Notes from the Director

Welcome to the third and final 2017 issue of the WVUCE-STEM newsletter!

As we reach the close of the fall semester, approaching the end of the calendar year and the beginning of the holiday season I would like to take this opportunity to express my gratitude to the Center's partners. During 2017, we submitted or supported the submission of 28 new grant proposals, and received funding on 8 proposals totaling $1.89M. These accomplishments would not have been possible without the great support for STEM education provided by our partnering faculty members.

I wish all of you a successful upcoming spring semester, and a joyous 2018! We, WVUCE-STEM, look forward to continuing to work and partner with you.

Kindest Regards,

Gay Stewart
Director, WVU Center for Excellence in STEM Education
Eberly Professor of STEM Education
Professor, Department of Physics
In the News

**Code.org**

*(Modified from a WVU news release dated December 8, 2017)*

Continuing our commitment to excellence in Science, Technology, Engineering, and Mathematics (STEM) Education, we announced on Friday, December 8, 2017, our selection as the regional partner of Code.org for the entire state of West Virginia.

"We are thrilled to become a Code.org Regional Partner and establish CodeWV to help build an effective computer science educator community across West Virginia, particularly in our rural and underserved areas," said Center Director Gay Stewart. "With computing jobs now the number one source of new earnings in the U.S., computer science must become a critical component of the K-12 curriculum. Not only can we ensure that West Virginia students have the skills necessary for future success, we can also bolster jobs and economic growth in the state."

As a regional partner, we are creating CodeWV to support increased accessibility to computer science for students in K-12 public schools across the state, in part by offering professional development to educators.

In making the personnel investment required to become a regional partner, WVU will be able to provide resources to support the West Virginia Department of Education’s efforts to bring computer science courses into all schools, enhance the state’s computer science learning standards and define the requirements for computer science teaching certification. To celebrate the launch of CodeWV, we hosted an Hour of Code event at Mylan Park Elementary School to showcase how easy it is for students of all ages to learn the basics of coding. Some 400 students participated in an Hour of Code, a global movement to demystify the various computer programming languages commonly called "codes."
Stewart was joined at the event by WVU President Gordon Gee and West Virginia's Department of Education and the Arts Secretary Gayle Manchin; U.S. Senators Joe Manchin and Shelley Moore Capito, along with State Superintendent Steven Paine, sent video greetings.

We will also be hosting a statewide convening in Charleston on February 2, 2018, focused on expanding access to computer science in classrooms statewide in partnership with the Education Alliance and the West Virginia Department of Education, and funded in part by STEMx.

Both events are part of the West Virginia Forward initiative, underpinning how collaboration among entities across the Mountain State can advance STEM education at all educational levels to help diversity and strengthen our current and future talent pool.

"We are proud to partner with the WVU Center for Excellence in STEM Education to expand access to computer science in West Virginia at a time when the majority of K-12 schools still don't offer it," said Hadi Partovi, founder and CEO of Code.org. "By offering Code.org Professional Learning Programs, WVU will give teachers the tools and support they need to introduce foundational 21st-century knowledge into their classrooms and put all students on a path to success in today's high-tech world."

West Virginia is one of only 10 states to have K-12 computer science standards and one of 34 states, plus Washington, D.C., to count computer science toward high school graduation math or science requirements.

"We are pleased to include WVUCE-STEM as a partner in our efforts to expand computer science education across the state," Dr. Paine said. "We recognize that computer science is fundamental for our children's future success. We must provide all of our students with the opportunity to become producers, not just consumers, of computer science."

To learn more about our new CodeWV program, please visit: https://codewv.wvu.edu.

State STEM News

- On April 13, in a voice vote with no nays heard, the WV BOE approved providing computer science courses that public high school students can take to satisfy math and science graduation requirements.

- House Bill 2711, which state legislators passed and Governor Jim Justice signed into law this year, banned the Smarter Balanced exam and effectively limited the state's choice for a high school standardized test to the SAT or ACT.

