

2014 - 2015

# 4-VA at JMU

UNIVERSITIES COLLABORATING TO ACHIEVE VIRGINIA'S GOALS FOR HIGHER EDUCATION





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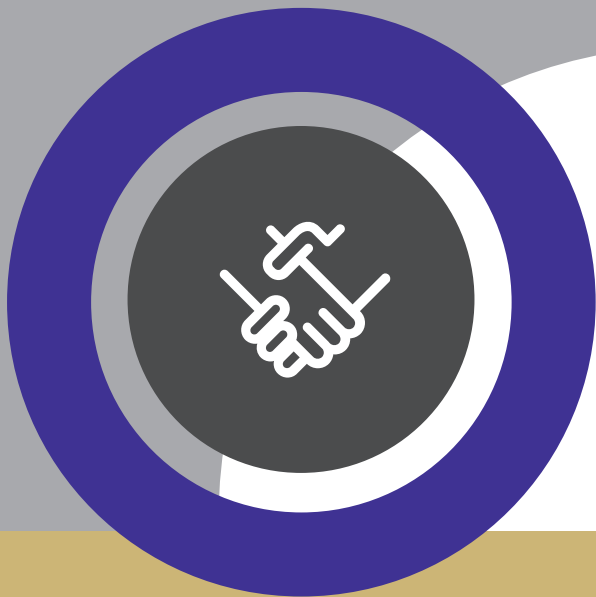
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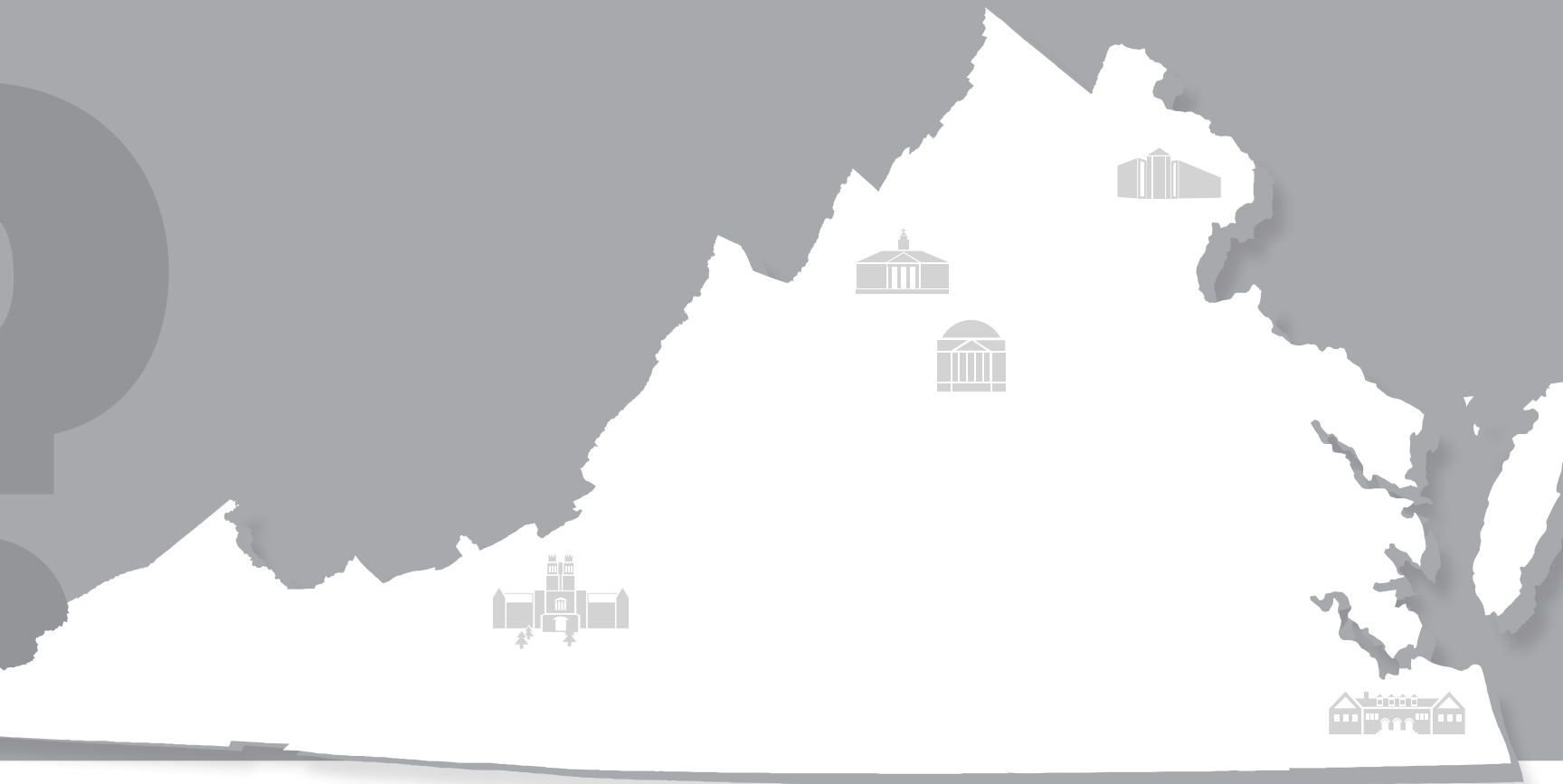
# What is 4-VA



4-VA is a collaborative partnership among five Virginia universities. Its mission is to promote inter-university collaborations that leverage the strengths of each partner university in order to accomplish much more than any individual university could achieve alone.

*In early 2015, 4-VA transferred management of the executive office to James Madison University and 4-VA welcomed Old Dominion University as its newest member.*





## History

In 2010, the presidents of GMU, JMU, UVA and VT combined forces with the governor, other members of Virginia's government, and Cisco Systems, Inc. to launch 4-VA in response to the Governor's Higher Education Commission and the Governor's Commission on Economic Development & Job Creation.

That same year, 4-VA began implementing a TelePresence system so the universities' administrations, staff and faculty could work toward their common goals in a live, virtual environment. With two videoconferencing rooms on each campus and the infrastructure in place, 4-VA was ready to focus on its initiatives.

The commissions' focus on education and innovation to "better position Virginia to create jobs and grow the economy" led to a broad challenge for the four institutions that continues to guide the work of the collaborative.

## 4-VA at JMU

4-VA at JMU is housed jointly under the Provost and the Assistant Vice President of Information Technology. Nick Swayne serves as the Executive Director as well as Campus Coordinator for JMU. Kai Brokamp serves as the Assistant Director and also works closely with the 4-VA graduate and undergraduate assistants.

## The Board

4-VA's direction is set by the management board, which consists of the five university presidents, Virginia's Secretary of Education, the Executive Director of the State Council of Higher Education for Virginia (SCHEV), and Carol Stillman, the Business Development Manager for Higher Education for Cisco.









# Initiatives

07-18 Collaborative Research

19-26 Course Redesign

27-32 Course Sharing

33-38 Degree Completion

## Initiative

# Collaborative Research

*Increase the research competitiveness of the partner universities*



Dr. Giovanna Scarel

*Assistant Professor of Physics and Astronomy*



## Workshop on Infrared Light as a Sustainable Energy Source

In June experts from as far as Italy and Mexico gathered to discuss infrared (IR) light as a sustainable energy source, examining the link between IR power generation and the non-linear phenomena found in thermoelectric processes and heat conduction.

