### FY 2016 NWO Staff

<table>
<thead>
<tr>
<th>Name</th>
<th>Position</th>
</tr>
</thead>
<tbody>
<tr>
<td>W. Robert Midden</td>
<td>Director</td>
</tr>
<tr>
<td>Emilio Duran</td>
<td>Faculty Associate Director</td>
</tr>
<tr>
<td>Jonathan Bostic</td>
<td>Faculty Associate</td>
</tr>
<tr>
<td>Gabriel Matney</td>
<td>Faculty Associate</td>
</tr>
<tr>
<td>Jessica Belcher</td>
<td>Associate Director of Finance and Operations</td>
</tr>
<tr>
<td>Susan Stearns</td>
<td>Assistant Director of Programming and Development</td>
</tr>
<tr>
<td>Lisa Addis</td>
<td>Graphic Designer/Marketing Director</td>
</tr>
<tr>
<td>Jenna Pollock</td>
<td>NWO Education Program Manager</td>
</tr>
<tr>
<td>Beth Ash</td>
<td>Research Program Manager</td>
</tr>
<tr>
<td>Judith Steiner</td>
<td>iEvolve with STEM Project Manager</td>
</tr>
</tbody>
</table>

### NWO Mission

The Center’s mission is to advance science, technology, engineering, and mathematics (STEM) education for people of all ages.

### NWO Vision

The Northwest Ohio Center of Excellence in STEM Education at BGSU aims to advance science, technology, engineering, and mathematics (STEM) education for people of all ages. Our purpose is to work with community partners to (a) generate new knowledge about the science of teaching and learning, (b) apply this knowledge by developing the expertise of K-12 educators and higher education faculty, (c) increase public support for, and understanding of, the STEM subject areas, and (d) stimulate the interest of young people, especially those in underrepresented groups, in these rewarding fields of study and career opportunities.
# Table of Contents

## 2 NWO Goals

## 3 NWO Advisory Board

## 4 Educator Professional Development and Outreach
- “NWO STEM Connection” E-Newsletters
- NWO STEM Education Inquiry Series
- NWO Symposium on Science, Technology, Engineering, and Mathematics Teaching (NWO Symposium)

## 7 Faculty Professional Development and Collaborative Education Research
- COSMOS STEM Education Learning Community
- COSMOS Team
- NWO Faculty Participants

## 10 Grant Projects
- Advancing the Science Skills of Elementary Teachers and Students (ASSETS)
- Black Swamp Math Teachers’ Circle (BS – MTC)
- Common Core for Achievement & Middle Grades Mathematical Proficiency (C²AM²P Middle Grades)
- Common Core for Mathematical Proficiency in Elementary and Middle Schools ((CO)²MP Elementary and 6 – 8)
- Inquiry and Engagement to Invigorate and Optimize Learning for Everyone (iEvolve) with STEM
- iTraining
- Ohio Junior Science and Humanities Symposium (OJSHS)

## 18 School and Community Activities and Outreach
- Falcon BEST Robotics
- Math Camp
- STEM in the Park
- Women in STEM
- You Be The Chemist Challenge

## 24 Student Scholarship Programs and Grants
- Academic Investment in Mathematics and Science (AIMS)
- Collaborative Research: AGEP-T: Northern Ohio AGEP Alliance (NOA-AGEP)
- Building Ohio’s Sustainable Energy Future (BOSEF)
- Granting Access to Math and Science (GRAMS)
- Science and Math Education in ACTION

## 28 Research Programs and Grants
- Identifying the Best Strategy to Reduce Phosphorus Loads to Lake Erie from Agricultural Watersheds Survey of Local Sources of Nutrients in the Upper Portage River Watershed (Sea Grant)
- Mitigation of Agricultural Nutrient Loss by Novel Manure Treatment (OWDA)

## 30 FY 2016 NWO Budget

## 34 Appendices

A: Faculty and Student Recognition
B: Falcon Best Recruitment Email
C: iEvolve with STEM Recognition
D: iTraining Advertising
E: Math Camp Recognition
F: NWO STEM E-Newsletters

G: NWO STEM Inquiry Series Advertising
H: NWO Symposium Advertising & Recognition
I: OJSHS Advertising & Recognition
J: STEM in the Park Advertising
K: Women in STEM Advertising
L: You Be The Chemist Challenge Recruitment Email
NWO GOALS AND CORRESPONDING ACTIVITIES

Goal 1: Develop the expertise of pre-service and in-service teachers in STEM and STEM education disciplines.

Goal 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for students, teachers, and faculty.

Goal 3: Conduct and communicate collaborative research in STEM and STEM education disciplines.

Goal 4: Develop and sustain a regional collaborative alliance including university, school, informal education, and business partners through a shared vision and collaborative spirit for tackling current STEM education issues.

Goal 5: Support higher education faculty and future faculty in pursuit of the best practices in STEM and STEM education disciplines to enhance undergraduate and graduate education.
## FY 2016 NWO Advisory Board

<table>
<thead>
<tr>
<th>Name</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melissa Basinger</td>
<td>Putnam County ESC</td>
</tr>
<tr>
<td>Eric Baumgartner</td>
<td>Ohio Northern University</td>
</tr>
<tr>
<td>Anne Bullerjahn</td>
<td>Owens Community College</td>
</tr>
<tr>
<td>Mary Caprella</td>
<td>BP Refinery, LLC</td>
</tr>
<tr>
<td>Dave Enzerra</td>
<td>Lubrizol</td>
</tr>
<tr>
<td>Julie Gerke</td>
<td>St. Henry Local Schools</td>
</tr>
<tr>
<td>Anjali Gray</td>
<td>Lourdes University</td>
</tr>
<tr>
<td>Jim Gunner</td>
<td>Perkins Local Schools</td>
</tr>
<tr>
<td>Sonny Hamizadeh</td>
<td>SSOE</td>
</tr>
<tr>
<td>Beth Hench</td>
<td>Ayersville Local Schools</td>
</tr>
<tr>
<td>Gary Herman</td>
<td>Putnam County ESC</td>
</tr>
<tr>
<td>Stephanie Johnson</td>
<td>Battelle/OSLN</td>
</tr>
<tr>
<td>Andy Jorgensen</td>
<td>The University of Toledo</td>
</tr>
<tr>
<td>Mitchell Magdich</td>
<td>Toledo Zoo</td>
</tr>
<tr>
<td>Sloan Mann</td>
<td>Imagination Station</td>
</tr>
<tr>
<td>Bob Mendenhall</td>
<td>Toledo Public Schools</td>
</tr>
<tr>
<td>Dusty Miller</td>
<td>WGTE</td>
</tr>
<tr>
<td>Rod Moorman</td>
<td>Mercer-Auglaize Business Education Alliance</td>
</tr>
<tr>
<td>Jan Osborn</td>
<td>Putnam County ESC</td>
</tr>
<tr>
<td>Jed Osborn</td>
<td>Ball Corporation</td>
</tr>
<tr>
<td>Kevin Parkins</td>
<td>Cardinal Stritch Catholic High School</td>
</tr>
<tr>
<td>Julie Payeff</td>
<td>The Andersons</td>
</tr>
<tr>
<td>Gwynne Rife</td>
<td>University of Findlay</td>
</tr>
<tr>
<td>Eugene Sanders</td>
<td>Sandusky City Schools</td>
</tr>
<tr>
<td>Michelle Shafer</td>
<td>Maumee City Schools</td>
</tr>
<tr>
<td>Joel Steinmetz</td>
<td>Lima Senior High School</td>
</tr>
<tr>
<td>Tom Stuckey</td>
<td>Northwest State Community College</td>
</tr>
<tr>
<td>Sybil Truster</td>
<td>Shelby County ESC</td>
</tr>
</tbody>
</table>
“NWO STEM Connection” E-Newsletters