- On September 11, WV Governor Jim Justice signed the state's federal Every Student Succeeds Act (ESSA) compliance plan, which included a new school labeling and accountability system, and the WV Department of Education announced that it had been submitted to the U.S. Department of Education. The U.S. Department of Education now has 120 days to review the plan and provide feedback. The full version of the submitted plan can be found online.

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Announcements

WVUCE-STEM Announces Advisory Board Members

The WVU Center for Excellence in STEM Education is governed by an Advisory Board made up of the following individuals:

- Michael Feder, Senior Policy Advisor, BOSE Public Affairs Group
- Michael Green, Director, High Technology Foundation
- Kevin Howard, Principal Research Scientist, The Dow Chemical Company, and Co-Founder and CTO K4M Consulting
- Gayle Manchin, Cabinet Secretary, WV Department of Education and the Arts
- Melanie Page, Associate Vice President for Creative and Scholarly Activities
- Donna Peduto, Executive Director, West Virginia Public Education Collaborative
- Shelia Tobias, noted education writer, scholar, and activist, who has focused much of her career on issues in mathematics and science education

For additional biographic information on the above advisory board members, please visit the WVUCE-STEM website.

*Continued State STEM News*

- On September 4, WVUCE-STEM Advisory Board Member, Michael Green, was featured in an article of The State Journal.
- West Virginia students showed improvement in math in 6 of the 7 grade levels assessed on the 2017 statewide summative assessments.
- On October 2, WVUCE-STEM Advisory Board Member, Donna Peduto, was featured in WVU TODAY.
- The Education Alliance released their 2017 Annual Report. The report highlights the stories of students and teachers impacted by The Education Alliance’s work.
- The WV Department of Education selects AIR (the American Institutes for Research) math and English language arts assessments as the new statewide standardized tests for grades 3-8, replacing the Smarter Balanced exam.
- On Thursday, December 7, 2017, the WV Council for Community and Technical College Education presented a report indicating that a growing percentage of high school graduates in WV who attend the state’s public colleges need to take remedial classes to be ready for entry-level college classes.
Nationwide STEM News

- On June 30, Rep. Dan Kildee (D-MI) introduced H.R. 3137, the Promoting Women in STEM Act, which would amend the Perkins to "require existing state programs funded by the Perkins Act to include programs that increase participation of women in STEM fields" by adding support for these programs to the list of required uses of state leadership funds.
- Education First, with the support of the Overdeck Family Foundation, developed a resource to help policymakers, district and school leaders, and advocates learn how states are using ESSA to support STEM education and how they can push those ideas further.
- On Wednesday, July 12, Achieve released a new brief examining ways in which ESSA supports STEM education.
- On July 26, the Executive Director of the STEM Education Coalition, James Brown, testified at the House Committee on Science, Space, and Technology Subcommittee on Research and Technology.
- The National Council of Teachers of Mathematics (NCTM) released an ESSA Toolkit in a collaborative effort between NCTM, the Math Teachers’ Circle Network, and the Association of State Supervisors of Mathematics and with support from 100Kin10.
- The College Board showed significant increases in the number of females, Latino and African-American students who took either the Advanced Placement Computer Science exams this spring.
- On September 7, the Senate Appropriations Committee voted overwhelmingly to approve a spending bill that rejected President Trump’s proposed cuts to education funding for fiscal year 2018.
- On September 25, the White House announced a $200 million per year commitment to computer science education in America’s schools and released a Presidential Memorandum for the Secretary of Education recognizing the importance of STEM skills in the workforce and emphasizing the lack of nationwide access to high-quality STEM learning.
- On September 26, five private sector technology companies (Amazon, Facebook, Google, Microsoft, and Salesforce Inc.), committed to contributing $50 million each over five years to boost STEM education programs.
- On October 12, Education Secretary Betsy DeVos put forth a new set of priorities including school choice, promoting STEM education with a focus on computer science, special education, and school safety. The U.S Department of Education will award approximately $4 billion per year in new and continuation competitive grants across some 80 programs. On November 3, Department released the Secretary’s proposed priorities for the Department’s competitive grant programs and launched the 30-day public comment period. On November 17, the STEM Education Coalition responded to the proposed priorities.
- The STEM Education Coalition signed onto two targeted letters to Congressional appropriators in support of federal funding for Title IV Student Support and Academic Enrichment Grants, part of ESSA. The letters urged increasing the funding for Part A from $400 million in FY2017 to $500 million in FY2018, $50 million more than the initial committee request.
- On November 15, the House Science and Technology Committee marked up a bi-partisan package of several STEM-related bills that pertain to the NSF.
Faculty Member Spotlight