To boost advances in IR power generation, the workshop examined the challenges that accompany the development of power conversion from ambient energy sources to commercial devices. Together faculty researchers, industrial researchers, and students explored a new fundamental knowledge of the interaction between radiation and matter, and its potential application toward sustainable energy production.

“4-VA funding supported the logistics of the workshop and the honoraria for speakers.

*Dr. Giovanna Scarel*

### Collaborating Institutions

🎓 College of William & Mary

### Benefits to the Commonwealth

- ✓ Contributed to alternative energy solutions
- ✓ Demonstrated Virginia's impact on global issues
- ✓ Brought together a global community of alternative energy researchers and experts at JMU



## Dr. Klebert Feitosa

Assistant Professor of Physics and Astronomy

# Soft Matter Research

Soft matter research impacts everything from fuel efficiency to our understanding of avalanches, landslides and lava flows, not to mention adhesives, cosmetics, and detergents.

Last year Dr. Feitosa established an annual workshop with the help of 4-VA so that soft matter experts in the area could connect and collaborate on their projects. These new relationships added a new dimension to his research, providing access to niche areas of expertise within the field.

This summer 4-VA provided support for an undergraduate student to help him continue to make headway in his research. JMU senior Olivia Cypull and rising freshman Brian Seymour investigated the short-range interactions between bubbles freely floating at an air-water interface using experiments, modeling and theory to understand the dynamics of large disordered accumulations of foam.

“

*Summer research is key. 4-VA has been a tremendous resource by providing an undergraduate student in the lab this summer, which helps build the groundwork for writing proposals for further funding.*

*Dr. Klebert Feitosa*

## Collaborating Institutions

🎓 Virginia Tech

## Benefits to the Commonwealth

- ✓ Facilitates collaboration with other institutions or organizations
- ✓ Improves undergraduate research

## Student Researchers

- 📖 Olivia Cypull
- 📖 Brian Seymour (rising freshman)





Dr. James Herrick  
*Associate Professor of Biology*

## Battling Antibiotic-Resistant Bacteria

Bacteria are increasingly resistant to antibiotics, posing a serious health issue. “If we are not careful, we will soon be in a post-antibiotic era,” remarked CDC director Tom Frieden in a September 2013 media briefing.

Dr. Herrick’s research shows that antibiotic-resistant genes can be isolated from bacteria native to a local stream and that they have the potential to transfer to pathogenic bacteria.

“We are now able to sequence the DNA responsible for the antibiotic resistance we have observed, enabling us to identify the specific genes involved,” Dr. Herrick explained.

Dr. Herrick’s team presented Testing the MinION, a New Nanopore-Based Third-Generation DNA Sequencer, for Comparative Plasmid Genomics and Salamander Skin Metagenomics at the Virginia branch of the American Society for Microbiology. The 4-VA grant positions both JMU and UVA to apply for federal NSF and/or NIH funding as well as future 4-VA scale-up funding to continue and expand the project.



“

*4-VA has funded a new capability in DNA sequencing using the Oxford Nanopore MinION—which we are testing before it goes on the market—that is usable by undergraduates*

*Dr. James Herrick*

### Student Quote

*4-VA’s funding has allowed for our lab to be a part of an exclusive group of scientists from around the world that are beta-testing a revolutionary DNA sequencer—the Oxford Nanopore MinION—and applying it to our research on antibiotic resistance genes. I wouldn’t be pursuing my Master’s at JMU if it wasn’t for my amazing undergraduate research experience.*

*Curtis Kapsak*



### Collaborating Institutions

🎓 University of Virginia

### Benefits to the Commonwealth

- ✓ Contributed to health/medical solutions
- ✓ Contributed to solutions in education
- ✓ Demonstrated Virginia’s impact on global issues
- ✓ Facilitated collaboration with other institutions or organizations
- ✓ Improved undergraduate research

### Student Researchers

- 📖 Kevin Libuit
- 📖 Curtis Kapsak
- 📖 Jesmine Roberts-Torres
- 📖 Shahzeb Kahn
- 📖 Jennifer Kurasz
- 📖 Lauren Wheeler

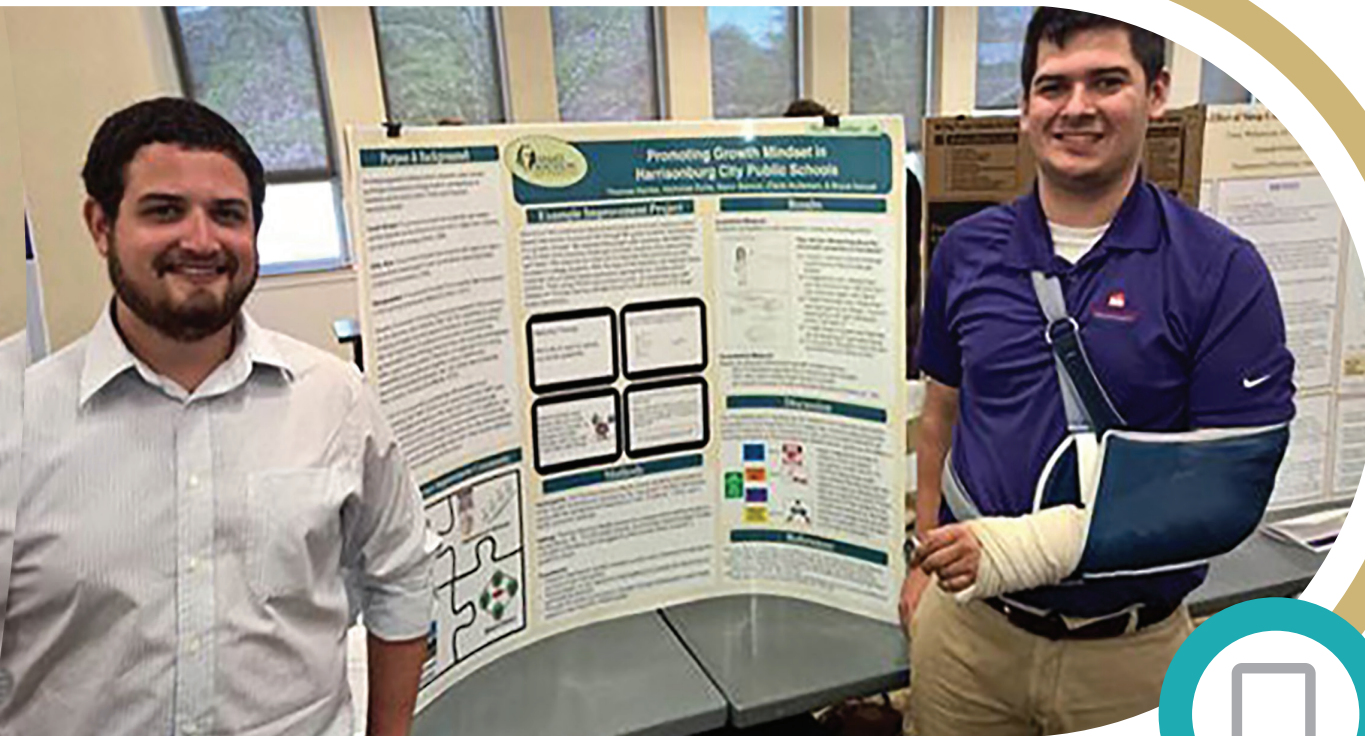


# Motivating Middle School Students

4-VA funding helped Dr. Barron's team develop the Rapid Assessment Platform and Intervention Delivery System (RAPID), designed for schools and teachers to diagnose and address student motivation issues.

