABITAT AND RESOURCE QUALITY ON SURVIVAL AND PRODUCTIVITY OF THREATENED POLLINATORS

MASON LEAD: Rebecca Forkner, professor of biology

This project studied eight managed grasslands in Northern Virginia that vary in bumble bee populations to discern key regional plant species that support the bees. Researchers compared the growth of sentinel colonies with availability of preferred floral resources. Novel techniques included drone monitoring of floral abundance and DNA barcoding of pollen carried by bees. The project seeks to improve ecological understanding of key drivers of pollinator abundance and diversity in order to inform conservationminded management of agroecosystems.

COLLABORATORS: James Madison University, Old Dominion University, University of Virginia, Virginia Commonwealth University, and Virginia Tech

CREATING AN EARLY CHILDHOOD PROFESSIONAL PATHWAY: THE AA-TO-BA ARTICULATION PROJECT

MASON LEAD: Julie Kidd, professor, and Ellen Rodgers, associate professor, College of Education and Human Development

This project supported partners as they collaborated to redesign courses in their respective early childhood programs with the goal of offering online formats that will be accessible to students across Virginia. In addition, partners provided advising and mentoring support to students to increase the likelihood of BA completion among early childhood practitioners.

COLLABORATORS: James Madison University, Old Dominion University, and Virginia Commonwealth University

4-VA MINDFULNESS AND SELF-CARE FOR THE HELPING PROFESSIONAL COURSE DEVELOPMENT

MASON LEAD: Mark Thurston, term associate professor, School of Integrative Studies

This project is a continuation of a collaboration with James Madison University to develop and disseminate a course entitled Mindfulness and Self-Care for the Helping Professional in order to create and provide an online version to students.

COLLABORATOR: James Madison University





2018–19

MEETING ASSESSMENT PROFESSIONAL DEVELOPMENT NEEDS ACROSS VIRGINIA: A VIRTUAL DRIVE-IN

MASON LEAD: Stephanie Foster, associate director in the Office of Undergraduate Education

This project led to the development and delivery of a successful statewide conference for assessment professionals. Results of a pre-post survey indicated that participants felt more confident in their ability to manage collection of assessment data and to communicate the results and value of the assessment.

COLLABORATORS: James Madison University, Old Dominion University, Virginia Commonwealth University, Virginia Tech, Virginia Assessment Group, National Institute for Learning Outcomes Assessment, and State Council of Higher Education for Virginia

ROLE OF HCV EXOSOME IN LIVER FIBROSIS

MASON LEAD: Ramin Hakami, associate professor of microbiology and infectious diseases

This study focused on the development of novel anti-fibrotic therapeutics that target the inhibition of exosome release to prevent Hepatitis C-associated chronic liver diseases.

COLLABORATOR: University of Virginia

ADVANCING SUSTAINABILITY GOALS THROUGH THE VIRGINIA FOOD SYSTEM LEADERSHIP INSTITUTE (VFSLI)

MASON LEAD: Kerri LaCharite, assistant professor in the Department of Nutrition and Food Studies

This project evaluated the student experience and developed a journal article on pedagogical methods in sustainable food systems curriculum. VFSLI harnesses the intellectual, human, and economic capital of Virginia colleges and universities to foster the emerging local food economy.

COLLABORATORS: James Madison University, Virginia Tech, and University of Virginia



LEADING CHANGE CONFERENCE

MASON LEAD: Stefan Toepler, professor of nonprofit studies and director of the Schar School of Policy and Government's Master of Public Administration Program

This project provides interactive workshops, paper sessions, and panels on leadership in higher education.

COLLABORATORS: 24 colleges, universities, and organizations

EVIDENCE-BASED INSTRUCTIONAL PRACTICES (EBIPs) AND THEIR USE IN FIRST-YEAR INTRODUCTORY ENGINEERING COURSES

MASON LEAD: Jill Nelson, associate professor, Department of Electrical and Computer Engineering

This study will lead to the development of statewide practices for EBIPs in first-year introductory engineering courses. Results will support educators in designing successful learning environments to engage students and promote deep understanding of the subject.

COLLABORATORS: Virginia Tech and University of Virginia

DEVELOPMENT OF A BLUEPRINT FOR THE VIRGINIA STEM ECOSYSTEM

MASON LEAD: Padmanabhan Seshaiyer, associate dean for academic affairs for Mason's College of Science and professor of mathematical sciences

The Virginia governor's science, technology, engineering, and math (STEM) coordinator and the Virginia Department of Education's STEM director are charged with developing a blueprint for a statewide STEM network or "ecosystem." This team will thoroughly research the process and assess outcomes of this effort.

