# 4-VA at JMU presents 2013 - 2014 MOVING FORWARD

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GMI



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What is 4-VA?

Course Sharing

Degree Completion

Upcoming Projects

# TO YOU? **4-VA Objectives** MEAN **Increase** research competitiveness Increase **153.1%** Return on Investment for Collaborative opportunities for 4 undergraduate **Research Grants** 4students **124** Students enrolled in shared courses in Spring 2014 DOES P) **Increase student** success rates in Science, WHAT Technology, Engineering, E.S. and Math (STEM) courses **Provide Virginians with** and programs access to four-year **2,000** Students per year benefit from course redesign degree programs 27 Courses offered through the Degree Completion program

"4-VA is a great opportunity to energize my research!" - Dr. Giovanna Scarel

> "4-VA offers opportunities to progress toward new avenues for undergraduate research, providing a higher quality education for our students." - Dr. Chris Berndsen

"4-VA funding has allowed me to open new collaborations with fellow researchers at other 4-VA universities that would otherwise not have been possible."

- Dr. Ronald Raab

"4-VA has been my creative outlet for exploring innovation." - Dr. Michele Estes

"4-VA is a great way to support faculty members, to generate preliminary data, and to keep the support going." - Dr. Raymond Enke

"4-VA offers a special opportunity at JMUit reminds us that we have a chance to grow in areas of research, teaching, and collaboration."

- Dr. Klebert Feitosa

"An exciting opportunity to broaden the scope of research and teaching that were already doing on campus - Dr. Sean McCarthy

# RESEARCH

# ALTERNATIVE ENERGY RESEARCH

With the help of 4-VA, Dr. Scarel supported five students as they facilitated her research to transform radiation into reusable energy.



The Russian Academy of Sciences recognized the

significance of the research and invited Dr. Scarel to Nizhny Novgorod, Russia. In May, 2014 Dr. Scarel presented her findings and performed an experiment on site using a special glass compartment created by student researcher Harkirat Mann. Using a power generator, Dr. Scarel demonstrated that the glass compartment behaves differently with heat than with radiation.





The United States Navy will continue to fund Dr. Scarel's research.

# **Collaboration** Map

#### George Mason University 4-VA Partnerships Moto Electra LLC • George Mason University James Madison University ESRI • University of Virgina SRI • Virginia Tech University of Virginia -William & Mary Virginia Commonwealth University Virginia Tech 🦯 ESRI Virginia Commonwealth University Moto Electra LLC • Stanford Research Institute (SRI) William & Mary **Events Funded Total Amount Funded** \$299,468.76 • Soft Matter Workshop February 11, 2014 • Mountain Stream Symposium II September 21, 2013 **Return on Investment** \$458,467 **RETURN ON INVESTMENT**

153.1%



**40 new** 

# FEATURING Dr. Giovanna Scarel **Assistant Professor** of Physics and Astronomy

"4-VA allows me to make a comparison and safely say that the two [ener-gies] are different" - Dr. Giovanna Scarel

# Harkirat Mann **Research Assistant**





articles and been exposed to the fields of materials science, solid state physics and non-linear dynamics. I also built an isolated sample compartment for measurements involving thermoelectric power generation, which would not have been possible without funding from the 4-VA grant." - Harkirat Mann

A forthcoming publication will feature Dr. Scarel's findings and Mann's glass compartment.

# FEATURING Dr. Ronald Raab Strange Alies Bed Bugs May Hold the Key to Fighting Drug-Resistent Bacteria



The impetus for Dr. Raab's research is that bed bugs seem to only carry bacteria that respond to antibiotics without also carrying penicillin-resistant bacteria.

4-VA has allowed us to expand our collaboration with a group at GMU that has expertise and the equipment to advance our research. - Dr. Ronald Read

# **Collaboration**

Dr. Raab's team predicts the discovery of novel antimicrobial compounds that may lead to new insights in antibiotic development. Through 4-VA, JMU undergraduates have forged important relationships with GMU graduates and undergraduates that will go beyond the project.



Outcome

This research could impact future development in antibiotics and may also lead to improvements in bed bug prevention.