*"Our project focused on developing new tablet-based assessment and intervention apps to help improve middle school students' motivation in K12 schools. In particular, we piloted and are ready to scale up an app that will be shown to all new incoming middle school students at Thomas Harrison Middle School to promote the development of a growth mindset." – Dr. Kenn Barron*

Dr. Barron presented Promoting Growth Mindset in Harrisonburg Public City Schools at JMU's Annual Undergraduate Psychology Conference. The project received additional funding from the Raikes Foundation as well as the Carnegie Foundation, who invited them to participate with school systems in Los Angeles, New York City, and Delaware in an ongoing network of similar programs around the country.







Dr. Kenn Barron

Professor of Psychology

“

*Without a doubt 4-VA scale-up funding made it possible to continue our work and fund key members of our team while we pursued additional external funding opportunities.*

*Dr. Kenn Barron*

### Student Quote

*4-VA has been an integral part to the current success of our RAPID System. With their gracious gift, we have been able to stay on course with our goals for improving the system and creating a more intuitive, student friendly, and reliable experience for all. I cannot imagine what stage our system would be in if it were not for 4-VA's support.*

*Nicholas Zurlo*

### Collaborating Institutions

- 🎓 University of Virginia
- 🎓 Harrisonburg City Public Schools
- 🎓 The Carnegie Foundation for the Advancement of Teaching

### Benefits to the Commonwealth

- ✓ Contributed to rapid solutions in K12 education
- ✓ Improved undergraduate research
- ✓ Facilitated collaboration with other institutions or organizations
- ✓ Garnered national attention when the Carnegie Foundation asked JMU to be part of their nationwide network

### Student Researchers

- 📖 Thomas Hartka
- 📖 Nick Zurlo

# Developing a Deployable Hearing System

Congenital aural atresia is a condition where an underdeveloped external auditory canal and middle ear prevent hearing. Surgery can correct the condition, but there's not much data on patients after their initial follow-up visit.

Dr. Gray's research evaluated patients with this condition—both pre- and post-operation—on the performance of binaural listening tasks. He and his team have custom-designed and built a hearing testing system device that can be shipped to patients to collect data from the comfort of home.

Funding from 4-VA has facilitated the following advances in Dr. Gray's project:

- **Multiplied number of deployable devices**
- **Increased results collected**
- **Moved research forward both in the laboratory and publicly**
- **Provided the opportunity to formally present at a large-scale conference for the Association for Research in Otolaryngology**
- **Provided the opportunity to meet with researchers from around the world**
- **Provided the opportunity to seek additional funding**

“

*This funding has allowed our team to multiply the number of deployable devices, which in turn increases the amount of results we can collect in the same amount of time. Because of this, we are even closer to being able to publish our data.*

*This funding has allowed our research to move forward not only in the laboratory, but also publicly. Because of 4-VA, our research was able to be presented at a large-scale conference (the Association for Research in Otolaryngology) formally and in poster-form. This led to the opportunity to meet with other brilliant researchers, from across the country and internationally, to discuss our current results and how to further progress the project.*

*Most importantly, these funds have opened up new doors for this project in seeking additional funding. By showing other investors that our project is already endorsed by an organization like 4-VA (2 years in a row), it speaks volumes and reinforces the justification for further funding.*

*Because of the additional funding we were able to receive, our project currently has enough funds to add more devices, fund more data collection deployments, pay more subject participants, possibly add a new team of undergraduate students to our current mission, and even more.*

*The list goes on as to how 4-VA has been a launching point, a catalyst, and a constant line of support in our project which was created about 5 years ago.*

*Dr. Lincoln Gray*



## Dr. Lincoln Gray

Professor of Communication Sciences and Disorders

### Student Quote

*This project has been a five-year journey starting as my undergraduate thesis and evolving into my doctoral dissertation for graduate school. What started as a research project, has rapidly grown into a realistic opportunity to benefit people of all populations in the medical field.*

*Because of 4-VA's funding and continued support, our team has been able to progress towards numerous expansions of this project that may benefit exponentially more patients in need. We plan to use this current hearing research to expand our knowledge of the field, to monitor surgical success, to measure learning of new skills, to treat and train our brains, and more. There is a serious opportunity to make a difference here... and I am thrilled to find out where we can take this project. This exciting future would not have been possible without the constant support of 4-VA.*

Sofia Ganev



### Collaborating Institutions

 University of Virginia

### Benefits to the Commonwealth

- ✓ Contributed to health/medical solutions — specifically auditory system solutions
- ✓ Facilitated collaboration with other institutions or organizations
- ✓ Improved technology and/or its scope
- ✓ Improved undergraduate and graduate research
- ✓ Resulted in intellectual property of a physical product that offers solutions for testing hearing

### Student Researchers

 Sofia Ganev



Dr. Raymond Enke  
*Assistant Professor of Biology*

## Understanding Retinal Diseases

Dr. Enke's research examined the molecular mechanisms of the developing retina and provided insight into how genes are expressed as a result of environmental factors. He and his team investigated how genetic predisposition toward a particular disease may be altered by the environment. Their findings were presented at the JMU Biosymposium.

*"These studies," Dr. Enke explained "will advance the understanding of gene regulation in the visual system, which will ultimately provide us with better tools for understanding and treating retinal diseases and disorders."*

“

*4-VA funding will be instrumental in publishing our research findings and pursuing additional external funding to support our research program.*

*Dr. Raymond Enke*

### Student Quote

*The research I conducted gave me experiences that I would have not been able to receive from a classroom. Working on this project helped me thoroughly understand complex aspects of biology in a fun and engaging setting.*

*Morgan Hedden*





### Collaborating Institutions

 University of Virginia

### Benefits to the Commonwealth

- ✓ Contributed to health/medical solutions for retinal diseases
- ✓ Facilitated collaboration with other institutions or organizations
- ✓ Improved undergraduate research
- ✓ Contributed to vision research

### Student Researchers

-  Emily Grunwald
-  Sophia Brown
-  Nicholas Dunham
-  Morgan Hedden





Dr. Michael Renfroe

Professor of Biology

## Antioxidants and the Environment

According to research, the environment plays a crucial role in determining the concentration of antioxidants in plants. To better understand this phenomenon, Dr. Renfroe and his interdisciplinary team have been analyzing the antioxidants in fresh and dried herbs and spices grown in temperate and tropical locations. By examining large-scale environmental influences on antioxidant production, they've been observing the variations that occur in antioxidant levels, which helps inform dieticians and helps consumers better meet their dietary needs.