COLLABORATORS: James Madison University, Virginia Tech, Virginia Commonwealth University, University of Virginia, Virginia Department of Education, and Virginia Office of the Governor

USING ECONOMICS THEORY TO IMPROVE CLOUD RESOURCE UTILIZATION WITH APPLICATION PERFORMANCE GUARANTEE

MASON LEAD: Jie Xu, associate professor with the Department of Systems Engineering and Operations Research

The study identified the optimal pricing, capacity planning, and service-level objectives to maximize the revenue for cloud computing service providers.

COLLABORATOR: University of Virginia



4-VA Grant Supports State STEM Summit

Through 4-VA, more than 140 leaders from Virginia's K-12 and higher education institutions, out-of-school providers, private education, businesses, and state government officials and institutions joined together to develop a blueprint for a statewide science, technology, engineering, and mathematics (STEM) education network. This structure will be the basis for creating cross-sector pedagogies providing Virginia's youth access to a learning environment that will allow them to grow important skills to engage in STEM learning from Pre-K through college. To share information to support this effort, Virginia's STEM Summit, hosted at Virginia Commonwealth University, was developed by a group of 4-VA schools-Virginia Commonwealth University, Virginia Tech, Mason, James Madison University, and University of Virginia-in coordination with the Virginia Department of Education and the Office of the Governor.

Governor Ralph Northam charged Virginia's STEM leaders with the job of creating an infrastructure with input from all stakeholders for the newly appointed Virginia STEM Education Commission.

As Susan Magliaro, a 4-VA grant team member and associate director of the Center for Educational Networks and Impacts at Virginia Tech, says, "Our goal was to provide a well woven tapestry of information for our STEM leaders."

The daylong conference began with a keynote address from retired NASA astronaut, materials science engineer, educator, and former NFL wide receiver Leland Melvin. Melvin shared with the audience how STEM education necessitates an open mind, perseverance, and personal support to be successful. George Mason University's principal investigator on the project Padmanabhan Seshaiyer says, "Leland was the perfect kickoff for our conference. He clearly illustrated that STEM doesn't have to be stuffy or difficult to understand. It's a hands-on experiential learning opportunity that can open doors for all of our students, and especially our minority or underserved students. It can bring projects and process to life."

Other Mason participants in this 4-VA summit were faculty with diverse backgrounds and expertise in STEM—



Left to right, Padmanabhan Seshaiyer, Leland Melvin, and Kelly Knight. Photo by Elizabeth Gillooly

Rebecca Jones, Kelly Knight, Karen Lee, Kammy Sanghera, and Kerin Hilker-Balkissoon.

The conference also featured a panel discussion addressing some of the more difficult obstacles facing the successful implementation of STEM programs. Presenters represented the business, education, and policy arenas. Each highlighted best practices developed by state or local school boards from around the country. The consensus was that effective existing ecosystems in STEM were developed by building a culture that welcomed all stakeholders and where the resulting guidelines represented a convergence of values and practices.

Following the panel discussions, attendees built out the framework for such ecosystems based on their professional backgrounds.

Longtime STEM proponent Amy Sabarre, director of STEM education for the Harrisonburg City Schools, observed at the summit, "I've been involved with the development of a core curriculum for STEM in the commonwealth for years, and this summit has been a long time coming. But, we're here now, and we're making great strides." Concurrently, newer stakeholders see the same bright future. Jonathan Frey, makerspace coordinator at William and Mary, says, "Makerspaces have been growing and evolving at a dramatic pace throughout the world. What was once a location for tinkerers to play with technology has now become an impactful community engineering center both in academia and the private sector. Here in the commonwealth, there are dozens of makerspaces, and it is time to coordinate collaboration throughout Virginia. The 4-VA STEM Summit offers an opportunity for introduction and collaboration between such efforts from the peaks of Appalachia to the sands of the Eastern Shore."

The day concluded with a group effort to integrate the work created at each roundtable into a viable framework for the commonwealth. The conclusions will provide the basis for the STEM ecosystem build-out and will be forwarded to the Virginia STEM Education Commission.