# THE TRANSGENERATIONAL **EFFECTS OF EDCs ON THE GENOME**

Dr. Anne Henriksen and Dr. Emilie Rissman of UVA are investigating the biological differences between the sexes as they relate to behavior disorders such as ADHD and autism spectrum disorders, which can be

further elucidated by testing for differences in gene transcription in mouse - Dr. Anne Henriksen brain. They are particularly interested in the role of endocrine-disrupting compounds (EDCs) such as bisphenol A (BPA) and phthalates, common components of plastics, among other things. These compounds are similar enough to sex steroids that they bind to their receptors in the body, disrupting their normal biological pathways. Dr. Rissman's work focuses on the transgenerational effects of EDCs in mice. For example, if a mouse was exposed to an EDC while in the uterus, her offspring's offspring will be affected, even though they were not directly exposed to the compound themselves

The 4-VA grant also allows Dr. Henriksen to participate in one of the first studies to look at the transgenerational epigenetic effects of EDCs in the brain and their relationship to behavior. Epigenetic changes to the genome do not involve the actual DNA bases, but affect the configuration of protein components of the genome such as histones.

Student researcher Justin Taylor uses computer programs and bioinformatics to analyze gene expression data in mice that have been treated with sex steroids and to determine their effects on gene transcription in the cerebellum.



"I have been working on analyzing a microarray data set using the statistical programming language called R, and Bioconductor, an opensource software package for bioinformatics analysis." - Justin Taylor, Student Researcher

Photo by Jackson Snari

Dr. Anne Henriksen Professor of Integrated Science and Technology

"I'm excited to be working in Charlottesville and Y-VA is the reason I have this opportunity.

4-VA grants provide the means for Dr. Henriksen to commute over 60 miles from Harrisonburg to Charlottesville to work with Dr. Rissman on this project. By participating in this world-class neuroscience, neuroendocrinology and genomics research, Dr. Henriksen is able to share valuable insights with her

IMU classes.

# CRYSTALLOGRAPHY & LIV PREVENTION

Crystallography is considered "the most powerful tool for structure determination of matter"\*. Since its discovery 100 years ago, crystallography has made everyday equipment like soda cans, jet engines and silicon semiconductors possible.\*\*

The research collaboration provides training for students in X-ray crystallography. Dr. Berndsen and his students traveled to the Argonne National Laboratory in Illinois to study the technology used there. 4-VA has also paid for student researchers, data collection, crystallography materials and the materials to use facilities at Virginia Tech.

FEATURING Dr. Christopher Berndsen Assistant Professor of Chemistry and Biochemistry

> With the help of 4-VA, Dr. Berndsen is collaborating with Virginia Tech to develop an undergraduate crystallography program to determine the structure of a human anti-viral protein that could lead to new insights in the prevention of HIV.



Since it began in September 2012, the project has already demonstrated success. Graduate students have solved two protein structures, which means they're halfway to reaching their HIV research goal.

# **Decoding the Genetics** of Eyesight Dr. Raymond Enke Assistant Professor of Biology

In the U.S., nearly 4 million people suffer from retina-related diseases. The retina is essential to eyesight since it receives, organizes and sends visual information to the brain.

Retina-related diseases have been linked to gene expression changes which, if understood, could provide improved tools for studying and treating retinal diseases and disorders.

With funding from 4-VA, Dr. Enke is focusing on mechanisms of gene regulation, while GMU researchers offer their expertise in highly specialized equipment that micro-dissects specific neurons.







A portion of 4-VA support pays for two student researchers: Nicholas Dunham and Emily Grunwald. Grunwald collects photoreceptors at GMU so she can compare gene expression. Meanwhile Dr. Enke and Dunham compare photoreceptors to the whole retina at JMU to understand the development and analysis of protein products.

"Overall, 4-VA has shown me how much is involved in research and how every part counts. It has given me the chance to learn outside the classroom setting."

Emily Grunwald Student Researcher



"Because of my time in a research laboratory I have gained a greater understanding of how genes work and are turned on and off. Additionally, I have been exposed to conditions that force me to think critically about what will generally work and what will not work in an experiment."

Nicholas Dunham Student Researcher

- Dr. Raymond Enke

# FEATURING **HOW EFFECTIVE** ARE Dr. John Almarode **Assistant Professor of Education PUBLIC PRE-K PROGRAMS** IN THE U.S.?

As part of a team of educational researchers from Virginia Tech, George Mason University, University of Virginia, and Virginia Early Childhood Foundation, Dr. Almarode is exploring educational outcomes for children of low socioeconomic status, students with a disability and English language learners, among others.

"I have had the excellent opportunity to collaborate with colleagues from other universities, engage in research and discussions around common challenges and questions, and foster professional relationships that will continue well beyond the timeframe of a single 4-VA project. What is most exciting about the collaboration nurtured by 4-VA is that I find that many of my colleagues are looking at many of the same challenges and questions as we are at James Madison University. Putting our heads together in a more focused approach allows each individual member to bring his or her own set of skills, talents, experiences, and perspectives on these ideas.