“

*4-VA provided essential research supplies and allowed me to collaborate with experts in allied fields of research, which made this project much richer in design and execution than it would have been without the grant.*

*Dr. Michael Renfroe*

### Collaborating Institutions

- 🎓 Virginia Tech
- 🎓 University of the Virgin Islands - St. Croix

### Benefits to the Commonwealth

- ✓ Contributed to health/medical solutions—specifically safe and healthy agricultural products
- ✓ Facilitated collaboration with other institutions or organizations
- ✓ Improved undergraduate research

### Student Researchers

- 📖 Clara Thiel
- 📖 Wesley Deaver
- 📖 Wesley Geyer
- 📖 Rachael Schneider
- 📖 Tyler Mullins
- 📖 Michele Barber
- 📖 Harley Burton
- 📖 Russie Tran
- 📖 Rachel Cisek



# Virginia Early Childhood Foundation Preschool Study

In 2012, 4-VA at JMU helped fund analysis of a study on the effects of public preschool in Virginia on a group of students through middle school. The Virginia Early Childhood Foundation (VECF) sponsored the study and coordinated a team of researchers from George Mason University, James Madison University, Virginia Tech, and the University of Virginia.

In May, 2015, the VECF released the report – the first study in Virginia to follow children from preschool to 8th grade: Predicting On-Time Promotion to and Literacy Achievement in Eighth Grade in Relation to Public Prekindergarten in Virginia.

*“The study revealed that children who participated in public preschool programs, including the Virginia Preschool Initiative, were more likely to be promoted on-time to 1st, 3rd, and 8th grade compared to similar students whose preschool experience was not known. Because the average per pupil funding is more than \$11,000 per year, the study confirms that Virginia’s public preschool programs contribute to reducing the costs and negative outcomes associated with grade retention.”* – Kathy Glazer, VECF President

Results also suggested approaches for improving early childhood services, reinforced efforts to look outside of standardized test scores for solutions, and raised further questions: What impact does attending Virginia public preschool have on middle school students with specific risk factors such as poverty? Which particular post-preschool, school-related factors impact middle school outcomes as opposed to preschool outcomes?

The report will be used to modify the VLDS for more effective research and to inform the Secretary of Education, legislators, and other policymakers of ways to improve Virginia’s school readiness.







“

*I can't thank [4-VA] enough for the support, patience, and encouragement you have provided us.*  
Kathy Glazer, VECF President

*4-VA's investment provided an important first step in assessing the long-term benefits of Virginia's early childhood programs.*  
Kathy Glazer, VECF President

### Collaborating Institutions

- 🎓 George Mason University
- 🎓 University of Virginia
- 🎓 Virginia Tech

### Benefits to the Commonwealth

- ✓ Contributed to solutions in education
- ✓ Facilitated collaboration with other institutions
- ✓ Created sufficient incentive to form a team of productive researchers from four state institutions
- ✓ Produced research that will likely be used by other institutions and may inform state data
- ✓ Made productive use of the Virginia Longitudinal Data System (VLDS)
- ✓ Identified changes that need to be made to the VLDS to enable more effective research

## 2015 jmUDESIGN Institute

This year the Center for Faculty Innovation (CFI) hosted the fifth annual jmUDESIGN Institute for course design and redesign processes that shift the focus from a content-centric teaching philosophy to a learner-centered philosophy.

Three years ago jmUDESIGN partnered with 4-VA to increase its impact by training more faculty and therefore serving more students.

### Due to 4-VA funding, jmUDESIGN . . .

- Provided the institute for free, which allowed them to offer the course to faculty from other institutions for the first time this year.
- Increased participants from 15-20 to 40 participants this year.
- Sent faculty to the Annual National Workshop—a 3-day intensive workshop in Chicago.
- Serves broader strategic needs, providing support to STEM faculty across institutions.

“

*Participants find it profoundly humanizing because they acutely remember what it's like to be a green student.*

*Cara Meixner, Assistant Director, CFI and Associate Professor of Psychology at JMU*





“

### Participant Quotes

*I just wanted to drop you a note of gratitude for your hard work and dedication that led to an amazing week at the jmUDESIGN camp. I appreciate the opportunity to attend and work with some amazing people. Thank you again!*

*Tammy Racer, Lord Fairfax Community College*

*I had an overwhelmingly positive experience with the group as a whole and with my smaller group as well. It was transformative in the sense that I don't have much time to really focus on the process of teaching and learning during the term so having this week dedicated to doing just that with a group of like-minded educators is an extremely valuable opportunity. Thank you for opening this institute to other faculty from around the state.*

*Jeff Hollar, Lord Fairfax Community College*

*I came away from jmUDESIGN thinking about learning objectives in an entirely new way. Making them actionable, assessable and clear as to their requirement is a valuable tool for both instructor and learner.*

*2015 Participant*

*This workshop was a really transformative experience for me in terms of thinking about teaching about learning. I understand so much more now about learning objectives and aligned assessments and activities.*

*2015 Participant*

### Benefits to the Commonwealth

- ✓ Contributed to solutions in education
- ✓ Facilitated collaboration with other institutions or organizations
- ✓ Improved student performance (fewer D and F grades and/or fewer withdrawals)
- ✓ Institute was offered to all higher education institutions in the commonwealth
- ✓ Supported SCHEV in their efforts to improve the consistency of courses

jmUDESIGN

# Flipping a Thermodynamics Course

The following is a series of excerpts from a case study written by Karim Altaii and Olga Pierrakos to be published by Springer in December 2015. It is reprinted here with permission.

## Why flip Energy Fundamentals I?

"Having taught a few versions of this course with both engineering and ISAT students using a more traditional lecture-based pedagogical model for about 25 years, it was not until the past two years that the course was flipped. Although learning still took place in the more traditional lecture-based course, it was evident year-after-year that students were not coming prepared, they were not reading course content, and thus class time was spent on lecturing mostly with some discussion and limited interaction. Outside of class, students were challenged to solve problems on their own and their understanding of content was not improving."

## What were the results of flipping the course?

"Upon flipping the course, it was evident that students came to class more prepared, with more questions, and more motivated to engage in conversation and work-out problems. This enthusiasm continued all semester."

"Flipping one of the most rigorous courses in the curriculum proved to be a rewarding experience for students and instructors. Students not only experienced a different teaching and learning style, but stronger engagement with the course. Being able to devote class time to answer questions and address misconceptions proved to be a much needed aspect (and something that rarely occurred in the traditional lecture-based model). Spending more time in class to solve problems was also worthwhile. Students saw the faculty-experts solve problems and practiced solving problems with the instructor present. The learning was deeper and more informative. The classroom atmosphere was more welcoming and engaging. Although flipping required more time of the instructors and the students, it was well worth the effort. For the instructor, preparation time will decrease over the years as flipped course materials improve."

Altaii, Karim and Pierrakos, Olga. In Press. "Flipping Engineering: A Thermodynamics Course Case Study." *The Flipped College Classroom: Conceptualized and Re-Conceptualized*. Ed. Ross Perkins, Ed. Lucy Santos Green, Ed. Jennifer R. Banas. New York: Springer, Forthcoming Publication, December, 2015.