Virginia Education Assessment Professionals Convene Statewide Symposium

In the largest and most widespread event that 4-VA has ever coordinated—including six 4-VA partner schools higher education assessment professionals from across the commonwealth came together for a virtual meeting using telepresence technology at each of the 4-VA schools.

Mason coordinator Stephanie Foster, associate director in the Office of Undergraduate Education, and her colleagues at the Virginia Assessment Group received a 4-VA grant to bring together assessment professionals from two- and four-year public schools, private schools, and alternative higher education institutions to offer advanced training for faculty and professionals who have responsibility for learning outcomes assessments in their institutions. Foster says, "The idea for the 'Drive-In' came from a self-study of the Virginia Assessment Group's professional development offerings. We wanted to increase participation from our community college colleagues, and travel cost was identified as a barrier to their participation. One of our board members had an idea to use the 4-VA telepresence technology to host a virtual workshop. Because it was a free event, and no participant needed to travel more than an hour to get to their closest 4-VA site, the virtual 'Drive-In' served a wider audience."

The daylong workshop provided critical training on best practices in data collection, analysis, and reporting. Facilitators at each location oversaw collaborative activities to encourage partnership and sharing of innovative practices. "Telling Our Stories: Using Assessment Data for Learning and Improvement" was an instant success, with 168 conference registrants representing 50 organizations comprising 31 universities, 15 community colleges, and 4 professional organizations.



Mason participants in the "Assessment Drive-In" interact with colleagues via telepresence room technology. Photo by Kim Reedy

Foster says, "Good assessment is essential to our practice as educators, and many programs are doing it well. Across the field, we are striving to improve how we share what we learn with faculty and institutional leaders so that assessment work can contribute to improving curriculum and instruction for student success."

The conference agenda involved input from each of the six locations, as well as national leaders in the field including representatives from the National Institute for Learning Outcomes Assessment.

It was clear throughout the day that connections were not only made at the individual sites but also from site to site. Attendee Adrienne Sullivan, director of accreditation in the College of Education and Human Development at Mason says, "For me, the opportunity to meet and chat with other colleagues from Mason was great. [But] the highlight was to meet colleagues from other local higher education institutions and learn how they implement and handle assessment data collection, [which] was really fabulous. It made me feel that we are not alone in the struggle to find an efficient way to collect data."

Course Redesign: From Kindling to Flame

ne of the mainstays of the 4-VA at Mason program is to identify and grow academic ventures that truly make a difference in higher education by creating cost savings, providing greater access to the educational process, and developing new or more effective pedagogies. Perhaps there is no better example of this than course redesign using Open Educational Resources (OER).

Over the years, with a relatively small investment, 4-VA at Mason has supported the development and delivery of almost 30 redesigned courses that have resulted in vibrant and exciting new course materials, interactive learning modules, up-to-date learning resources, and "flipped" classrooms, all while saving students thousands of dollars. Here's a closer look at a few of our success stories.

4-VA MAKES A RETURN TRIP TO ASTRONOMY: ASTR 113

Kiend's Curve

After tackling the development of an OER textbook for ASTR 113 Stars, Galaxies, and the Universe, which resulted in enlivening digitized materials for the course and saving students up to \$200 on a textbook, Mario Gliozzi applied for and received a second 4-VA at Mason grant to take on the challenge of producing an online homework system to complement the redesigned educational resources.

Gliozzi recognized that students were not completing their homework assignments on a regular basis, which is integral in testing their understanding of the course topics. He and colleague Rebecca Ericson were interested in developing a homework system closely related to the new OER material, including weekly quizzes with multiple choice, multiple answer, ordering, matching, and jumbled sentences, with feedback and clarification accessible after the quiz deadline. Additionally, Gliozzi wanted to utilize the many illustrations and graphs available online, which helped prompt questions on fundamental concepts and allowed the students to learn the importance of understanding and interpreting graphs and diagrams. After employing the new homework program for a semester, Gliozzi tweaked some of the elements and employed them fully the next year (ASTR 113 is only taught in the spring semester). He noticed that once the importance of the weekly homework assignment was properly emphasized at the beginning of the semester, and the students realized the close link between the homework questions and the questions on the proctored tests, the students recognized that the homework quizzes were one of the most effective tools for preparation and success in the class.

After fine-tuning the homework and quizzes, the materials were made available to all Mason astronomy instructors by uploading them on their permanent ASTR 113 Blackboard repository. Thus, the new materials were a positive change not only for the students, but also for fellow faculty.