We hope that the findings from this project will provide empirical evidence on the value added by public Pre-K in the Commonwealth of Virginia. Regardless of the nature of our findings (positive or negative), we hope this evidence will contribute to the conversation on the education of the young children in our communities and inform policies about best-practices in the education of young children.

4-VA to me, means collaboration. Through productive collaboration, researchers, policy makers, and all of the Commonwealth's invested stakeholders, we have a greater opportunity to pool together our community's greatest resource, its people, and make the absolute best contribution to our community's greatest investment: its children."

- Dr. John Almarode

"Personally, as a young faculty member at James Madison University, 4-VA has offered me the opportunity to collaborate with some of the top minds in the field, which happen to be on faculty at other universities in the Commonwealth."

-Dr. John Almarode

# THE NETWORKED WRITING PROJECT

FEATURING **Dr. Sean McCarthy** Assistant Professor of Writing, Rhetoric, and Technical Communication

When Dr. McCarthy heard about 4-VA, he realized it could help him network with the four participating universities to promote and celebrate faculty and student research. He dubbed his proposal The Networked Writing Project—an initiative that encourages JMU teachers and students to use social media platforms to publish student research and writing projects.

4-VA provided his team the funds to experiment with different platforms and devices.

# Five writing, rhetoric and technical communications professors now use this writing methodology regularly, prompting an IRB-sanctioned collaborative research project. As a result, the works of approximately 200 JMU freshmen have been published.

In the fall of 2012, Dr. McCarthy's section of the GWRTC 103 Critical Reading and Writing class piloted the project with students creating multimedia magazines. Two years later five writing, rhetoric, and technical communications professors now use this writing methodology regularly, prompting an IRB-sanctioned collaborative research project. As a result, the works of approximately 200 JMU freshman have been published.

Currently, Dr. McCarthy is working with JMU faculty to develop a website of resources to help instructors with multimedia authorship. He is also networking with faculty from the other three 4-VA institutions to see if they're interested in participating.

"The very existence of 4-VA helped me with the creation of this idea."

- Dr. Sean McCarthy

#### project hashtag: #nwp4va

# BRINGING TOGETHER A COMMUNICATION OF Soft matter researchers

"We are very fortunate to have 4-VA here. The initiatives and telepresence room are major accomplishments that 4-VA supports."

- Dr. Klebert Feitosa HIS YEAR 4-VA awarded Dr. Klebert Feitosa a grant entitled "Bringing Together a Community of Soft Matter Researchers in Virginia".

What is soft matter, you may ask? It's stuff you encounter every day, such as adhesives, cosmetics, detergents, foams, food additives, and lubricants.

So why does soft matter, well, matter? None of those products would exist without soft matter research. Life as we know it wouldn't be the same without glue, soap, plastic, yogurt and liquid crystal television displays. Soft matter research also impacts fuel efficiency and our understanding of natural phenomena such as avalanches, landslides and lava flows. The applications are boundless.

And yet soft matter researchers don't often have the opportunity to connect and share their research with one another. 4-VA provided such an opportunity by bringing together a community of researchers from multiple disciplines across the 4-VA institutions. On February 11th ideas, techniques, and expertise were shared among faculty at the Soft Matter Workshop at JMU and working relationships were forged.

Dr. Klebert Feitosa met a colleague from Virginia Tech at the workshop and he is applying for a Scale-up grant to support their collaboration.



"MA has features you would normally use in a meeting over Skype: video conferencing, file sharing, chat, ability to post media. However what makes it unique is that it's a secure space (the government uses it) that gives a sense of presence in the room and personable interactions (hand gestures, waving, clapping)."

- Dr. Michele Estes

FEATURING Dr. Klebert Feitosa Assistant Professor of Physics and Astronomy



FEATURING Dr. Michele Estes Assistant Professor of Educational Technology

HINK ABOUT the benefits of a traditional STEM lab classroom. Non-verbal cues and interactions allow faculty and students to connect directly with one another to master the material. Now imagine retaining those benefits in an online course.

Dr. Michele Estes and her collaborators, Dr. Stephanie Moore from UVA and Dr. Kammy Sanghera from GMU, sought to do just that.

With 4-VA's support, Estes and Moore tested VIA video conferencing for a year and a half as a pilot for future online students. Guest lecturers and students from different institutions met through VIA for a firsthand experience.

VIA looks similar to Second Life, an online 3D virtual world, but with features used in meetings, like file sharing. It's a safe, closed environment, where participants customize an avatar.

Avatars sit in chairs in a meeting room. Students share work from their own space and people can come by and comment on it, or they can have an active, small-group discussion. As they start to recognize each other's avatars, the scenario appears more realistic than other applications as a seamless sense of presence.