“

*Teaching the flipped class was one of the best experiences I've had as an instructor in 25 years:*

- *I felt a lot less pressure as a lecturer and was able to engage and teach more effectively.*
- *Students earned higher grades compared to previous years.*
- *I submitted a proposal to a book on flipped classes and my experience was accepted as the engineering example for the book.*
- *I'm excited to continue my work with Dr. Colin Reagle from GMU.*

*Dr. Karim Altaii*



Dr. Karim Altaii, P.E.

Professor, Integrated Science and Technology

### Student Quotes

*I really enjoyed the flip lectures. When listening to them it gave me the opportunity to pause the lecture to write down thorough notes or to rewind the video if I didn't understand the material. ... The lectures also allowed for more application and practice problems in class which I believe really helped me gain comfort with the material... The extra time spent doing work outside of the classroom was the only downside I saw with this format of teaching.*

*Student, 2014*

*The most beneficial part of the flip lecture was that it gave us more time to practice problems. Without the flip lecture, I would have had significantly less time to work on problems, which would have made it more challenging to learn the material...Lastly, the flip lecture model was so successful because class time was dedicated to answering questions and solving problems...*

*Student, 2014*



### Collaborating Institutions

 George Mason University

### Benefits to the Commonwealth

- ✓ Contributed to solutions in education
- ✓ Facilitated collaboration with other institutions
- ✓ Improved capacity in face-to-face courses
- ✓ Improved capacity in online and blended courses
- ✓ Improved student performance (fewer D and F grades and/or fewer withdrawals)



Dr. Erica Lewis  
*Assistant Professor of Nursing*



Dr. Jacquelyn Nagel  
*Assistant Professor of Engineering*



Dr. Patrice Ludwig  
*Assistant Professor of Biology*

## Cross-Disciplinary Medical Innovations Class

Dr. Lewis, Dr. Ludwig, and Dr. Nagel designed a semester-long medical innovations pilot course that allowed biology, engineering and nursing students to leverage maker technology to produce and communicate solutions for current community health challenges.

The students formulated ideas for mitigating metabolic syndrome—a disorder which affects about 34% of Americans and increases the risk of heart disease and diabetes.

Students found it both challenging and rewarding to learn how to communicate their knowledge and ideas across disciplines and made great strides in solving problems in a collaborative setting.

Guests from the community were invited to meet students, listen to their presentations, ask questions, and provide feedback on their work from a professional standpoint.



“

*4-VA funding made this course possible by providing the space and resources needed to produce the prototype solutions and by generating interest and engagement through promoting our work and the work of our students.*

*Dr. Erica Lewis*

## Benefits to the Commonwealth

- ✓ Contributed to health/medical solutions—specifically metabolic syndrome
- ✓ Contributed to solutions in education
- ✓ Facilitated collaboration with other institutions, organizations, and departments
- ✓ Engaged subject matter/health experts in the Harrisonburg area
- ✓ Increased course access to students and empowered students to understand how they can engage in solving problems
- ✓ Improved capacity in face-to-face courses





# The Networked Writing Project for Virginia (#nwp4va)

The Networked Writing Project is a teaching and learning initiative that encourages JMU teachers and students to use social media platforms to publish students' research and writing projects. Piloted in the fall of 2012 in Dr. McCarthy's section of GWRTC 103 "Critical Reading and Writing" class, this writing methodology is now used regularly by five WRTC professors. Approximately 200 JMU freshman students have published their work through the project and it prompted an IRB-sanctioned collaborative research project.

In 2014 Dr. McCarthy presented the project in Indianapolis at the Conference on College Composition and Communication and it was accepted for publication by the Journal of Global Literacies, Technologies, and Emerging Pedagogies.





## Dr. Sean McCarthy

Assistant Professor of Writing, Rhetoric and Technical Communication (WRTC)  
Faculty Affiliate, the Center for Instructional Technology (CIT)

“

*4-VA has been instrumental in the ongoing development of this project. Its very existence has opened up networks within and beyond my home institution that has helped me think about and expand the scope of the project. The start-up grant I received has enabled me to prototype digital writing solutions with a variety of technologies, as well as provide faculty with support to be part of the project and secure its ongoing development.*

*Dr. Sean McCarthy*



### Benefits to the Commonwealth

- ✓ Contributed to solutions in education
- ✓ Facilitated collaboration with other institutions or organizations
- ✓ Increased course access to students
- ✓ Improved capacity in face-to-face courses
- ✓ Improved capacity in online or blended courses
- ✓ Improved technology and/or its scope
- ✓ Improved undergraduate research

# Course Sharing

*Increase opportunities and enhance the success of students in science, technology, engineering, and mathematics (STEM) courses and programs.*

## International Security Simulations in a Shared Class with Virginia Tech

With support from 4-VA, Dr. Kaussler redesigned the Political Science 398 Simulations class in 2013 and the following year JMU offered it as a shared course with Virginia Tech.

The first five weeks of the class focus on the theories of international security, diplomacy, and conflict resolution while surveying the current global state of war and peace. The students then participate in five separate simulations—each lasting almost three hours—where they are faced with sometimes violent and intractable conflict scenarios.

During these simulations, students engage in negotiations while making public and secret moves. Just as in the real world of policymakers, students can choose from the tools of statecraft in order to meet their objectives (e.g., gathering intelligence, leaking information, moving troops, imposing sanctions, forming alliances, etc.). As students find themselves facing each other in different locations, the task of finding common ground with those they perceive as ‘antagonistic’ or the ‘enemy’ is a difficult one. The students take pride in playing the roles and enjoy the simulations, but they also find it meaningful as a hands-on experience in solving problems that affect real people’s lives.

With the redesign, simulation scenarios may include Southeast Asia, the Middle East, and European security issues, providing a broad scope for a more realistic look at international relations.

“

*4-VA funding made the simulations course better because I was able to create various models of war and diplomacy—and 4-VA funds permitted students from two different campuses to interact in ways that simulate interactions between people from different countries.*

*Dr. Bernie Kaussler*







## Dr. Bernie Kaussler

Associate Professor of Political Science

### Student Quotes

*International Relations (IR) taught in the classroom is utopian. It seems so simple—to the point that you began to question how the world is in so much conflict. It is not until you are pitted against enemies, or, in our case, rival schools that you begin to understand the complexity of IR in the real world. Rules are broken, people cheat the classroom-prescribed systems and tactics, and egos flare. Without 4-VA, I would not have had the chance to test my knowledge in real-life situations and I wouldn't fully understand International Relations.*

Michael Comer

*Dr. Kaussler's class was unlike any learning experience I've previously had at college. The simulation component facilitated by the 4-VA network enabled me to take the concepts discussed in lecture and apply them in a "real life" context, strengthening my understanding of the material and topics in a collaborative learning environment. It was one of the most interesting classes I've taken part of here at JMU, and really contributed to my knowledge of International Affairs.*

Sarah Biron

### Collaborating Institutions

🎓 Virginia Tech

### Benefits to the Commonwealth

- ✓ Contributed to solutions in education
- ✓ Demonstrated Virginia's impact on global issues
- ✓ Facilitated collaboration with other institutions
- ✓ Increased course access to students
- ✓ Provided in-depth preparation for students interested in working at government agencies in Virginia

# JMU's First UAV Design and Fabrication Class

In the spring of 2015, Dr. Kevin Giovanetti piloted an undergraduate course with Nova Labs, whose experts design, develop and program Unmanned Aerial Vehicles (UAVs). Nova Labs is located two hours from Harrisonburg, making a regular commute unreasonable for everyone involved. The solution was to interact with the students through Suitable® Technologies BeamPro robots from the comfort of their offices.