The NWO e-newsletter is focused on bringing attention to new opportunities, programs and events happening in STEM K-16 education. Monthly e-newsletters feature stories about area K-12 schools with a focus on STEM learning. Each month also includes feature stories from community partner organizations detailing how business and non profit organizations are working with K-12 schools to enhance STEM teaching and learning. A hands-on, inquiry based STEM activity is also included for teachers to use in K-12 classrooms, upcoming teacher professional development and student opportunities and STEM resource announcements. The e-newsletter is distributed electronically to 8,000+ contacts within the NWO database covering regional school districts and their teachers and administrators. See Appendix F for an example of an e-newsletter for FY 16. **Meets NWO Goals: 1, 2, & 4**
NWO STEM Education Inquiry Series

**Brief Description**

Sustained professional development is offered by NWO throughout the academic year through the NWO Inquiry Series. The Inquiry Series is a series of STEM professional development workshops that continues to be highly popular with educators in the region. It also functions as a monthly platform for affiliated NWO grant projects and regional educators to come together for project-specific professional development. The Inquiry Series is open to in-service and pre-service teachers, higher education faculty, and business/community partners in the region. Participants can opt to attend only one event or all the Inquiry Series events. **Meets NWO Goal: 1**

**FY 2016 Activity Information**

In an effort to reduce the competition for recruiting STEM teachers in northwest Ohio, the 2015-16 NWO Inquiry Series was a partnership with existing education agencies and projects. These partnerships allowed both parties to benefit from the professional development provided and offered a more streamlined list of opportunities for teachers in the region.

The first partnership was with the Black Swamp – Math Teachers Circle (BS – MTC). This was a free program offered 7 times throughout the year for two hours each evening for K – 16 math teachers. The dates and attendance data for these meetings is listed below.

During the winter of 2016 NWO partnered with Xcite Learning to present the “Supercharged Science Mini-Series” for grades 3 – 8 teachers. This two part series took place on two consecutive days from 8:30 AM – 3:30 PM. Teachers who participated paid $250/person to attend and this included all of their meals and materials. The dates and attendance for this series is listed below. See Appendix G for examples of the advertisement materials for this program.

### Black Swamp – Math Teachers Circle (BS – MTC)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Location</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>August 25, 2015</td>
<td>North Baltimore Elementary School, North Baltimore, OH</td>
<td>20</td>
</tr>
<tr>
<td>September 22, 2015</td>
<td>North Baltimore Elementary School, North Baltimore, OH</td>
<td>21</td>
</tr>
<tr>
<td>October 20, 2015</td>
<td>North Baltimore Elementary School, North Baltimore, OH</td>
<td>21</td>
</tr>
<tr>
<td>November 7, 2015</td>
<td>North Baltimore Elementary School, North Baltimore, OH</td>
<td>19</td>
</tr>
<tr>
<td>January 28, 2016</td>
<td>Life Science Building, BGSU, Bowling Green, OH</td>
<td>21</td>
</tr>
<tr>
<td>March 3, 2016</td>
<td>Life Science Building, BGSU, Bowling Green, OH</td>
<td>13</td>
</tr>
<tr>
<td>April 21, 2016</td>
<td>Life Science Building, BGSU, Bowling Green, OH</td>
<td>20</td>
</tr>
</tbody>
</table>

### Supercharged Science Mini – Series (Xcite Learning)

<table>
<thead>
<tr>
<th>Dates</th>
<th>Presenters</th>
<th>Attendance</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 28, 2016 &amp; January 29, 2016</td>
<td>Dr. Jodi Haney, Xcite Learning and Jenna Pollock, NWO</td>
<td>30</td>
</tr>
</tbody>
</table>
**NWO Symposium on Science, Technology, Engineering, and Mathematics Teaching (NWO Symposium)**

**Brief Description**
Over the past several years, the NWO Symposium has brought together hundreds of participants to exchange effective strategies for teaching STEM. This popular event has provided the Center with huge visibility in the community, attracting educators to our long-term professional development opportunities and giving all participants resources and ideas they can use immediately in their classroom or setting. **Meets NWO Goals: 1 & 5**

**FY 2016 Activity Information**
The 2015 NWO Symposium was held on the BGSU campus on Saturday, November 21. The Symposium began with a keynote address from BGSU Professor of Teaching Excellence Dr. Daniel Brahier titled: “Science and Mathematics for a New Generation”, and continued with five one-hour blocks of seven different content strands. A registration fee of $35 was charged to educators and administrators and a $5 fee was charged to undergraduate and graduate students. Presenters remained free and for the first time the Symposium did not include a vendor area. Session strands continued to help participants determine what sessions were ideal for their personal professional development. Fewer sessions were offered during each block to maximize attendance in each offered session during the block. The 2015 Symposium had a heavy focus on mathematics sessions to accompany the mathematics themed keynote. Below is breakdown of the sessions offered by strand (51 total) and the overall attendance of 425. See Appendix H for examples of the Symposium advertising & recognition. The evaluation report can be found at: [www.nwocenter.org/reports](http://www.nwocenter.org/reports).
COSMOS Research Learning Community

Brief Description
Faculty, graduate students, and others with a common interest in STEM teaching and learning come together throughout the academic year to collaboratively examine and design high tech and highly engaging environments to enhance student attitudes, motivation, engagement, and ultimately success. The learning community supports the overriding goal of enhancing STEM education for people of all ages. Meets NWO Goals: 3 & 5

FY 2016 Activity Information
The 2015-16 faculty learning community was led by Dr. Kate Dellenbusch of the Department of Physics and Astronomy. Participants explored the misconceptions BGSU students come to STEM classes with and how those misconceptions can be overcome. During the Fall semester the meetings focused on discussing the literature on misconceptions. Participants also identified the specific misconceptions held by BGSU students in their courses using formative assessments. This was used to form a repository of the common misconceptions held by college students in the STEM disciplines represented by the learning community members (e.g. astronomy, physics, biology, chemistry, etc.).

Continued on page 8
Participation in the COSMOS Research Learning Community shows a diverse group of faculty participants from 7 university departments and 3 corresponding colleges (Arts & Sciences, Health & Human Services and Technology, Architecture & Applied Engineering). The community consisted of 11 regular attendees and met regularly throughout the academic year.

**COSMOS Team**

**Brief Description**
The Center Of Excellence in Science and Mathematics Education: Opportunities for Success (COSMOS), the BGSU branch of NWO, hosts the COSMOS Team meeting for BGSU faculty and administrators to work with NWO staff to communicate, collaborate, and champion STEM initiatives at BGSU and throughout the northwest Ohio region. This enthusiastic and supportive group has been meeting as a formal group for over 10 years and is committed to advancing STEM education for people of all ages. **Meets NWO Goal: 3**

**FY 2016 Activity Information**
Participation in the COSMOS Team demonstrates a diverse group of faculty participants from 9 university departments and 3 corresponding colleges (Arts & Sciences, Education & Human Development, and Technology, Architecture & Applied Engineering). Additional representatives from the AIMS (Academic Investment in Mathematics and Science) and CURS (Center for Undergraduate Research and Scholarship) were also in attendance at each meeting. The team consisted of 20 total attendees and met once in Fall 2015 and once in Spring 2016.
NWO Faculty Participants

Brief Description
NWO has partners in colleges and universities all over northwest Ohio and southeast Michigan. These faculty assist NWO in many ways, including participating in and/or presenting at the following NWO events: (a) NWO STEM Education Inquiry Series, (b) NWO Symposium, (c) STEM in the Park, (d) OJSHS, (e) NWO Advisory Board, (f) COSMOS STEM Education Learning Community, (g) COSMOS Team, and (h) multiple NWO grant projects. 