Both Estes and Moore have extensive experience in accessibility and universal design, which plays an important role in the development of online labs. Their expertise ensured an effective lab designed to serve the greatest number of learners, to the greatest extent possible.

# **Moving Forward**

This grant will also fund research that leads to a submission for a National Science Foundation Proposal.

FEATURING **Dr. Louise Temple** Professor of Integrated Science

# Laying the Groundwork and Technology for Viral Detection



After winning a 4-VA grant, Dr. Louise Temple has been studying Bordetella, the bacterium that causes whooping cough. She and Dr. Erik Hewlett of UVA are isolating viruses that can be developed as tools to detect the bacterium in humans. Such tools also help improve drug and vaccine development. 4-VA provided the funding for Nicholas Minahan and Alexis Brouillette to work as student researchers alongside Dr. Temple.

"Sophomore year, I began research with Dr. Louise Temple through a course called SuperPhage, a unique continuation of Viral Discovery and Genomics (VDG) that facilitates independent research in viral genomics. A few of my peers and I explored the pathogenesis of methicillin-resistant Staphylococcus awens (MRSA). This project is ongoing, with funding from 4-VA.

The synergy of the projects I have been involved in has propelled my development as a scientist. I plan on continuing to work on these projects through completion of my degree here at JMU, and progress

as a PhD student in microbiology and immunology."



Nicholas Minahan **Student Researcher** 

As a Health Science, Health Studies major, Alexis Brouillette spent her summer phage hunting. A phage (bacteriophage) is a

virus that infects and reproduces inside a bacterium. Finding a virus that will infect the phages could lead to treatments for infections such as gonorrhea.

There's not much literature on this work, so she's somewhat of a pioneer phage hunter, using trial and error as part of the process. This summer project is just the beginning though, as she'll pursue the core of the research during the school year.

> Once she earns her degree, Brouillette plans to pursue virology and work with bacteriophage and infectious diseases.

# **COLLABORATIVE RESEARCH GRANTS** Fall 2013 - Spring 2014

## OCTOBER 2013 – QUARTER 2

Dr. Kenn Barron – Development of a Real-time Data Collection and Intervention Platform for Classrooms: The Rapid Assessment Platform and Intervention Delivery (RAPID) System (Scale-up grant)

Dr. Mace Bentley – Bringing an Understanding of Southeast Asia Environments & Hazards to Virginia

Function of Electrical Conductivity

Dr. John Guo – A Newly Designed Cyber Security Course for 4-VA Dr. James Herrick – Genomic Analysis of Multi-drug Antibiotic Resistance Encoded on Mobile Genetic Elements in Virginia Stream Bacterial Populations

**Dr. Elizabeth Johnson** – Laboratory Techniques in Geology: Redesign of a STEM Course to Prepare Students for Graduate School and Employment

**Dr. Brook Kennedy** – Sustainable Innovation: Integrating Teams in Biology, Design and Engineering **Dr. Ronald Raab** – Antimicrobial Activity in the Bedbug, Cimex Lectularius

Dr. Giovanna Scarel - Effects on thermoelectric power generation of the source-device distance

## JANUARY 2014 – QUARTER 3

Two Virginia Universities

pression during Development of the Vertebrate Retina

Dr. David Fordham – Complete Re-Design of "Introduction to Information Security" Course (MBA680)

Epigenome **Dr. Sean McCarthy** – The Networked Writing Project for Virginia (#nwp4va)

Dr. Isaiah Sumner – Computational Insights into the Motion of the Protein, GroEL Dr. Louise Temple - Evaluation of potential vaccine strain of Bordetella avium in turkey poults

## MAY 2014 – QUARTER 4

Grace Barth - Connecting MDID and Omeka: Two Powerful Open Source Products and Intervention Delivery (RAPID) System (Scale-up grant)

Dr. Elizabeth (Beaux) V. Berkeley – Fossil Evidence for Early Human Predation on Rhinos Dr. Klebert Feitosa – Short-Range Interactions of Interfacial Bubbles **Remy Pangle** – Developing a Collaborative Teaching Model through Planning Regional KidWind Challenges at 4-VA Universities Dr. Giovanna Scarel – Giving to JMU International Visibility in Infrared Power Generation and its Link to Non-Linear Phenomena

# **Alexis Brouillette Student Researcher**



Dr. Costel Constantin – Thermal Conductivity and Thermal Boundary Conductance Measurements of Metal/PEDOT:PSS Interfaces as a

- Dr. Michael Renfroe Quantitative Analysis of Antioxidants in Fresh and Dried Herbs and Spices
- Dr. Maria Gilson deValpine A Collaborative Course Redesign Combining On-line Delivery Methods with Historic Nursing Research at
- **Dr. Raymond Enke** Establishing a Collaborative Undergraduate Research Program: Characterizing Epigenetic Regulation of Gene Ex-
- Dr. Anne Henriksen Using High-Throughput, Next-Generation Sequencing to Identify Transgenerational Effects of Bisphenol A on the
- Dr. Kenn Barron Development of a Real-time Data Collection and Intervention Platform for Classrooms: The Rapid Assessment Platform

Only the lead PI is listed for each project.