Students learned the theory, practice and hands-on execution of robot design and electronic control system development for UAVs. They programmed and integrated motor controls, flight controls, sensors, cameras and GPS navigation systems, culminating in the construction of fully functioning UAVs.

The program was mutually gratifying: Since the debut of the program, course enrollment lingered at maximum capacity and industry engineers mentored students with proven interest who will soon be joining the workforce.

**Enthusiasm for the pilot class led to a second class in the fall of 2015, with participants from a broad diversity of backgrounds:**

- 42 students from 9 different majors
- 8 faculty from 6 different disciplines
- 3 expert engineers from Nova Labs

*Through collaboration between JMU and Nova Labs, Dr. Giovanetti introduced a course that provides access to direct, interactive instruction with remote field engineers located two hours from campus. The engineers worked with exceptional math, physics, engineering, and computer science students taking the initiative to learn real-life applications and who will soon be joining the workforce.*

*Dr. Giovanetti initiated the relationship between JMU and Nova Labs as part of his vision to create an interactive and technologically advanced learning environment and to provide students with the tools they need to be successful—a true testament to his innovation and leadership. In April he was awarded the 2015 Award for Innovative Excellence in Teaching, Learning, and Technology at the 26th International Conference on College Teaching and Learning.*





Dr. Kevin Giovanetti

*Professor of Physics*



### Benefits to the Commonwealth

- ✓ Contributed to solutions in education
- ✓ Facilitated collaboration with industry experts
- ✓ Facilitated collaboration with other institutions and organizations
- ✓ Improved student engagement through relevant course work and networking
- ✓ Improved technology and its scope
- ✓ Designed a successful pilot for future shared STEM courses



Remy Pangle

*Associate Director, Center for Wind Energy at JMU*



Dr. Kyle Gipson

*Assistant Professor of Engineering*

## Sustainable Energy for Kids

Since the first KidWind Challenge in 2009, more than 2,800 students have designed and built their own wind turbines in teams after learning how wind energy works. In 2012, The Center for Wind Energy (CWE) at JMU began hosting challenges in Virginia where kids compete against each other to build the most creative and functional wind turbine.

Beginning in 2013, 4-VA awarded the CWE with funds to support the project. In 2014, after hosting the events for two years, Remy Pangle, Associate Director of the CWE, had an idea. She realized that if local universities hosted the challenges, the K12 students could explore ideas and programs in higher education between competitions.

Together with Dr. Kyle Gipson, Mrs. Pangle developed a shared course for undergraduate students to plan, organize and host the challenges. Undergraduates who wouldn't normally cross paths collaborated on the project together—from the College of Education, the Department of Engineering, the Department of Integrated Science and Technology, the Program of Hospitality Management, and the Department of Psychology.

With the funding from 4-VA, they formed the JMU event planning team and grew relationships with GMU, UVA, and Virginia Tech as they tailored similar courses to fit their schools' needs.

2015 was the first year the CWE hosted four challenges, as well as the Eastern Regional Finals at JMU.

In June, 2015 the CWE presented the project at the North American Wind Energy Academy: Engaging a Multidisciplinary Group of Students in Wind Energy Education through the Planning and Execution of a KidWind Challenge at James Madison University.



“

*The Center for Wind Energy has hosted 1-2 KidWind Challenges per year in Virginia since 2012. This year, the Center proposed to host 4 Challenges as well as the Eastern Regional Finals at JMU. This could not have happened without the 4-VA funding and the collaborations that were built because of the award.*

*Remy Pangle, Associate Director, Center for Wind Energy at JMU*

## Collaborating Institutions

- 🎓 George Mason University
- 🎓 University of Virginia
- 🎓 Virginia Tech

## Benefits to the Commonwealth

- ✓ Contributed to alternative energy solutions
- ✓ Contributed to solutions in education



# Degree Completion

*Significantly expand access for all Virginians to programs, preparing them for rewarding careers*

## Degree Completion 2014-2015

Since 1977, Outreach and Engagement's Adult Degree Program (ADP) at JMU has served adult students who are returning to college to complete their bachelor's degrees. More than 400 students have graduated from the program, and this year a record 30 students completed their bachelor's degrees.

Over the past several years, ADP began offering online modules, providing access to those who require remote study. Since students have been able to complete 50 percent or more of their degree online, admissions have annually increased by an average of 10 percent.

But the reach of the program could only go so far without support. Funding from 4-VA helped double the number of available modules and added online general education classes as well. New classes developed and taught this year include Introduction to American Studies, American Literature 1, and Ethics in Public Administration. A six-class module in Applied Computing was finalized in the spring, and the first two classes will be offered in the Fall 2015 semester. In total, 15 classes funded through 4-VA were offered this academic year with a total enrollment of 96 students.

In addition, 4-VA provides funding for faculty to work with instructional designers from JMU's Center for Instructional Technology (CIT) to create dynamic, content-rich online classes. To date, over 20 faculty have participated in the CIT training and have taught the online classes to ADP students.

“

*As a full time employee, wife, and mother of two, finding time to sit in a traditional classroom is extremely difficult,” explained Tracey Kite, who completed more than half of her courses online. “Distance learning (online) courses provide me with the convenience and flexibility of studying from home or anywhere with an Internet connection.*





## Nursing Simulation Lab

Earning a nursing degree online wouldn't be the same without the nursing simulation lab, where students practice on mannequins called patient simulators. Video cameras are installed in four of these labs, and are used to document student performance throughout various simulation scenarios. Instructors review these scenario recordings to provide feedback on application of learned skills.

“

*One of the most important things I learned and incorporate in my online teaching, is that to be effective students need to feel instructor presence in the course. Online courses are not ‘plug and play’— they require faculty to be online daily, even if in short time periods in order to communicate timely with students. I feel like I know my online students better than some of my face to face students because of these active communications, and I can tell they appreciate it.*

*Jamie Lee, Assistant Professor of Nursing*



Kiran Ahmad

*Registered Nurse*



## The Outreach & Engagement RN to BSN Program

Hospitals around the country are requesting that their registered nurses (RNs) go back to school to earn Bachelor of Science in Nursing (BSN) degrees. To fulfill that need, 4-VA funded the development of the RN to BSN curriculum through Outreach & Engagement. The most successful Degree Completion program to date, the course provides flexible online learning opportunities while allowing students to maintain employment. The balance between work and study drives the success of the program, which depends on those it serves—its students.

Kiran Ahmad is a student in the RN to BSN program who works at Inova Fair Oaks Hospital in Fairfax, Virginia where she coordinates care for women and families during childbirth. A registered nurse for almost five years, Kiran recently enrolled in the program and shared her experience with 4-VA.



**4-VA: What do you love about being a nurse?**

Kiran Ahmad: Nursing is a truly humbling experience. What I love most about it is that it gives me the opportunity to make a difference in someone’s life. Our impact as nurses is immeasurable; we give all we’ve got each and every day and keep going back for more!