Meets NWO Goals: 3 & 5

FY 2016 Activity Information
Advancing the Science Skills of Elementary Teachers and Students (ASSETS)

**Brief Description**
Project ASSETS: Advancing the Science Skills of Elementary Teachers and Students is a collaborative partnership among many northwest Ohio school districts, the School of Teaching and Learning and the School of Intervention Services at BGSU and the College of Natural Sciences and Mathematics at the University of Toledo. The goals of ASSETS are (1) Improve the academic achievement of students in partnering school districts; (2) Develop deep science teacher content knowledge by facilitating professional development that uses active learning experiences and incorporates research-based best practices consistent with local, state, and national standards; and (3) Expose participating teachers to effective inquiry and 6E models and strategies for reaching diverse learners to improve science teaching and assessment. Meets NWO Goals: 1, 3, 4, & 5

**FY 2016 Activity Information**
The cohort of 28 grades 3 – 5 teachers are participating in a three-phase program which will offer over 100 contact hours of high quality professional development. The first phase of the project was the Kick-Off in May 2016 and was devoted to team building, training on the 6E Instructional Model, and guidance through Ohio’s Learning Standards in Science. An introduction and overview of Phase Two was presented to each grade level by the respective Teaching Team.

*Continued on page 11*
Black Swamp Math Teachers’ Circle (BS – MTC)

Brief Description
Black Swamp Math Teachers’ Circle (BS – MTC) is a one-year Improving Teacher Quality grant from the Ohio Board of Regents. BS – MTC focuses on preparing K – 12 in-service teachers for the Common Core State Standards for Mathematics (CCSSM). This preparation includes about 100 hours of professional development throughout the grant period of January 2015 – May 2016. Through the program teachers learn about best practices in teaching mathematics including ways to promote the 8 Standards for Mathematical Practice expected by the CCSSM. A major focus of this grant project is deepening teachers’ mathematical problem solving power. Teachers work to solve rich mathematical tasks that start with mathematical ideas around grade 4 and grow to levels of complexity that professional mathematicians would work on. By reflecting on and explicating the problem solving techniques used in these mathematical tasks teachers deepen their own abilities and gain insight into pedagogical spaces for their students to do the same. Teachers then go on to explore and practice these BS – MTC techniques with their own students, and share their findings with others at state level conferences. Meets NWO Goals: 1, 3, 4, & 5

FY 2016 Activity Information
A total of 18 mathematics teachers from schools around northwest Ohio participated in the 2015-2016 Black Swamp – Math Teachers’ Circle. Teachers in the program begin their work with the project in April 2015 for an evening kick-off which was followed by a 5 day intensive training in July 2015. The summer training ran from 8:00 AM – 8:00 PM Monday – Friday and teachers were provided a hotel room in Findlay, OH during the workshop. The academic year follow-up to the summer training took place over 7 evenings between August 2015 – April 2016. The academic year events were open to the public in addition to the grant participants. See NWO Inquiry Series for details on the attendance at the academic year events.

NWO Role in BS – MTC
• Financial management of the grant budget
• Grant project management assistance
Brief Description

C²AM²P Middle Grades is a Math Science Partnership project funded by the Ohio Department of Education. C²AM²P serves grades 6-8 mathematics teachers from around northwest ohio. This grant is a partnership between K-12 school districts and Bowling Green State University’s Colleges of Education and Human Development and Arts and Sciences as well as the Northwest Ohio Center for Excellence in STEM Education. Teachers will become familiar with the content and practices embedded in the new mathematics standards and develop instructional strategies that promote problem solving through rich tasks, technology, and research-based practices such as teaching through problem solving. The project will run from August 2014 through August 2016. See Appendix A for examples recognition. Meets NWO Goals: 1, 3, 4, & 5

FY 2016 Activity Information

C²AM²P Middle Grades served 26 grades 6-8 mathematics teachers from Findlay, Hardin-Houston, Jackson Center, Lima, McComb, and Vanlue Schools during it’s second year of programming from August 2015 – June 2016. Teachers met with the instructional team nine times during the 2015 – 16 academic year and conducted two lesson studies (one in the Fall of 2015 at Jackson Center and Hardin-Houston Schools and one in the Spring of 2016 at Findlay City Schools). The teachers concluded their year two work with an eight-day summer institute in June 2016 where they worked on writing a series of lessons for use by their entire grade level team. Year three of the grant has been officially funded and will begin in August 2016 with work concluding in June 2017.

NWO Role in C²AM²P Middle Grades

• Financial management of the grant budget
• Grant project management assistance
Common Core for Mathematical Proficiency in Elementary and Middle Schools
((CO)$^2$MP Elementary and 6-8)

**Brief Description**

((CO)$^2$MP is a Math Science Partnership project funded by the Ohio Department of Education. ((CO)$^2$MP is a collaboration between several northwest Ohio schools and Bowling Green State University’s Colleges’ of Education & Human Development and Arts & Sciences as well as the Northwest Ohio Center for Excellence in STEM Education. Through this partnership K-5 and 6-8 teachers from school districts in the Sandusky area will take part in professional development focused on the greatest areas of their students’ mathematical content and mathematical proficiency needs. The project will run from August 2014 through August 2016. **Meets NWO Goals: 1, 3, 4, & 5**

**FY 2016 Activity Information**

Through this partnership 30 elementary and 16 middle school teachers from five school districts in the Sandusky area (Margaretta, Perkins, Sandusky Central Catholic, and Sandusky City Schools) took part in professional development focused on the greatest areas of their students’ mathematical content and mathematical proficiency needs. Teachers met with the instructional team eight times during the 2015 – 16 academic year and conducted two lesson studies (one in the fall of 2015 and one in the spring of 2016). The teachers concluded their year two work with an eight-day summer institute in June 2016. Year three of the grant has been officially funded and will begin in August 2016 with work concluding in June 2017.

**NWO Role in ((CO)$^2$MP**

- Financial management of the grant budget
- Grant project management assistance
Inquiry and Engagement to Invigorate and Optimize Learning for Everyone (iEvolve) with STEM

**Brief Description**

The iEvolve with STEM project is funded by the National Science Foundation: Math and Science Partnership Program. This project is designed to transform teaching and learning in grades 3-8 of two moderate sized school districts by fully integrating the practice of science research throughout the curriculum, with the goal of substantially improving student achievement of Ohio science standards. The project also aims to improve undergraduate science instruction by increasing science and mathematics research faculty engagement with K-12 education. Building on past experience in prior NSF-funded work, this will increase awareness and appreciation of best practices in teaching among higher education faculty and will foster a greater commitment to improving the STEM pipeline as well as the effectiveness of undergraduate learning.

Based on nearly a decade of highly successful collaboration in STEM education research and reform and the experience gained from more than $20 million of externally funded STEM initiatives, the key innovations in this project are: 1) students mastering rigorous state and national science standards by practicing science in national citizen-science research projects led by professional scientists and fully integrated into classroom learning; 2) participation of teachers and administrators for an extended 3-year period in a rigorous program of professional development as members of Professional Learning Communities; 3) teachers and students learning to lead through dissemination of their findings to their peers, to their communities, and to their profession; 4) implementation of best practices for differentiating instruction to maximize learning for all students.