FEATURING Dr. Erika Kancler Assistant Professor of Health Sciences at JMU

# X-RAY "VISION" HELPS TEACH **ANATOMY**

#### We may not have X-ray vision to help us understand the human body, but Dr. Erika Kancler and the CIT may have created the next best thing.

With a 4-VA grant and support from the CIT, Kancler developed special radiology images for teaching anatomy to undergraduates at JMU.

Using Neatline, a tool meant to enhance geographical maps and timelines, Kancler innovated interactive and informative maps and timelines of the human body. Each detailed X-ray image will have hot spots with annotations to identify complex and minute anatomical structures and pathologies.

The images will be stored in the CIT's Omeka installations. Omeka is a web publishing platform for curating digital collections of research.

FEATURING Kevin Hegg Director of Systems, R&D at the CIT **Grace Barth** Visual Resources Librarian in the School of Art, Design and Art History

# **CONNECTOR HELPS FACULTY** EXHIBIT IMAGES

Did you know that JMU developed its own freely distributed, open source web application called the Madison Digital Image Database (MDID)? It's a state-of-the-art image collection management system with excellent tools for teaching with images online and in mediated classrooms.

Faculty who want to showcase their MDID images on Omeka haven't been able to because the database lacks an exhibit builder.

Enter Kevin Hegg and Grace Barth. They received a 4-VA grant to develop a connector to integrate MDID with Omeka. The proposed connector will allow JMU faculty to create Omeka exhibits from MDID slideshows and showcase them as needed.

# **ENVIRONMENTAL HAZARDS A FOCUS ON SOUTHEAST ASIA**

#### FEATURING

#### **Dr. Mace Bentley** Associate Professor of Integrated Science and Technology

Over 280,000 people lost their lives or went missing in 15 developing countries during the 2004 Indian Ocean earthquake. Societies in such areas face challenges and vulnerabilities that we can only imagine when it comes to natural disasters.

In an effort to explore and understand cultural responses to these disasters, Dr. Bentley is developing an online course called Environmental Hazards: A focus on Southeast Asia. Funds from a 4-VA grant have been dedicated to the project, which examines the complex interactions between earth surface systems and the physical and social environment.

"If not for the funds provided, I would not have had the resources necessary to develop the content in this course," he asserted.

Since the specific content for an online course is

"The 4-VA award allowed me to develop a course using innovative pedagogies that will permit access to students from anywhere there exists an internet connection."

- Dr. Mace Bentley

different from a campus course, Dr. Bentley needed software and time to produce vodcasts (short explanation videos) and webquests (query-based assignments) and to obtain reading and discussion materials from sources in the region.

# **Moving Forward**

4-VA also provided travel funds that will be used to produce new vodcasts, gather new research on regional climate changes, and update the course as natural disasters continue to occur in the area



Language. The Language Department makes up 53% of all shared courses, offering courses like Advanced Chinese and Advanced Arabic.



# COURSE SHARING

**Business Advanced Chinese Political Science Advanced Business** Chinese Intermediate Languag International Crisis Simulations Introductory Portuguese **Intermediate Portuguese Introductory Korean** Intermediate Korean **Digital Photography** Advanced Italian (Grammar & Communication) **Advanced Italian (Phonetics)** Advanced Arabic (Grammar & Communication)

11%

# **MANAGEMENT CLASS COLLABORATES VIA 4-VA TELEPRESENCE TECHNOLOGY**



"[TelePresence technology] is increasingly being used in the marketplace. It's good to have students exposed to it. It also increases the variety of perspectives in the course." - Dr. Ira Harris

fter teaching a critical thinking class for 11 years at UVA's McIntire School of Commerce, Dr. Ira Harris decided to mix things up a bit. He invited students from 1MU and GMU to participate in a pilot version of the course with UVA-remotely.

The course, Management 398 Honors Critical Thinking, is not unknown in Virginia. Dr. Scott Gallagher of JMU described it this way, "Dr. Harris was basically offering to deal our students into one of their most prestigious classes as a goodwill gesture."

Students from all three universities attend the class through 4-VA TelePresence technology, which Harris said is "increasingly being used in the marketplace. It's good to have students exposed to it. It also increases the

variety of perspectives in the course. An important part of good thinking is gaining an appreciation of the breadth of the topic and the variety of perspectives. Someone forces you to think differently about something."