**4-VA: What made you decide to take the RN to BSN program?**

Kiran Ahmad: Getting a BSN has always been a goal for me, but I wanted to take a few years off to focus on gaining experience in my field. Recently, my employer made it a requirement and this gave me the final push to enroll.

**4-VA: What do you like about the program?**

Kiran Ahmad: The online-only aspect and the fact that a part-time track is offered so I can still work, have a family, go to school, and not get too overwhelmed.

**4-VA: Are you able to continue working as a registered nurse while taking the program?**

Kiran Ahmad: Yes, I am still working while going to school because of the flexibility this program offers.

**4-VA: How does the online aspect of the course impact your life?**

Kiran Ahmad: The online aspect of this program makes earning a degree possible. There just aren’t enough hours in the day for me to work, have a family, and physically attend school. In online programs, you can work at your pace and you are not bound by attending classes. Programs such as these require a tremendous amount of self-motivation and structure, but the fact that you can do it on your own time and still be active in all other aspects of your life makes it all worth it.

**4-VA: If you didn’t have the ability to take the course online, how would that have changed things for you?**

Kiran Ahmad: I wouldn’t have enrolled in JMU’s program. I live in NOVA and it is not possible for me to commute 2 hours for school. I would have chosen another online RN-BSN program.

**4-VA: Is there anything else you’d like to share?**

Kiran Ahmad: Surprisingly, this program offers a lot of online support from the staff. It started with the face-to-face orientation that honestly, really made a difference. Our teachers also post weekly videos of course material and they are always available via email if there are ever any questions or concerns. The face-to-face orientation also gave us the chance to meet our peers and I found that to be really helpful.

Going back to school is never easy, but if you know you are not alone, it makes a difference. Completing this program will give me the opportunity to enhance my scope as a nurse, provide better patient care, and further my education in the nursing profession if I choose to in the future.

“

*Programs such as these require a tremendous amount of self-motivation and structure, but the fact that you can do it on your own time and still be active in all other aspects of your life makes it all worth it.*

*Kiran Ahmad, RN*

# 9th Period Dual-Enrollment Program

Even though the demand for high-paying jobs in Computer Science (CS) is increasing at twice the national average, only one out of every four high schools offers CS classes and less than 2.4% of college students graduate with a degree in CS<sup>1</sup>.

In order to both increase the number of qualified high school CS teachers and to offer dual enrollment CS courses to high school students, the Department of Computer Science at JMU received 4-VA funding to develop the 9th Period program.

## **The program has three primary goals:**

1. Provide professional development for high school faculty
2. Pilot CS courses in divisions that may not yet have a qualified CS instructor
3. Offer new dual enrollment opportunities for high school students

## **Leading the project is Dr. Chris Mayfield, Assistant Professor of Computer Science, who designed a new course called CS 101 as an innovative survey of computing with the following goals:**

1. Provide majors with a common language and broad understanding of CS that will help them put the rest of their coursework into a larger context
2. Align with the proposed AP CS Principles course that seeks to broaden participation in computing in K-12 education
3. Give non-majors a unique opportunity to learn how to think like computer scientists, without having to take a programming-intensive course

<sup>1</sup>[code.org/stats](http://code.org/stats)





Dr. Chris Mayfield  
*Assistant Professor of Computer Science*



“

*Overall, I would say the program is working out very well. We have a very strong model for training new CS teachers, and the two I'm currently working with are prepared to become independent as early as next year. Then we can be working with brand new teachers—the goal of the program is to prepare cohorts of teachers to offer the new AP course once they have enough experience and can satisfy licensure requirements.*

*Dr. Chris Mayfield, Assistant Professor of Computer Science*









# Also Inside

- Other 4-VA Sponsored Projects
- Data Management Bootcamp
- University Innovation Fellows
- The Move to Lakeview Hall
- Faculty and Program Contacts

## Collaborative Research

**Dr. Grace Barth**

Connecting MDID and Omeka: Two Powerful Open Source Products

**Dr. Beau Berkeley**

Fossil Evidence for Human Predation on Rhinos

**Dr. Shannon Conley**

Towards Assessing the Breadth of Expertise in Science and Engineering Education

**Dr. Maria deValpine**

Health care disparities in the Alaskan 1918-1919 Influenza Epidemic

**Dr. Kevin Giovanetti**

Development of a High Stability, Precise, High Voltage Power System: a Critical Component for the Muon g-2 Experiment at Fermi National Laboratory

**Dr. Susan Halsell**

Molecular Dissection of Noxious Cold Nociception

**Dr. Anne Henriksen**

Using High-Throughput, Next-Generation Sequencing to Identify Transgenerational Effects of Bisphenol A on the Epigenome

**Dr. LouAnn Lovin**

Fraction Schemes and Operations: An Extension to PreK-8 Prospective Teachers

**Dr. Jacquelyn Nagel**

Sustainable Innovation: Integrating teams in Biology, Design and Engineering

**Dr. Jacquelyn Nagel**

Manufacturing Innovation through Sustainable Design

**Dr. Ronald Raab**

Novel lacritin mitochondrial signaling in the treatment of dry eye

**Dr. David Stringham**

Music Technology Engagement for Adults with Intellectual and Developmental Disabilities

**Dr. Isaiah Sumner**

Computational Insights into the Motion of the Protein, GroEL

**Dr. Louise Temple**

Finding and Analyzing Methicillin Resistance Genes in the Shenandoah Valley: A partnership between JMU and VCU



## Course Redesign

**Dr. Mace Bentley**

Bringing an Understanding of Southeast Asia Environments & Hazards to Virginia

**Dr. Kerry Cresawn**

Scientific Teaching Workshop

**Dr. David Fordham**

Development of Hybrid Course Materials for Introductory Information Security Course

**Dr. Kyle Gipson**

Development and Implementation of the Madison Engineering Department

**Dr. John Guo**

Redesign the Class of Cyber Security & Defense

## 2015 Virginia Data Management Bootcamp (Big Data)

In January of this year, faculty, graduate students, administrators, and staff attended the third annual Virginia Data Management Bootcamp at JMU. Featuring experts from across the state, the event immersed participants in data management issues and best practices.

In 2013, UVA and Virginia Tech hosted the first bootcamp in their telepresence rooms, reaching 50 people across both schools. Two years later—using 4-VA methods and technology—the bootcamp reached 197 people across seven sites and JMU had the third highest attendance with 31 participants.

*The following was published by e-Science Community Blog and written by guest contributor Yasmeen Shorish, Physical & Life Sciences Librarian at James Madison University and is reprinted here with permission.*

**Question:** How do you deliver the same data management training to graduate students, faculty, and staff simultaneously? How do you deliver that content not just at your own institution, but also to six other institutions across the state?

**Answer:** Very carefully, with a lot of cooperation, collaboration, and some technical wizardry thrown in as well. This is the story of seven Virginia institutions that stopped repeating content individually and started getting real—real collaborative.