The primary research questions focus on some of the most salient issues that STEM educators currently face: how student engagement and motivation relate to achievement of rigorous learning outcomes. NWO will examine how participation in citizen-science research affects these variables across the grades 3-8 range. NWO is working with nationally renowned Horizon Research, Inc. for evaluation of project outcomes.

Two cohorts of approximately 50 teachers will evolve through an intense 3-year professional development program involving more than 400 hours in direct contact, additional project activities, and research with their students, collaborating with more than 20 professional scientists in 5 different disciplines to accomplish sustained, transformational change in 3th-8th grade science instruction. The instructional innovations practiced by iEvolve teachers are expected to improve learning for more than 6,000 students in grades 3-8 during the 5 years of this project, and through the sustained transformation of these districts, tens of thousands of additional students will be affected. This impact is expected to increase as the influence of iEvolve teachers and students is spread throughout the region through their dissemination of their achievements.

This project is implementing strategies that have been previously found effective for increasing the engagement and success of all students, especially in high-needs schools like those involved in this project. A central theme of iEvolve will be differentiating instruction within all contexts so that every student participates, every student learns, and every student succeeds, as each one becomes a practicing scientist-learner. iEvolve teachers will use action research with the support of Professional Learning Communities to promote continuous improvement of their teaching. They will also learn how to disseminate their action research findings and their students’ findings in their science research projects to their peers, their local communities, and their professions. Through
this dissemination they will influence the region, shifting the culture towards a greater level of engagement and interest in science discovery and innovation in education. Improving the quality and effectiveness of science education for all students will benefit our society due to higher economic productivity and better participation of citizens in democratic decision-making involving complex STEM issues. The project is led by NWO at BGSU with Dr. W. Robert Midden acting as the Principal Investigator. Project partners include Bowling Green State University, Erie Soil and Water Conservation District, Lourdes University, Toledo Area Metroparks, NWO, The Ohio State University: Stone Lab, Perkins Local Schools, Sandusky City Schools, The University of Toledo, and the Toledo Zoo. Meets NWO Goals: 1, 2, 3, 4, & 5

FY 2016 Activity Information
The first cohort of 54 teachers in grades 3-5 completed their third formal year of the project, continuing the implementation of inquiry science and Citizen Science Research projects. Citizen Science Research included studies of pollinators for 3rd grade, rain garden soil infiltration and FrogWatch USA for 4th grade, and water quality monitoring of local streams and the Sandusky Bay for 5th grade. The focus for this final formal year for this cohort, however, was action research and dissemination of research. To accomplish this, teachers attended their third summer institute, which included work with renowned inquiry science educator and author, Page Keeley, who led sessions on research-based formative assessment and action research. Teachers also continued to attend monthly professional development sessions and worked in grade level professional learning teams. Citizen Science Research partners, who continued to provide support for teachers and students, included The Toledo Zoo, Erie Soil and Water Conservation District, BGSU’s Herpetology and Marine Labs, as well as The Ohio State University Stone Lab.

Some notable dissemination efforts of the elementary cohort’s teachers and students include the installation of a pollinator garden at a community hospice memorial site, an Earth Day booth highlighting the importance of protecting amphibians, and a presentation at a local grocery store to build awareness of how our food is impacted by the health of pollinators. Additionally, two Student Research Symposia were held—one each for partner school districts with more than 1200 students giving presentations about the science research they had conducted during the year.

The second cohort for grades 6 – 8 teachers also formally began this year, with their focus on new inquiry science materials and cross-curricular connections to science content themes. 43 teachers across all content areas participated in their first summer institute, monthly professional development sessions and professional learning team work. Master teachers from three other districts for middle school science were instrumental in inquiry training, both during the first summer institute and evening school year sessions.

Also during this year, middle school Citizen Science Research projects were developed for implementation in the following school year. Many of these projects focus on more targeted studies of water quality and aquatic life, as well as for vernal pools and soil—all utilizing NASA’s GLOBE program for data entry and analysis for 6th and 7th grades. Research for 8th grade will focus on the genetics of pollinators and native plants. Some partners are the same as for cohort 1, with the Toledo Zoo, Erie Soil and Water Conservation District and The Ohio State University Stone Lab continuing. A new partner, the Metro Parks of the Toledo Area, has also begun their work in the project. All partners are involved in the second summer institute, training teachers in how to lead students in their respective Citizen Science Research projects.

Continued on page 16
Both cohorts’ Curriculum Design Teams met throughout the year, with representative teachers from all grade levels and content areas. The elementary team worked to finalize cross-curricular connections and create formative assessments for all learning targets for science content, designed to balance all levels of cognitive demand required by state learning standards. The middle school team began to align the new science curriculum with state learning standards and create cross-curricular connections. They also helped to refine Citizen Science Research projects.

Although not originally planned, because of district interest and requests for additional on-going support, some activities will be continued on a limited basis, at least for the coming school year for cohort 1. These include 3 evening professional development sessions, additional Curriculum Design Team work, helping to implement new teacher orientation modules, and assisting with other sustainability measures. See Appendix C for examples of recognition.

### iTraining

**Brief Description**

NWO has implemented classroom technology professional development training sessions for teachers in the districts of Putnam County, Ohio since 2013. This year we reached out to Van Wert City schools as well. This program was funded by the Martha Holden Jennings Foundation and NWO. **Meets NWO Goals: 1 & 4**

**FY 2016 Activity Information**

The iTraining III program provided two training sessions to teachers in the Van Wert City schools during the fall of 2015. These trainings were geared toward implementing Google Education software tools in the Project Based Learning classroom.

Three sessions with similar content were provided to teachers in the school districts of Putnam County. A total of 124 teachers participated in this program. The components of these trainings included practical applications of effective digital classroom management, and building and advancing teachers’ level of knowledge on how to effectively engage their students with appropriate Google Education software applications in the digital classroom. Monthly session surveys and a pre and post survey were conducted to assess program success. See Appendix D for examples of the teacher recruitment for this program.
Ohio Junior Science and Humanities Symposium (Ohio JSHS)

**Brief Description**

OJSHS brings some of the best and brightest students from Ohio middle and high schools together for a competition to highlight and judge the quality of their research projects in the sciences and humanities. This event is an excellent opportunity for the recruitment of the next generation of scientists, mathematicians, engineers, and teachers. OJSHS is co-sponsored by NWO and a grant from the Academy of Applied Science. Paper and poster presentations by these students demonstrate a level of achievement that would rival some of the very best junior and senior undergraduate students with some even approaching what is expected of beginning graduate students. Past Ohio winners have gone on to win the top award at the National competition, demonstrating the extraordinary talent and achievement of these students. **Meets NWO Goal: 2**

**FY 2016 Activity Information**

Bowling Green State University hosted the 3-day event for the eighth year in a row from March 16 – 18, 2016. This year marked the 53rd Anniversary of the OJSHS program. Dr. Gabriel Matney, a Bowling Green State University faculty member in the School of Teaching and Learning gave the keynote address. There were 24 paper presentations and 83 poster presentations. Graham Lane from University School was the 1st place winner for paper presentations with his project titled “Pannexin-1 in EG7 Murine Thymoma Acts as a Functional Channel During Apoptosis”. Graham along with 3 other OJSHS winners traveled to the National JSHS in Dayton, Ohio in April 2016. A complete program and other information about the 2016 OJSHS can be found at www.ojshs.org. Below is a breakdown of attendance data for the 2016 Symposium. The 2016 OJSHS Evaluation Report offers a more thorough account of the implementation and impact of the event, and can be found at [www.nwocenter.org/reports](http://www.nwocenter.org/reports). See Appendix I for examples of the Ohio JSHS recruitment materials and recognition.