In the classrooms, the TelePresence camera detects a person's voice and then focuses in that direction, pro-

#### The TelePresence camera detects a person's voice and then focuses in that direction, projecting the image onto a screen. There are three screens in each classroom, so students can see everyone during the class.

jecting the image onto a screen. There are three screens in each classroom, so students can see everyone during the class.

"I've heard from several students. They said at the beginning of the semester they were skeptical about the technology being an obstacle. They soon learned that after you settle into the discussion, you become accustomed to it," affirmed Harris.

"It's been a good experience to really push the students in their thinking. I push them to go deeper and deeper; they aren't used to this type of probing. But that's how you get better with your thinking, by holding yourself and others more accountable. Students need to pay attention to the communication and content of the message. By the end of the semester, students tend to leave the course with more questions than they started with. They begin to think differently, to notice things they didn't notice before. This is indicative of a successful semester."

# **A NEW WAVE OF TECHNOLOGY**

FEATURING Dr. Robert Nagel Assistant Professor of Engineering

**STEM Robotics Lab** 

Both the engineering and computer science departments share the STEM robotics lab space.

Features

- Five Linux workstations for coding small robots
- Five PLC workstations for studying industrial robotics
- One short-throw interactive projector
- Six mobile tables and chairs to make way for robot mobility

# **STEM Classroom Redesign**

ISAT/CS 150 was redesigned as a flexible teaching space for traditional classes, **DISTANCE LEARNING** and other novel pedagogies. The design included three whiteboard walls, two interactive short-throw projectors, and flexible furniture

# **Hearing Test Kit Project**

Current methods for hearing tests before and after medical procedures are costly and inconvenient for patients, not to mention less informative to doctors.

Thanks to a 4-VA grant, this may no longer be the case. Funding supported the design and development of a SHIPPABLE HEARING TEST KIT that can be used in a patient's home at their convenience. These new hearing tests are more realistic and provide useful data "for understanding how the brain learns to use a new' ear."

Communication Sciences & Disorders student Sofia Ganev, working with Dr. Lincoln Gray at JMU, has collected validation data and is working toward a journal publication demonstrating the validity of the testing instrument for measuring speech in noise threshold and ability to localize sound.

Dr. Robert Nagel teaches Health and Humans Services (HHS) 1056. The HHS lab used for his class was redesigned to incorporate an interactive short-throw projector system that can interface with all of the computers in the room. Students can display their SolidWorks design<mark>s, drawings, and other creations on the screen</mark> for class discussion and critique. 4-VA provided a MICROSOFT SURFACE which Nagel will use to demonstrate SolidWorks tools to the class through the new projector system.

#### Achievements

- Used to create a terrestrial robot that can take wildlife photos in the woods
- Used to create a device to help package glaucoma test devices
- Hosted an engineering sensors course
- Hosted a computer science robotics course and the robotics club

## **Design Visualization Lab**

# COURSE REDESIGN

# Approximately **2,000** students a year benefit from **Course Redesign**

# Workshops, Conferences, and Symposiums

Biology Vision and Change Conference - Summer 2012

Articulation Conference - Spring 2013 jmUDESIGN STEM Redesign Workshop - Summer 2013 and Summer 2014

Scientific Teaching Workshop

# **COURSES** Redesigned

BIO 290 - Human Anatomy Lab INDU 492 - Topics in Industrial Design BIO 452 - Population Ecology CIS 424 - Computer Security Management ISAT - Environmental Hazards NSG 317 - History of Nursing MBA 680 - Introduction to Information Security ART 391E - DIY Photography POSC 398 - Simulations CIS 101 - Introduction to Computer Science CIS 139 - Programming Fundamentals IA 490 - Special Studies Intelligence Analysis

The impressive range of redesigned . . . i courses wasn't the only result of this **4-VA initiative. The** jmUDESIGN program also strengthened professional relationships, which faculty indicated was important in the program evaluation.

# The Future of **Computer Science** in the **Classroom**

# **DID YOU KNOW?**

Dr. Mayfield described the CTA as a graduate credit "boot camp" and an opportunity to "go back to school **Employment of computer and information research scientists** for a week and network with other teachers to exchange is projected to grow 15 percent from 2012 to 2022, faster than tips and tricks". After two to three years, once they have fulfilled their credits, Dr. Mayfield will entrust the average for all occupations. - United States Department of Labor, 2014 future course instruction to teachers.