Gliozzi says, "This 4-VA at Mason grant gave us the chance to develop a tool that proved useful (and free of charge) to complete the student preparation out of class, which gave them the best tools possible to be successful in ASTR 113."

CREATING BETTER CHEMISTRY AND DELIVERING STUDENT SAVINGS: CHEM 336

An email from a staff member at Fenwick Library caught the collective eye of the teaching team responsible for delivering CHEM 336 Physical Chemistry Lab I. The email referenced the 4-VA at Mason course redesign grants.

Lead principal investigator (PI) Moissa Fayissa thought that this might just be the path for the team to pursue. He believed their current text and lab books were subpar and incomplete as a match for their course. Fayissa saw the need to provide far more suitable materials for this intensive class, which is offered in three sessions in the fall semester and two sessions in the spring semester. Additionally, Fayissa worried about the cost of the course textbook at the time. At more than \$250, it was a high price to ask students to pay.

When Fayissa and his co-PI Pritha Roy received their 4-VA grant, they divided up the lesson plans and got to work. Fayissa says, "The materials search included looking at printed laboratory manuals and online open resources. When we could not find enough information online for the experiment, we referred to the previous laboratory manual and cited the lab manual as the reference. The instructions and background materials found online were rewritten to suit our needs."

While the team did find that locating and utilizing materials without copyright infringement was challenging, they relied upon the help of library staff to ensure they were taking the correct approach and gave careful consideration to each citation.

Fayissa is pleased with the results. "This process has led to better background materials and better explanations for experiments," he says. "In addition, the students have access to these materials without the expensive textbook, which was an important goal of this project." Although CHEM 336 is limited to 16 students per class due to lab restrictions, the total textbook cost savings approximates an impressive \$20,000 annually.

Fayissa and Roy uploaded all course work into Blackboard for the fall semester. They agree that the final product was worth the effort for the improved curriculum and cost savings for the students.



A CIRCUITOUS ROUTE IN MATERIALS DEVELOPMENT FOR ECE 285

While interest in OER is expanding exponentially, sometimes the search results come up short. This was clearly evidenced by the research undertaken by Nathalia Peixoto for her ECE 285 course. Electric Circuit Analysis I is a complex course with many different attributes, covering the first half of electric circuit theory and practice. Topics include analyses of circuits with resistors, capacitors, inductors, and operational amplifiers, all supplemented with lab experiments to reinforce the subject matter. As

Peixoto looked for suitable written resources, she found they did not meet the needs of her course.

Peixoto's research then took a hard turn. While she could not identify any written sources, she did find videos of lectures and presentations—primarily on You'Tube—that more directly addressed the topics. So she began compiling four pages of links to 66 different videos of nodal and mesh analysis, operational amplifiers, capacitors, and inductors, as well as first order and second order circuits, and more. In the end, the free video series she

curated served as an adaptable substitute for the textbook, which had sold for \$300. With 100 students taking the course each year, it resulted in students saving a collective \$30,000.

Although Peixoto's proposal to provide free, engaging, and informative materials for her students in ECE 285 did come to fruition, the mode employed was not what she had anticipated. She offers some perspective on her journey, noting that the 4-VA grant "helped me move forward [with] helping out students." Peixoto plans to develop her course notes to share with the wider Mason faculty and more fully test the course materials.

DEFINING IMPACT: ENGH 302

Assessing the combined results of OER course redesign grants to date through 4-VA at Mason, it is hard to find a more impactful grant than the one supporting ENGH 302 Advanced Composition. This grant helped build an OER collection for this celebrated Mason Core class, which has an enrollment of almost 7,000 students annually and is delivered by a rotating group of approximately 65 faculty.

Lead principal investigator Catherine Saunders—who has served as coordinator over the two stages of the 4-VA at



Mason grant project-and the 13 colleagues who served on the project team faced plenty of challenges. As instructors of an advanced composition course offered at only a few American universities, the team-all faculty members who teach ENGH 302-did not have off-the-shelf textbooks appropriate for the specific goals of the course. Instead, most instructors created and/or adapted materials to suit their students' needs within an informal culture of sharing and collaboration of various versions of assignments and activities, all developed within the ENGH 302 instructor community. Adding to the challenge was the growing number of instructors hired to serve the expanding ranks of ENGH 302 students, increasing the danger of losing consistency across sections. The ENGH 302 instructors' goal was to formalize the existing culture of collaboration and ensure that resources developed by experienced instructors would be easily available to new instructors.