<table>
<thead>
<tr>
<th>Participant Group</th>
<th>Total Attendance for 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School and Middle School Students</td>
<td>115</td>
</tr>
<tr>
<td>K-12 Educators</td>
<td>13</td>
</tr>
<tr>
<td>Higher Ed Faculty (Poster &amp; Paper Judges)</td>
<td>41</td>
</tr>
<tr>
<td>Staff and Volunteers</td>
<td>12</td>
</tr>
<tr>
<td>Parents and Guests</td>
<td>30</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>211</strong></td>
</tr>
</tbody>
</table>
Falcon BEST Robotics

Brief Description
The Falcon BEST Hub at Bowling Green State University is a proud participant in BEST (Boosting Engineering, Science and Technology) Inc. - a national organization that inspires middle and high school students to consider careers in science, technology, engineering, and mathematics (STEM) through participation in a sports-like, science- and engineering-based robotics competition.

However, BEST is more than just a robotics competition; it offers several opportunities for many students to be involved in different parts of the competition. The competition consists of an engineering notebook, robotics competition, spirit competition, marketing presentation, and display presentation with awards given for each of these aspects of the event. All of these pieces are combined to get the score for the overall “BEST” award. Because awards are given for these other aspects of the competition, students with a diverse array of skills are rewarded for their participation and thus a broader array of students benefit than from some other types of

Continued on page 19
robotics competitions. Students who participate in BEST: (1) understand the practical use of math concepts and applied physics, (2) solve real-world science and engineering problems, (3) gain training that is transferable to all academic disciplines and career pursuits, (4) increase their interest in science, technology, engineering, and mathematics (STEM), (5) learn what engineers “do”, and (6) experience “design-to-market” product development.

The Falcon BEST Hub is a partnership between BGSU’s College of Technology, Architecture and Applied Engineering and the Northwest Ohio Center for Excellence in STEM Education. The Hub was created in 2013 and the first competition was held that fall. The top teams from the Falcon BEST Hub join teams from several other states at the Northern Plains Regional Competition each year. This is the highest level of advancement for BEST as a national competition does not exist. Each year a new Hub around the nation designs the competition for that year and each new year brings a completely new robotics task for the participating students. Meets NWO Goals: 2 & 4

**FY 2016 Activity Information**

The third Falcon BEST Robotics Competition was held in the fall of 2015 and started with 16 teams. The six-week competition called “PayDirt” started on September 12 with the Kick-Off for teams. At this event they received their robotics materials and got their first look at the robotics game. Teams had the next four weeks to work on their robot and other aspects of the BEST competition before participating in Mall/Practice Day on October 10. Mall/Practice Day allowed the teams to test out their robots on the game field and learn what others were doing and share ideas. The Falcon BEST Game Day took place in the Stroh Center on October 24. One team was not able to complete their robot before Game Day and as a result only 15 teams competed. The first place “BEST Award” and the first place “Robotics Game Award” were earned by the team from Hamilton Southeastern High School. The top teams performed well at the Northern Plains Regional BEST in Fargo, ND December 3rd – 5th with the Millstream Career Center winning 4th place in the regional robotics competition. Three other Falcon BEST teams won awards at regionals and altogether this was the best showing at regionals for the Falcon BEST hub in our three year’s of participation. A full list of winners and more information about Falcon BEST and BEST robotics is available at: [http://www.bgsu.edu/technology-architecture-and-applied-engineering/falcon-best-robotics-competition/events/2013-events.html](http://www.bgsu.edu/technology-architecture-and-applied-engineering/falcon-best-robotics-competition/events/2013-events.html). See Appendix B for an example of recruitment materials.
Math Camp

Brief Description

Math Camp is an energetic and active day of teamwork, problem solving, and development of skills for K-12 students. Students engage in fun filled experiences about mathematics, the connections between mathematics and the real world, and mathematicians all in a camp atmosphere where there is song, dance, and silliness. Each math camp is specifically designed by the preservice teachers of the Bowling Green Council of Teachers of Mathematics (BGCTM) at BGSU with oversight from BGSU’s mathematics education faculty. The camps are aligned with the Common Core and New Ohio Learning Standards for Mathematics. The BGCTM preservice teachers work with each schools liaison to identify specific areas of mathematical need for the students in order to design a worthwhile and focused camp experience. Camps are conducted for one grade level at a time to ensure that the mathematics tasks are targeted to the specific needs of the students attending the camp.

Research has shown that students who attend BGCTM Math Camp’s demonstrate statistically significant improvement in their mathematical self-efficacy, are more comfortable with mathematics, and become more flexible in their problem solving strategies. Meets NWO Goals: 1, 2, 3, 4 & 5

FY 2016 Activity Information

The 2015 Collegiate Training Camp took place at McComb High School September 11 – 12 with around 78 college students in attendance. Four K – 12 camps were held during the 2016 spring semester; Napoleon Schools on February 6, McComb Schools on February 27 and two camps at Imagine Clay Avenue School on March 19. The four K – 12 camps were each organized and enacted by teams of college students who were trained at the fall training camp. See Appendix E for an examples of recognition.

NWO Role in Math Camp

- Financial management of the camp funds
- Assistance purchasing materials for camps
- Advertising assistance
**STEM in the Park™**

**Brief Description**

STEM in the Park is a free NWO event for all northwest Ohio families and the entire community to stimulate public interest and encourage learning in science, technology, engineering, and mathematics (STEM). Held on the campus of Bowling Green State University, the event features four hours of engaging hands-on STEM activities from over 50 area businesses, schools, and organizations along with take-home STEM activity cards for parents and children to continue STEM exploration at home. By increasing awareness in STEM facilities, programs and activities in the area, STEM in the Park is an opportunity for businesses, universities, K-12 schools, and non-profit organizations to showcase innovation, educational opportunities, careers, and to promote positive attitudes toward STEM teaching and learning. **Meets NWO Goal: 2**

**FY 2016 Activity Information**

The Sixth Annual STEM in the Park event was held on September 26, 2015 and showcased 144 hands-on activities from 101 unique activity station providers from many NWO community and business partners and university departments. Once again a free hot lunch was provided for all participants and catered by Tony Packo’s. Presenting Sponsors for the event were BGSU, BP, Emerson Climate Technologies, First Solar, Lubrizol Foundation, and Verizon with community support from Hanson Digital Agency, John Deere, NWO, Perrysburg Rotary, Spectra Group, Thayer Family Dealership, and Wal-Mart and general support from Bowling Green Community Foundation, Cooper Tire, Dura Magnetics, K12, Kroger, and SSOE. In-kind donations were provided by Biggby Coffee, Bostdorff’s Greenhouse, Carolina Biological, Costco, Hampton Inn, Kroger, and Tony Packo’s.

The event was held at the Perry Field House for the fifth consecutive year. The attendance was the largest to date, with a total of 4,373 attendees/exhibitors/staff/volunteers. The event attracted families from 104 different cities and towns (in 35 different counties) in Ohio and Michigan. A complete list of exhibitors as well as a video and pictures of the event is available at [www.STEMinthepark.org](http://www.STEMinthepark.org). The evaluation report can be found at [www.nwocenter.org/reports](http://www.nwocenter.org/reports). See Appendix J for examples of the advertising.