Students today may not know life without computers, but that doesn't mean they're primed for careers in computer science (CS). At the rate technology is evolving, how can the limited number of CS teachers amass enough resources to prepare students with a competitive education in the field?

Dr. Chris Mayfield has proposed a solution that reaches beyond university limits into secondary classrooms. With 4-VA funding, he aims to simulate apprenticeships with high school teachers through the Content Teaching Academy (CTA) to develop teacher acumen in computer science, its coursework and classwork design. 4-VA funding will provide the necessary equipment, content and seed money for teacher salaries.

jmUDESIGN So how do you redesign a course? Just ask jmUDE-SIGN. Developed to teach faculty the intricate processes of course design and redesign, this program begins with an intensive, five-day workshop during the summer, followed by consultations and optional summer workdays. The program provides skills, knowledge and support for developing brand new courses, redesigning mainstay courses, or updating course platforms (Face to Face, Hybrid, Flipped Classroom, Online, etc.).

"This event promotes a sense of community within the faculty participants that we think strengthens their teaching and the larger teaching community." - Dr. Carol Hurney



# the CONTENT TEACHING ACADEMY

#### A Realistic Impression of CS as a Major

As it stands, computer science majors kick off their coursework with CS 139 Programming Fundamentals, an intensive, semester-long intro class. Although programming is the primary CS tool, the class doesn't give freshmen a realistic impression of the major.

Through 4-VA course redesign, Dr. Mayfield plans to clarify the CS major for new students by combining the first week of content from each CS course into a compilation called Computer Science 101. The class is intended to provide a well-rounded understanding of the major and a pragmatic glimpse into the field of computer science.

> Faculty learned course design and redesign processes during the **jmUDESIGN** program.

# 

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, with an average of 25 annually for the past 10 years.

"As a full-time employee, wife, and mother of two, finding time to sit in a traditional classroom is extremely difficult," says Tracey Kite, who has 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."

Within the past three years, the 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 three online general education classes. 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.

# **4-VA Boosts Nursing Program**

Hospitals around the country are asking their registered nurses (RNs) to go back to school to earn Bachelor of Science in Nursing (BSN) degrees. To fulfill that need, 4-VA supported the development of an RN to BSN curriculum, which has guickly become the most successful Degree Completion program to date. The course provides flexible online learning opportunities and allows students to maintain employment while completing their BSNs.

# **Nursing Simulation Lab**

Earning a nursing degree online wouldn't be the same without the nursing simulation lab, where students practice on manneguins 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.



# Words from the Faculty

"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 this active communication, and I can tell they appreciate it."

- Jamie Lee, Assistant Professor of Nursing

"The [RN to BSN Nursing] Institute supported by the 4-VA grant was helpful in providing our faculty group with a basic working understanding of Canvas as well as evidence-based online pedagogy. Our participation last spring in this institute allowed us to be some of the first users of the new Canvas LMS system and facilitated our moving the RN/BSN program to a fully online format."

- Dr. Nena Powell, RN/BSN Program Coordinator

# **CIT Training: Strategies for Teaching and Learning Online**

The Center for Instructional Technology (CIT) provided customized facilitation and in-depth consultation for 12 JMU faculty who prepared to teach an online course through the 4-VA initiatives. Nine of

# teaching best practices for online courses

the faculty completed one of two immersive institutes to develop a quality online course that is based on best practices and sound pedagogy. The faculty worked extensively with various CIT staff and online modules to develop strategies for teaching and learning online, design learning activities, online courses

# prepared to teach

and select appropriate instructional technologies, which all support the instructional learning objectives of their course. Each faculty member spent over 20 hours completing the institute and consulting with CIT. A total of 14 courses were developed through the institutes. The other three faculty, who previously completed a CIT institute for online course development, worked individually with CIT Instructional Technologists to design and develop their online course.

# **14 COURSES** developed during dedicated institutes

Consultation time with the three faculty totaled 23 hours. In addition, CIT continued supporting several faculty who completed a CIT institute for online course development for 4-VA in FY 2013.

# Impact of 4-VA Support on Adult Degree Program Enrollment



4-VA contracted the JMU Office of Outreach & Engagement to enhance the degree completion initiative. The office partnered with the CIT to develop modules in subjects such as entrepreneurship, public policy & admin, and nursing. As a result enrollment has increased tremendously.

"I talk all the time about building the new Virginia economy. It can't just be talk-it has to be action... We have to do a better job of building entrepreneurship, creativity, and innovation. I am all in. . . We have to work better together and this collaboration is where it starts... Let's push the edge."