Saunders and a group of colleagues first got started on their effort when they received their initial 4-VA at Mason grant. That grant provided support for the creation of a core collection of OER items-assignments, activities, and other curricular materials created and peer-reviewed by experienced ENGH 302 instructors. Those were then made available to new and experienced ENGH 302 instructors via Blackboard. Although the Blackboardbased collection was popular with ENGH 302 instructors, follow-up surveys of users indicated there was room for improvement in the design of the collection, as well as a desire for additional resources and a preference for a publicfacing collection. A different platform was needed to make the OER curated by the ENGH 302 team more readily available not only to Mason faculty, but also to the wider composition community. Hence, the team applied for and received a second 4-VA at Mason grant to finish the work.

Team member Psyche Ready, assisted by Joyce Johnston, took the lead in adapting Mason Journals' iteration of the Open Journal System (OJS) to meet the needs of ENGH 302 OER collection authors, reviewers, and users. Each item in the new, public-facing collection includes an abstract, instructor's notes, and Creative Commonslicensed curricular materials, such as assignments, activities, or background readings, all created and adapted for use in ENGH 302. The OJS platform eases the review process and allows user-friendly features such as keyword searching.

The response from the instructors and students alike has been rewarding for Saunders and her team of developers. "The students express appreciation that course materials are free to them and that they are specifically adapted to the goals of the course," Saunders says. "They also like that the materials break down larger concepts and assignments into manageable chunks, and that they employ active learning strategies and real-world materials."

Saunders and Ready brought their project to a larger audience by presenting their work at the Northeast Modern Language Association Conference, and they have plans for other conference presentations.

In addition to Saunders, Ready, and Johnston, the ENGH 302 team included the following faculty members: Lourdes Fernandez, Virginia Hoy, Sara King, Stephanie Liberatore, Jessica Matthews,

Benjamin Orlando, Mark Rudnicki, and Margaret Scolaro. Saunders also credits the "invaluable assistance" of Fenwick Library staff members John Warren, Aaron McCollough, and especially Andrew Kierig.

PROVIDING BALANCE, INJECTING ENERGY, CREATING STUDENT SAVINGS— REDESIGNING HIST 121

After spending almost one full year redesigning HIST 121 Formation of the American Republic, Cynthia Kierner rolled out the new course and awaited student response. Judging from the feedback, the new HIST 121 is a great success.

Here's a sampling of students' comments:

- The Civil War letters assignment "crafted my skills as a writer [and with] document analysis.... It should be like this for all classes."
- "It was a great experience. I was able to get the info I needed on Monday and work collaboratively on Wednesday."
- "Really appreciated the opportunities for discussion in lectures. It helps cement the material."
- Modules were "a good way to shift focus from memorizing information to interpreting information."
- The Civil War letters assignment "allowed me to really dive into primary sources to learn about history."

As she began the redesign, Kierner recognized her challenge. The course, a sweeping overview beginning with the Native Americans and moving through Reconstruction, covers a lot of ground. Moreover, the introductory class is primarily taken by non-history majors who do not necessarily harbor a passion for the subject.

"I sought to use the 4-VA at Mason grant to redesign HIST 121 to emphasize skills and active learning while simultaneously lowering student costs," Kierner says. "Specifically, I planned to replace expensive textbooks and document readers with free online sources—including the acclaimed open source U.S. history text, *The American Yawp*—and also to create a series of new module assignments that give students the guidance they need to use online databases encouraging the development of research questions, to find and interpret primary sources (words and images), and ultimately to produce their own small-scale research projects. In other words, to let them act like real historians."

Although quite familiar with many sources available to create the modules, as a researcher in the field who has taught this course often, Kierner conducted some further investigation to identify new information sources, including digitized Civil War letters. Kierner credits Mason's history librarian George Oberle for his assistance in finding information and making it accessible.

Kierner says, "This was a desirable opportunity to retool a lecture class to emphasize active learning. It reinvigorated my teaching in lecture-style classes, while providing students with a better experience at a more affordable cost, reducing books and materials costs from \$100 to \$150, to \$0."