**Women in STEM**

**Brief Description**

Women in STEM is an outreach and engagement program that exposes sixth through eighth grade girls from the region to STEM education and professions. The program goal is two-fold as it (1) aims to connect high impact and fun-filled STEM-based activities to the real world while (2) inspiring students to pursue higher education and careers in STEM fields.

The annual Women in STEM program is held on BGSU’s main campus to give students the experience of the college setting. Scores of dedicated BGSU students and staff members volunteer to escort students around campus and share their collegiate experiences. The schedule of events begins with a welcome and interactive keynote address followed by over 40 hands-on breakout sessions provided by dynamic and devoted STEM professional role models. Additional information can be found on the NWO website at [http://www.bgsu.edu/nwo/programs/women-in-stem.html](http://www.bgsu.edu/nwo/programs/women-in-stem.html). **Meets NWO Goal: 2**

Continued on page 22
FY 2016 Activity Information

The 2015 Women in STEM program was held on the Bowling Green State University main campus on November 6th. The program attracted 352 sixth through eighth grade young women from the northwest Ohio area. A program fee of $20 was charged for all student attendees and $15 for school chaperones; which is a reduction in both charges from previous years and made possible due to the support of BP and John Deere. The keynote presentation by MIT Engineer and producer/host of FOX’s Xploration Outer Space, Emily Calandrelli, was sponsored by Texas Instruments.

Students remained in their school groups (a change from previous years where girls were randomly assigned to mixed school groups) and each group engaged in multiple program activities including the opening remarks, an engaging keynote presentation, and two hands-on fun-filled STEM-based workshops. The schedule for the day is below.

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:40 AM – 9:00 AM</td>
<td>Check-in and Welcome by BGSU President, Dr. Mary Ellen Mazey</td>
</tr>
<tr>
<td>9:00 AM – 10:00 AM</td>
<td>Keynote Address by Emily Calandrelli</td>
</tr>
<tr>
<td>10:10 AM – 11:05 AM</td>
<td>Session 1</td>
</tr>
<tr>
<td>11:15 AM – 12:10 PM</td>
<td>Lunch (students split)</td>
</tr>
<tr>
<td>12:20 PM – 1:15 PM</td>
<td>Lunch (students split)</td>
</tr>
<tr>
<td>1:25 PM – 2:15 PM</td>
<td>Closing Remarks, Admissions Raffle, Imagination Station Presentation</td>
</tr>
</tbody>
</table>

Many dedicated BGSU staff members and students volunteered their time and shared their experiences in STEM education and employment with the middle school girls throughout the day. Over 54 STEM professional role models from BGSU faculty, students and the surrounding community facilitated the hands-on workshops.

Below is a breakdown of the sessions offered by content area and the overall attendance (487). Many sessions were offered more than once during the day. The evaluation report can be found at [www.nwocenter.org/reports](http://www.nwocenter.org/reports). See Appendix K for examples of advertising.
You Be The Chemist Challenge

**Brief Description**
The You be the Chemist (YBTC) Challenge is a fun and innovative academic competition that engages 5th – 8th grade students in learning about important chemistry concepts, discoveries and chemical safety. Challenge competitions are exciting events that take place across the country, encouraging the collaboration of community organizations, schools and the chemical industry, as together they educate students about the benefits and value of the study of chemistry. Ohio schools take part in local challenges within their school districts, and winners attend a state competition held in northwest Ohio to qualify for the YBTC National Challenge. **Meets NWO Goal: 2**

**FY 2016 Activity Information**
This year’s statewide competition took place at Bowsher High School in Toledo on April 9th. 39 students from all over Ohio came together to try and earn the top prize of representing Ohio at the National YBTC in June. This year’s winner was Tom Schlomi from Palmer Holland who went on to place second at the National competition! Along with 2nd place, Tom earned a $5,000 educational scholarship, a TI-84 Plus Calculator, a U.S. National Park Annual Pass, and a chemistry set.

All participants at the state competition earned certificates and trophies were awarded to the top three students. The Local and State Challenges were sponsored by NWO, The University of Toledo’s American Chemical Society, Toledo Public Schools, PVS Nolwood Chemicals, Inc., and Imagination Station.

**NWO Role in YBTC**
- Funding for student awards and certificates of participation
- Advertisement/recruitment via Constant Contact to 8,000+ regional K –16 contacts
- Announcement in NWO e-newsletter
Academic Investment in Mathematics and Science (AIMS)

**Brief Description**
The Purpose of the Academic Investment in Math and Science (AIMS) Program is to increase the number of women and students of color who graduate from BGSU with majors in Science, Technology, Engineering & Mathematics (STEM), and who proceed to get terminal degrees in their fields then ultimately perform cutting-edge research and/or teaching.

All AIMS Scholars have a unique array of resources to help them strengthen their academic skills and to increase their likelihood for academic success in college, by developing professional leadership skills required for advancement in mathematics and the sciences. The AIMS Program requires study leading to a bachelor’s degree in STEM related fields or teacher education with majors in these areas. The AIMS program has two scholarship packages with distinct requirements. The AIMS Standard scholarship is traditionally awarded to women and students of color with STEM majors. The AIMS BOSEF scholarship targets Ohio residents majoring in the following programs: chemistry, physics, biology, geology, environmental science, applied mathematics, engineering technology and those students with career goals related to renewable and sustainable energy. More information about AIMS can be found at [www.bgsu.edu/aims.html](http://www.bgsu.edu/aims.html). Meets NWO Goals: 1, 2, & 3

*Continued on page 25*
**NWO Role in AIMS**

- Oversight and management of the project including financial management of the budget
- NWO Director also serves as the AIMS Director
- Assist in the management of scholarship awards and renewals
- Assist with student advising
- Assist with academic mentoring and support

**Collaborative Research: AGEP-T: Northern Ohio AGEP Alliance (NOA-AGEP)**

**Brief Description**

With support from the National Science Foundation, the Northern Ohio Alliance for Graduate Education and the Professoriate (NOA-AGEP) was created to increase the number of underrepresented minority students completing science, technology, engineering, and mathematics (STEM) doctoral degrees and to prepare them for entry into the professoriate. NOA-AGEP is a collaborative effort among seven universities in Northern Ohio. The fall 2016 NOA-AGEP Scholar cohort will serve as a model for ongoing research to improve underrepresented minority student participation, preparation and success in STEM graduate education, an approach that, hopefully, can be exported nationally. Each year, NOA-AGEP Scholars receive a stipend enhancement, travel allowance to attend a research conference, and opportunities to participate in professional development activities/community building events (e.g. academic coaching, mentoring circles, NOA-AGEP research symposia).