- Governor Terry McAuliffe

JAMES MADISON SATHER OF THE U.S. CONSTITUTION DONATED B AND LOIS FORBES (64) TO COMMEMORATE THE INIVERSITY'S CENTENNIAL



# WELCOME ICE HOUSE

Originally built in 1934, the Cassco Ice House preserved and distributed local produce and goods. Seventy years later, the need for central cold storage had declined and the Ice House closed down. In early 2014, 4-VA helped design and staff the second floor to promote community innovation, collaboration and entrepreneurship.

NNOVATION



The ICE House gives students and professors the ability to make use of cutting-edge technologies, such as the following:

- 3D printer
- Laser cutter
- Large carriage printer
- Interactive projector
- Videoconferencing capability
- Virtual reality headset

The ICE House was designed as a multi-disciplinary collaboration space.

"I thank you for. . . what you're going to do in this facility. . . for the great work JMU is doing to grow and di-versify the economy, bring in new jobs, and build the small businesses. This is how you do it, by bringing people together."

- Governor Terry McAuliffe

The ICE House offers a place for students and entrepreneurs to collaborate, do rapid prototyping, and build relationships with business professionals and outside mentors. The space also provides student entrepreneurs with easy access to resources such as the Small Business Development Center, the Center for Entrepreneurship, and the Office of Technology Transfer.

# **ICE HOUSE** TECHNOLOGY WORKSHOP **LEADS TO COURSE** INNOVATION

**On June 6th students and professors** interacted with new technologies at the ICE House through a workshop, which generated ideas for both a new project and a new course.

The Center for Instructional Technology (CIT) is offering this new project to explore the ICE House, 3SPACE\*, and the collaboration furniture in the EPIC\*\* Spaces in the new Student Success Center along with the MediaScape in the CIT. Participants will learn how to use the different technologies in each space and how each one can be useful to their students. This will be an exploratory project in which selected faculty and CIT will work and learn together, generate ideas, and reflect on discoveries. \*3SPACE = 3-Dimensional Solid Printing Active Classroom Experience \*\*EPIC = Enhancing Pedagogy through Innovative Classrooms

# **GOVERNOR MCAULIFFE SPEAKS AT THE ICE HOUSE GRAND OPENING**

On June 4th, Governor Terry McAuliffe cut the ribbon at the Ice House grand opening.

"When everybody works together: this is how you grow and diversify an economy. It's how you create those 21st century jobs. Just to walk around the building and to feel the energy and the excitement, we know we are preparing our students to get into that workforce with that skill set that's going to be needed for the 21st century."

- Governor Terry McAuliffe

# **OUTCOMES** Innovative Spaces SANDBOX Collaborate and Make

# Interdisciplinary Collaborative Technology Course

As a result of the workshop, Patrice Ludwig, Erika Lewis and other collaborators decided to create an interdisciplinary course utilizing the technology that they discovered in the ICE House. Currently in the early stages of development, they expect to offer the course in the Spring 2015.



NU President Jon Alger. Secretary of Commonwealth **Levar Stoney** ('04) and **Governor Terry** McAuliffe

# \*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\* 2014 - 2015PROJECTS

# JMU's first full-scale hackathon

A creative, collaborative, software development experience

September 19 – 20, 2014 at 6pm ICE House, 127 W. Bruce St. Harrisonburg, VA

## For 24 hours students will build the coolest and most innovative web, mobile, and hardware applications.

- MadHack is FREEL
- Optional workshops throughout the event
- Teams will be limited in size from 1-4 people. We can help you form teams at the event.
- All code should be written at the event.
- Technology experts will be on hand to assist you along the way.
- Free snacks throughout the event
- Three free meals

Amazing people, \$\$ THOUSANDS in prizes, giveaways, t-shirts, and awards!

# What to bring

laptop, power cords, toothbrush, creativity, and anything else you need for a 24-hour endeavor

# JMU Offers WebEx

\*\*\*\*\*

Faculty, staff, and students at JMU now have the ability to videoconference with each other and others outside of the university network using WebEx.

WebEx provides on-demand collaboration, online meeting, web conferencing, and videoconferencing applications.

Users can connect using personal computers or by incorporating a videoconferencing unit on campus.

For more information or to set up a help session, please email Kai Brokamp at brokamkma jmu.edu.

# Altaii Introduces Flipped Classroom

Normally when we think of taking a class we picture listening to lectures in a classroom and then doing homework, well, at home.

But professors are increasingly turning to the flipped classroom model, which "flips" things around: students watch lectures at home online and then collaborate in an interactive classroom with the instructor.

According to knewton.com, flipped classrooms significantly increase student performance.

Dr. Karim Altaii, professor of Integrated Science and Technology at JMU, appreciates the benefits of the methodology and plans to introduce it into his ISAT 310 Energy Fundamentals I class this year.

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