STEERING WORLD HISTORY FROM FLAT TO MULTIDIMENSIONAL: HIST 125

Twenty-five years ago, developing and navigating a wideranging curriculum for a course titled Introduction to World History was daunting. Today, teaching that same class presents all new challenges as the myriad "sources" found by students on the internet can often send them off course. That same internet rabbit hole faces faculty interested in utilizing OER. Faculty members must identify appropriate events to form the hefty narrative of the course; research openly available and credible materials; locate engaging, interactive resources to support each lesson; and organize the results in a user-friendly digital architecture. Untold hours are needed to accurately research the options. Yet 4-VA at Mason course redesign grantee Sheri Ann Huerta saw an opportunity to do something even bigger with her project. Huerta says, "I wanted to create analytical modules that facilitated learning by developing incremental training in the key critical thinking skills utilized by historians, which also serve to develop savvy consumers of information in our digital age."

Huerta began her efforts by scanning a wide variety of sources for inclusion in the course materials—everything from existing textbooks and primary source books to films on demand, and the Adam Matthews databases. She also visited databases of art museums, signed up for appropriate history and teaching pedagogy listservs, and consulted with subject matter experts at Mason, including Jane Hooper, assistant professor of art history, and history librarian George Oberle.

"The redesign focuses attention on students developing a personal 'historical voice' of world history informed by primary sources rather than relying on the limited story told in textbooks or lecture-test style delivery," says Huerta. "By shifting the emphasis from memorization to interpretation, the course connects well with the goal of applying critical thinking skills. By evaluating sources of information for accuracy and reliability and working more in small groups, students develop a heightened awareness of multiple perspectives and diversity of thought in the classroom—skills that help create informed global citizens." Huerta collaborated with Oberle to structure the course to gradually identify and develop key career-ready skills: evaluation of sources; teamwork and collaboration; written, oral, and digital communication of ideas; professional communication; and developing persuasive, evidencebased arguments.

Not surprisingly, the students greatly appreciated that the redesigned course makes use of eco-friendly digital materials accompanied with a significant drop in the cost of course materials—from \$137.50 to \$7. More importantly, students showed an appreciation for the inclusion of accounts from voices often neglected in broad historical narratives, including women, persons of color, and non-European and non-American cultural groups.

"This project was multifaceted and difficult, however with the help of my colleagues and the 4-VA at Mason grant, it was very worthwhile for the course and our students," says Huerta.

Shared Courses: A Distant Light



he first project undertaken by 4-VA statewide at its inception was the development of shared courses-utilizing technology to expand access to education, which also resulted in cost savings for the institutions

involved. Joy Hughes, the first coordinator of 4-VA at Mason in 2010, explains, "We started with language courses. We identified classes that students wanted to take, but the enrollment numbers did not warrant hiring a new faculty member and instituting the course on our campus. Through the telepresence technology, we were able to share the educational burden within the 4-VA system."

Today, the shared courses program tradition continues. Mason students benefit from receiving classes taught at other partner 4-VA schools, while Mason faculty share their knowledge with students hundreds of miles away, all delivered through the latest in technology.

SHARED COURSES

FALL 2017

Mason Hosted

- + KORE 110
- + PERS 110
- + PERS 210

SPRING 2018

Mason Hosted

- + KORE 210
- + PERS 210
- PERS 330
- + GAME 399

FALL 2018

Mason Hosted

- KORE 101-V01
- KORE 101-V02 **PERS 110**
- + PERS 202

SPRING 2019

Mason Hosted

- + KORE 102-V02
- **PERS 201**
- PERS 330

Although the technology does support student-teacher interaction, teaching in two different classrooms simultaneously necessitates some adjustments. For Mason's Dae Yong Kim, an experienced Korean-language instructor, it meant making some modifications in his teaching style and in the class materials. "I needed to change up the classroom approach to make it interesting and challenging," Kim says.

"I recognized I had to make some changes in everything from the font size on my PowerPoint slides to how I engage my students, especially the ones at [James Madison University (JMU)]," says Kim. So, Kim got to work, enlarging the font and minimizing the content on the slides.

His next step was to change his style. "You can't do lecturestyle teaching," he says. "I had to engage the class. I decided that I had to focus on the JMU students, because I've already got the attention of my students here. But they can't spend one hour and 15 minutes staring at the monitor. I do more group activities, including having the students interview their peers and then analyze the interview as a class."

Kim's next hurdle was to figure out how to handle quizzesthe backbone of a language class-to ensure that students are retaining their vocabulary. But conducting such quizzes, fairly, from more than 100 miles away would be difficult. To overcome this, Kim gave each of the students at JMU different vocabulary tests and they chose their correct answers from responses provided. Once a student selects the right answer, they record it in a notebook. When their notebook response sheet is completed, the student takes a picture of the page with their phone and emails it to Kim. Kim monitors his phone throughout the allotted quiz time to ensure that he has received each student's quiz.