**NWO Role in NOA – AGEP**

- Develop marketing materials for BGSU doctoral programs that could qualify for NOA-AGEP
- Develop and manage BGSU’s NOA-AGEP website and email account
- Plan a Summer Bridge event for all NOA-AGEP scholars and mentors
- Oversight and management of the project including financial management of the budgets

**Building Ohio’s Sustainable Energy Future (BOSEF)**

**Brief Description**

BOSEF is a scholarship project funded by the Choose Ohio First program of the state of Ohio. BOSEF increases the recruitment, training, and graduation of STEM students to supply the growing job markets in renewable energy and sustainable environment technologies. Northwest Ohio has a growing reputation for research, development, and manufacturing in the high technology, renewable energy fields of photovoltaics (PV) and wind. In addition, northwest Ohio has major research and development strengths in environmental analysis and remediation technologies. The University of Toledo (UT), and Bowling Green State University (BGSU), work together to leverage the enormous public interest and burgeoning job markets in these fields to recruit, educate, and retain the best and brightest of Ohio’s students to support these rapidly developing high tech professions. Student success is enhanced through a summer bridge program focused on mathematics, undergraduate research experiences for all, and integration with the Wright Center for PV Innovation and Commercialization, the Lake Erie Research Center,

Continued on page 26
Center of Photochemical Sciences, and the Environmental Remediation and Restoration Experimental Park. It prepares students for scientific and technical careers by providing internships with business, industry, agencies, and non-profits in renewable energy and environmental sustainability fields. Although the primary program focus is on the undergraduate STEM pipeline, it also includes masters and PhD students. The participating institutions have a comprehensive and vertically integrated approach to STEM education that maximizes student success and provides skilled professionals in these crucial STEM areas. *Meets NWO Goals: 2 & 3*

**NWO Role in BOSEF**
- Oversight and management of the grant project including financial management of the grant budget
- Direct recruitment of students through AIMS and the chemistry and physics departments at recruiting events
- Advertisement/recruitment to ~ 4,300 regional K-12 contacts
- Advertisement/recruitment at NWO Inquiry Series
- Management of scholarship awards and renewals
- Career development
- Student advising
- Academic mentoring and support

---

**Granting Access to Mathematics and Science (GRAMS)**

**Brief Description**

GRAMS (Granting Access to Mathematics & Science) is a scholarship up to $10,000 per student each year for up to four years program supported by two 5-year grants totaling $1,200,000 from the National Science Foundation. In this project, Bowling Green State University collaborates with two regional community colleges, Owens and Terra, to increase the number of highly qualified and capable students who are able to complete degrees in STEM majors by providing approximately 20-30 need-based scholarships up to $10,000 per student each year for up to four years and a proven support program to foster student success. Student persistence and success was fostered with two major projects: (a) BGSU’s NSF-funded STEP grant project Science, Engineering, and Technology Gateway Ohio (SETGO) which ended in 2013 and (b) the BGSU Academic Investment in Mathematics and Science (AIMS). These programs include a 4-week summer bridge for entering students, to prepare them for the rigors of college science and math courses; a tiered system of mentoring by peers and faculty; learning communities with monthly events that draw students and faculty together by merging academics and social networking; and summer research opportunities. These strategies have been proven in BGSU’s AIMS program to increase student persistence and success, particularly of under-represented minority students majoring in science and math disciplines and are based on research that has identified the factors that most account for student attrition from these disciplines. *Meets NWO Goals: 2 & 3*
GRAMS (Granting Access to Math and Science continued from page 26)

**NWO Role in GRAMS**
- Oversight and management of the grant project including financial management of the grant budget
- Direct recruitment of students through AIMS and the chemistry and physics departments at recruiting events
- Advertisement/recruitment to ~ 4,300 regional K-12 contacts
- Advertisement/recruitment at NWO Inquiry Series
- Management of scholarship awards and renewals
- Career development
- Student advising
- Academic mentoring and support

Science and Math Education in ACTION (ACTION)

**Brief Description**
BGSU received $3,000,000 in funding from the Ohio Board of Regents through the Choose Ohio First program to recruit and train undergraduates to become Ohio mathematics and science teachers. ACTION focuses on the use of innovative strategies for preparing highly effective science and mathematics teachers for grades 5-12. Students involved in the project participate in: (a) a 4-week summer bridge program preceding the first regular semester of college; (b) a collaborative science or mathematics research team that addresses a real community problem or concern; (c) a co-op or internship work experience in a regional science or mathematics related business or industry in their second year; (d) early teaching experiences in a regional school; and (e) the creation of a capstone project that involves applying research techniques to determining the best teaching practices that advance the students’ learning. **Meets NWO Goal: 1, 2, & 3**

**NWO Role in ACTION**
- Assistance with the undergraduate research component of the project
- Assistance and advice for project activities and logistics
Identifying the Best Strategy to Reduce Phosphorus Loads to Lake Erie from Agricultural Watersheds Survey of Local Sources of Nutrients in the Upper Portage River Watershed (Sea Grant)

**Brief Description**
BGSU is working with Heidelberg University on this project with the goal of identifying the best strategy to reduce phosphorus loading to Lake Erie. In an effort to accomplish this, BGSU will sample subwatersheds of the Portage River using automated sampling equipment and sensors to collect empirical water quality and quantity data. The samples will be analyzed for all standard nutrient analyses, including soluble reactive phosphorus (P), total P, nitrate, total nitrogen, and ammonia. Sampling results will be evaluated to identify potential sources of high levels of nutrients.

Continued on page 29
NWO Role in Grant Project
- Reviewed geography of Portage River Watershed and determined that sampling should start upstream of the main branch of the Portage River.
- Identified initial sites (three in the North Branch, two in the Middle Branch and one in the South Branch) close to the start of the main branch to start monitoring and obtained permission from landowners to use sites. Data from each branch will be analyzed for significant differences and used to plan future sampling.
- Collected samples at each site following a rain of 0.5 inches or more and analyzed for nutrient levels.

Mitigation of Agricultural Nutrient Loss by Novel Manure Treatment (OWDA)

Brief Description
Through an Ohio Water Development Authority (OWDA) Research and Development (R&D) Grant, Bowling Green State University is collaborating with the United States Geological Survey (USGS) on a research project to develop and field test dairy manure dewatering treatment processes. BGSU is testing different dewatering dairy manure treatments for their abilities to slowly release nutrients; these laboratory studies are ongoing. The treatments typically involve a combination of coagulants and polymers. To test these treatments in a pilot field setting, BGSU assembled a team of collaborators that included The Ohio State University Agricultural Research and Development Center (OARDC) Northwest Agricultural Research Station (NWARS) in Wood County and the City of Ottawa, Ohio. The OARDC-NWARS offered the use of pilot test plots for application of the treated dairy manure and the City of Ottawa offered the use of their wastewater treatment plant for treating the dairy manure.

The project is funded in two phases, both done at the NWARS site—phase 1 is to test and install equipment and establish baseline conditions; phase 2 is to test two treatments, analyze samples for nutrients, and compute nutrient loads in surface and tile samples. An additional R&D proposal was submitted to OWDA in June 2015 and funds were secured for phase 2. Phase 1 was conducted in FY2015 and is continuing into early FY2016.

NWO Role in Grant Project
- Conduct lab-scale experiments to develop manure treatment protocol.
- Evaluate treated manure as a slow-release fertilizer.
- Collect and analyze runoff water samples from test plots during significant rain events.
- Evaluate the flow profile of test plots to understand similarities and differences in plots.
FY 2016 NWO Budget

TOTAL INCOME FOR FY 2016 $2,835,349.38

Continued on page 31
The table below shows funding provided by Bowling Green State University for FY 2016.

<table>
<thead>
<tr>
<th>Agency: Program</th>
<th>Award Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bowling Green State University Fiscal Support for NWO</td>
<td>$186,369.01</td>
</tr>
</tbody>
</table>

The table below shows funding sources that supported FY 2016 NWO Activities.