Dr. Graham D.M. Andrews, Assistant Professor of Geology

Department of Geology and Geography

I received my Ph.D. from the University of Leicester, U.K., in 2006 for research into explosive supereruptions from volcanoes like Yellowstone. Since then I have conducted varied research into volcanic processes and rocks in the U.S., Canada, Mexico, and Japan, during research appointments at the University of British Columbia, the Geological Survey of Canada, and the University of California Santa Barbara, and faculty positions at Franklin and Marshall College and California State University Bakersfield. I arrived at WVU in August 2016. I currently teach undergraduate major classes in mineralogy, petrology (the study of how rocks form), physical volcanology, and a study abroad course in Iceland.

Physical volcanology emphasizes the dynamic physical processes happening during volcanic eruptions, rather than chemical processes, and lends itself to demonstrations and interactive learning exercises like the now famous “Diet Coke & Mentos” experiment. Because volcanic eruptions are inherently dangerous, often in difficult to reach places, and do not erupt on demand, physical and numerical experiments are often the best way to study them; in my research I work with dedicated experimental and numerical volcanologists and add my expertise of the forensic investigation of volcanic rocks to their studies. This has led to breakthroughs in the understanding of several volcanic phenomena not witnessed by modern science, including how kimberlite volcanoes, the sources of diamonds, erupt.

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I integrate simple, safe, analog experiments into my physical volcanology classes to introduce students to both volcanic processes and experimental design. Geology is not often thought of as being experimentally focused and undergraduate education in the geosciences is not often taught with an experimental component. However, many of the scientific breakthroughs in geoscience in the past decade have been experimentally-driven, and future geoscientists need to be familiar with experimental design and data.

I am new to STEM education research and practice so working with the WVU Center for Excellence in STEM Education is an exciting, and a little daunting, opportunity. I am working with Vanessa Licwov-Channell of the STEM Center to develop hands-on experiments and demonstrations in my volcanology class for high school teachers to deploy in their classrooms across the state. This work is part of a National Science Foundation-funded research grant.

Geology is an excellent science capstone because it integrates physics, chemistry, biology, and mathematics, and therefore, volcanology experiments can be appropriate for physics, math, and earth science classrooms. I have a strong research interest in how lava flows and investigation of this lends itself to analog experiments where blobs of corn syrup are allowed to flow down slopes of different gradient. The behavior of lava is fundamentally controlled by viscosity and fluid dynamics, and therefore has a place in the physics curriculum. Students can change the temperature of the corn syrup to lower viscosity and change the crystal content by adding grains of rice or sugar. Because these experiments only use food stuffs they are relatively cheap and easy to prepare, although they can get sticky. I instrument my classes’ experiment with high-definition video cameras to allow students to record and replay the experiments in slow motion. Vanessa and I will work together in Spring 2018 to modify my existing experiments and make them adoptable by high school teachers, and hopefully they can be tested in schools starting in the Fall.

I am indebted to Dr. Gay Stewart and Vanessa Licwov-Channell for helping me develop a viable STEM education program and to Dr. Katie Stores in Eberly College for bringing us all together in the first place.
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