At the conclusion of his first year in the telepresence room, Kim was impressed with the results. "I honestly thought students would drop the class after one or two sessions. I thought they'd find it too difficult to follow," says Kim. But the students proved him wrong. They all stayed engaged and worked hard throughout the course. What's more, Kim says, "As an experienced Korean teacher, I know what their proficiency level should be at the end of the semester and what they need to do to achieve that level. I was surprised to see that there was not a drop off in proficiency at all!"

Mason Received + HEBR 102

Mason Received

+ HEBR 101

- **Mason Received**
- + FREN 319
- **HIST 535**
- **Mason Received**
- + HEBR 102

Degree Completion: Flicker to a Flame

or some college students—especially adult learners, first-generation students, and veterans—getting a degree takes much more than going to class and doing homework. For these students, finding light in the day for education is a challenge. That is why the degree completion focus at 4-VA at Mason is committed to seeing these students successfully achieve their four-year degree through the Bachelor of Applied Science (BAS) Program. The BAS offers a unique curriculum designed for students who have earned an associate of applied science (AAS) degree, are typically in the workforce, and are interested in furthering their advancement opportunities.

Under the 4-VA at Mason spotlight, the BAS has changed exponentially, including removing various barriers such as age requirements, to allow more students access to the opportunity. Additionally, the program has greatly expanded the available degree pathways, growing from two initial specializations to eight concentrations, with four of these in technology-rich fields:

- Applied conflict analysis and resolution
- Cloud computing
- Cybersecurity
- Health, wellness, and social services
- Human development and family sciences
- Legal studies
- Managerial leadership
- Technology and innovation

Eliminating entrance barriers and increasing the concentrations has attracted significantly more students, explains BAS academic program coordinator and adjunct professor Krystal Dains. "Not only are our technology offerings the right degree at the right time, through BAS we ensure a seamless move from community college, with all credits transferring to Mason," says Dains. Many BAS concentrations can be completed entirely online or via a hybrid format.



BAS Program Lights the Path



After seven years in the U.S. Army, including deployments to both Afghanistan and Iraq, Gavin Amy returned to Northern Virginia to begin the next chapter in his life. Studying his options, he decided to take advantage of his GI benefits and enroll at Northern Virginia Community College (NOVA).

His time at NOVA moved quickly thanks to several Russian language classes he had already taken, which were applied to his general studies course requirements. He then began classes specific to an associate of applied science degree in cyber security. Soon after, Amy learned about Mason's Bachelor of Applied Science Program, which could help him see that next point of light: a four-year degree. "When I looked at the cyber security option in the BAS program, it offered a more practical and focused group of classes that could lead me to a job," he says.

At Mason's BAS orientation, Amy met his future advisor Krystal Dains. "Krystal answered all my questions that day," Amy says, and he also credits that she did so from that day forward. "She was my first exposure to the BAS Program. The transition to BAS was seamless and painless. But probably what helped more than anything was Krystal."

Amy graduated from Mason with a degree in cybersecurity in 2019. "In my second to last semester of undergraduate, I applied to the graduate program to get a master of science in digital forensics," he says. The graduate degree allowed Amy even more opportunities in the job market.

The light shined brightly for Amy. He is beginning a new job in incidence response, which combines his academic experience in cybersecurity and forensics. "I'm happy with what my academic career has led me to," Amy says.

Dains also notes that the Mason BAS Program is built on flexibility. Even the approach to constructing the degree pathway is nimble. "The benefit of this model we've created is it's really quick," she says. Dains says that a working group gathers to decide the learning outcomes and which classes support them. Then, the group develops the curriculum and submits it to the Undergraduate Council (UC). "For BAS, once UC approves it, we are good to go," says Dains. "We are perfectly positioned to put a new program in place quickly so we can be on the cutting edge."

In fall 2019, a record 42 students enrolled in the program and predictions for fall 2020 look promising, especially in the new area of cloud computing. While Dains is enthusiastic about the future of BAS at Mason, she points to the already realized success of graduates who have gone on to successful careers.

"We have so much potential for future growth," says Dains. "For me, it's an exciting program to work with and a great opportunity to be a part of something new and growing and growing fast."





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