In January 2013, the libraries at the University of Virginia (UVA) and Virginia Tech (VT) teamed up to produce a “Data Management Bootcamp” for graduate students on their campuses. Utilizing telepresence technology, speakers could interact with participants at either school in large, virtual sessions as opposed to discreet events at each venue. Librarian interest in this event resulted in the addition of three additional institutions in 2014: James Madison University (JMU), George Mason University (GMU), and Old Dominion University (ODU). UVA, VT, JMU, and GMU have an existing telepresence set-up called 4-VA and it was not difficult, technology-wise, to add ODU in to participate fully as well. Librarians from these five institutions, including myself, formed a planning group to produce the “2014 Virginia Data Management Bootcamp.”

However, expanding a program from two locations to five locations does present some complications. Can everyone connect simultaneously? Do the screens get too cluttered when everyone is connected? How do we decide what content is most appropriate for five very different institutions? The 2014 Bootcamp began planning in the summer of 2013. A series of virtual meetings among the planning group resulted in an agenda that included understanding research data, operational data management, data documentation and metadata, file formats and transformations, storage and security, DMPTool and funding agencies, rights and licensing, protection and privacy, and preservation and sharing. It was a lot to cover in two full days, with a third half-day for local discussion.





The group debriefed after the 2014 event and discussed what 2015 should look like. We knew that the next event should be less dense, as that much content in two days was somewhat overwhelming. The College of William & Mary (WM) and Virginia Commonwealth University (VCU) both expressed a desire to participate. With some technological work involving bridges, WebEx, and patience, the Virginia Data Management Bootcamp was able to expand to include these universities. Happily, increasing the number of participating institutions did not increase the complexity very much. One change that may have had the most impact was that the planning group decided to add more in-person meetings to work through curriculum ideas. We found that as a group, we could accomplish more in a shorter amount of time when we were gathered around one table, discussing ideas.

“*Data management is an important topic for researchers and scholars across domains, especially as funding agencies increasingly require submission of data management plans with grant proposals.*

*Data Management Bootcamp*



## Benefits to the Commonwealth

- ✓ Contributed to solutions in education
- ✓ Facilitated collaboration with other institutions and organizations
- ✓ Generated additional efficiencies
  - ✓ Improved accessibility
  - ✓ Eliminated travel expenses
  - ✓ Decreased total cost
  - ✓ Increased participation
- ✓ Improved student performance (fewer D and F grades and/or fewer withdrawals)



## University Innovation Fellows (UIF) Program

### Featuring

Undergraduates **Chris Ashley, Andrew Carlone, Timothy Moore, Jack O'Neill, and Emily Platt**

In the fall of 2014, 4-VA sponsored the applications of five JMU students to participate in the UIF program: Chris Ashley, Andrew Carlone, Timothy Moore, Jack O'Neill, and Emily Platt. In March, 2015, after taking a six-week training online, the students flew out to Silicon Valley for workshops at Google, Stanford University, and NCIIA's Open 2015 Conference.

The UIF program tasked the students with mapping their university's entrepreneurial ecosystem. Based on their findings, the students presented the four following priorities to President Jonathan Alger and Mary Ann Alger:

1. **Create cross-disciplinary collaboration**
2. **Establish hubs and entities for entrepreneurship on campus**
3. **Create outlets to learn through experience**
4. **Create a culture of entrepreneurship**

To achieve those priorities, the fellows organized the first annual Bluestone Hacks, the first student-run hackathon at JMU. In April, 65 students showed up at Memorial Hall to solve real world problems in food and agriculture, healthcare and consumer devices and tools. The traditional 50-hour hackathon was condensed into 24 hours and attracted big name sponsors including ABS Technology Architects, Capital One, CareTaker, Cisco, Friendship Industries, Inc., IVCi, and Target. Fifteen teams presented their innovations to a panel of judges consisting of local experts, experts from sponsoring companies and entrepreneurs with a grand prize of \$1,000.

Two days after the hackathon, President Alger and his wife presented the five students with special pins to acknowledge their work and to signify their official status as University Innovation Fellows.



## Student Quotes

*All that we have accomplished this past year would not have been possible without the support of 4-VA and Nick Swayne. Donating resources to send us out to Stanford as well as Nick spending the time to introduce us to community leaders and being a constant level of support for the 5 of us really made an impact on the difference we were able to make here at JMU.*

*Emily Platt, University Innovation Fellow*

*It is clear to me and the other University Innovation Fellows that the guidance and support from 4-Virginia has been vital to our success as a group of aspiring innovators and entrepreneurs who want to enhance the learning experience on our campus. The resources shared with us have been very helpful but what has been more significant to me is the willingness to converge on ideas and the range of knowledge the 4-Virginia staff has when it's come to elevating a campus initiative.*

*Timothy Moore, University Innovation Fellow*

*The financial support of 4-VA and the mentorship of Nick have had a huge hand in the success of our University Innovation Fellows program. The partnership with 4-VA has enabled us to hold larger successful events that have impacted more students on campus than the UIF team alone could have.*

*Chris Ashley, University Innovation Fellow*

## Benefits to the Commonwealth

- ✓ Contributed to solutions in education
- ✓ Empowered student impact on JMU's entrepreneurial and innovation ecosystem
- ✓ Facilitated collaboration with other institutions and organizations
- ✓ Improved student engagement across campus in entrepreneurial and innovative pursuits
- ✓ Increased student involvement in the economic impact of the institution
- ✓ Improved student performance (fewer D and F grades and/or fewer withdrawals)



## The Move to Lakeview Hall

In 2015, JMU renovated the former home of the WVPT television station to house growing academic programs. In June, 4-VA at JMU relocated to Lakeview Hall along with the Center for Assessment and Research Studies (CARS) and the School of Strategic Leadership Studies (SSLS).

In addition to expanded office space, the Lakeview Hall location features a TelePresence classroom—seating up to 36 students—and a STEM X-lab with extensive maker equipment and instructional technology. 4-VA encourages JMU students and faculty to collaborate at the new site through multidisciplinary classes, projects, and events.

### **In its first semester, 4-VA is already hosting a wide array of classes and events:**

- **An Unmanned Aerial Vehicle-Remote Sensor Research class**
- **A visiting scholar workshop**
- **Pop-up classes**
  - 3D Printing with Tom Wilcox
  - Bio-Inspired Design with Dr. Jacquelyn Nagel
  - Designing Computer Technologies with Dr. Morgan Benton
  - Laser Cutting and Vinyl Cutting with Tom Wilcox
  - Venture Validation with Rick Gardner
- **An intercontinental course with Malta**

*For the most up-to-date information, visit [jmuxlabs.org](http://jmuxlabs.org).*







*JMU faculty, keep an eye out for future exploratory workshops/sandboxes sponsored by the Center for Instructional Technology (CIT) in the STEM X-lab at Lakeview Hall!*

*JMU nursing faculty, keep an eye out for a telepresence meeting with GMU, ODU, UVA and VT called The Role of Interprofessional Team Training in Providing Effective, Collaborative Care at Lakeview Hall in February, 2016!*

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Sarah Cheverton	Director, Center for Instructional Technology
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Carol Hurney	Executive Director, Center for Faculty Innovation
John Knight	AVP for Finance

## JMU Contributing Members

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Jim West	Assistant Director, Classroom Technology Services

## Corporate and State Partners

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