<table>
<thead>
<tr>
<th>Agency: Program</th>
<th>Description</th>
<th>Award Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academy of Applied Science</td>
<td>Ohio Junior Science &amp; Humanities Symposium</td>
<td>$20,000.00</td>
</tr>
<tr>
<td>Martha Holden Jennings Foundation</td>
<td>iTraining</td>
<td>$16,100.00</td>
</tr>
<tr>
<td>National Science Foundation</td>
<td>Collaborative Research: AGEP-T: Northern Ohio AGEP Alliance (NOA-AGEP) (Year 1 of 3)</td>
<td>$110,367.00</td>
</tr>
<tr>
<td>National Science Foundation</td>
<td>iEvolve: Inquiry and Engagement to Invigorate and Optimize Learning for Everyone (Year 4 of 5)</td>
<td>$1,553,408.00</td>
</tr>
<tr>
<td>National Science Foundation</td>
<td>GRAMS II: Granting Access to Mathematics and Science II (No Cost Extension of 6 year grant)</td>
<td>$0.00 Additional Funding; $291,704.81 Spent in FY 16</td>
</tr>
<tr>
<td>Ohio Department of Higher Education</td>
<td>Advancing the Science Skills of Elementary Teachers and Students (ASSETS)</td>
<td>$92,041.00</td>
</tr>
<tr>
<td>Ohio Department of Higher Education</td>
<td>Black Swamp – Math Teacher’ Circle (BS-MTC)</td>
<td>$46,597.00</td>
</tr>
<tr>
<td>Ohio Department of Higher Education</td>
<td>BOSEF: Building Ohio’s Sustainable Energy Future</td>
<td>$95,780.00</td>
</tr>
<tr>
<td>Ohio Department of Higher Education</td>
<td>Identifying the Best Strategy to Reduce Phosphorus Loads to Lake Erie from Agricultural Watersheds Survey of Local Sources of Nutrients in the Upper Portage River Watershed (Year 1 of 2)</td>
<td>$51,239.00</td>
</tr>
<tr>
<td>Ohio Department of Higher Education</td>
<td>Survey of Local Sources of Nutrients in the Upper Portage River Watershed (Year 1 of 2)</td>
<td>$53,223.00</td>
</tr>
<tr>
<td>Ohio Department of Education</td>
<td>Common Core for Mathematical Proficiency in Elementary and Middle Schools ((CO)MP Elementary and 6 – 8) (Year 2)</td>
<td>$349,422.00</td>
</tr>
<tr>
<td>Ohio Department of Education</td>
<td>Common Core for Achievement &amp; Middle Grades Mathematical Proficiency (C^2AMP Middle Grades) (Year 2)</td>
<td>$226,434.00</td>
</tr>
<tr>
<td>Ohio Water Development Authority</td>
<td>Mitigation of Agricultural Nutrient Loss by Novel Manure Treatment #1 (Year 1 of 2)</td>
<td>$291,801.00</td>
</tr>
<tr>
<td>Ohio Water Development Authority</td>
<td>Mitigation of Agricultural Nutrient Loss by Novel Manure Treatment #2 (Year 1 of 2)</td>
<td>$277,796.00</td>
</tr>
<tr>
<td>OSLN/Battelle Foundation</td>
<td>Battelle Hub Grant</td>
<td>$25,000.00</td>
</tr>
</tbody>
</table>
We wish to thank the following for their support of NWO activities during FY 16!

BGSU Foundation Inc.
Appendices

A: Faculty and Student Recognition
B: Falcon Best Recruitment Email
C: iEvolve with STEM Recognition
D: iTraining Advertising
E: Math Camp Recognition
F: NWO STEM E-Newsletters
G: NWO STEM Inquiry Series Advertising
H: NWO Symposium Advertising & Recognition
I: OJSHS Advertising & Recognition
J: STEM in the Park Advertising
K: Women in STEM Advertising
L: You Be The Chemist Challenge Recruitment Email
Appendix A: Faculty and Student Recognition

Bob Midden meets with AIMS students, who are among the target population for the new minority graduate student recruitment effort.

BGSU PARTNERS TO BUILD DIVERSITY IN FACULTY RANKS FROM GRADUATE LEVEL UP

As the national need for professionals and higher education faculty in the science, technology, engineering and mathematics (STEM) disciplines has grown, the number of minority students going into those disciplines has remained disappointingly low, leaving much rich potential untapped.

“We consider it a value to change that,” said Dr. Bob Midden, director of BGSU’s Academic Investment in Math and Science (AIMS) program and the Northwest Ohio Center of Excellence in STEM Education (NWO/COSMOS).

To help prepare more graduate students to step into these important roles, the University is partnering with seven other public and private northern Ohio universities to recruit, support and mentor talented students through graduate school and ultimately into the ranks of faculty.

The new graduate student effort is sponsored by the National Science Foundation (NSF) as part of its Alliances for Graduate Education and the Professoriate (AGEP) programs. BGSU will receive $200,000 over three and a half years to support student recruitment, mentorship, professional development and research activities. Case Western University is the lead institution on the grant.
Appendix A: Faculty and Student Recognition cont.

BOWLING GREEN STATE UNIVERSITY

BGSU. NEWS

FACULTY SENATE PRESENTS COMMUNITY INVOLVEMENT AWARD TO EMILIO DURAN

Bowling Green State University / News / 2016 / April / Faculty Senate presents Community Involvement Award to Emilio Duran

Dr. Emilio Duran, associate professor in the School of Teaching and Learning at Bowling Green State University, received the Community Involvement Award at the Faculty Excellence Awards Ceremony and Reception April 14.

This award, presented by the Faculty Senate, recognizes a faculty member for outstanding contributions to the community or to other local, state, national or international communities and includes a $1,000 prize.

Dr. W. Robert Midden, who nominated Duran for this award, wrote that Duran’s “extensive contributions to numerous community partnerships and initiatives have markedly raised the profile and increased the visibility of BGSU in our locale and throughout the region.”

One of Duran’s most notable contributions has been the development of STEM in the Park, which has become a signature community engagement event. The purpose of this event is to increase awareness, interest and knowledge in STEM and STEM careers by providing engaging and meaningful opportunities for people of all ages, especially children and underrepresented communities, to explore the many aspects and applications of STEM in their lives. STEM in the Park started in 2010 and last year included more than 4,300 participants in more than 140 activities. Duran has recruited sponsors and support from 35 corporate, non-profit and educational partners for this event.

“STEM in the Park is a premier example of a program that enhances the relationship between BGSU and our community,” Dr. Tim Murnen, director, School of Teaching and Learning, wrote in his nomination of Duran. “The feedback from the community about this program is simply phenomenal and undoubtedly conveys a positive message about BGSU and its commitment to the community we serve. We appreciate the work Dr. Duran continues to do regarding community involvement.”

Another highlight of Duran’s community involvement includes coordinating the Annual Symposium on STEM Teaching, which brings together as many as 600 educators and administrators from throughout the region to exchange best practices and new knowledge about how to most effectively promote our students’ success.

Duran’s other contributions to the community include serving as lead faculty member for the Ohio Junior Science and Humanities Symposium and contributing to Women in STEM, the NWO Inquiry Series and Literacy in the Park. He also serves in numerous community organizations and groups, including as a member of the Toledo School for the Arts STEAM Lab Advisory Panel; as a guest scientist at Ottawa Hills Elementary School and the Montessori School of Bowling Greens; as a member of the Ottawa Hills Elementary Science EXPO, Elementary School Day and Strategic planning committees; and as a guest presenter or teacher at various elementary and middle schools.

Outside of education, Duran has served as a grant consultant for the Toledo Football Academy and as a member of the Board of Directors, Executive Committee, Scholarship Committee, Honors Day Committee, Art Exchange Committee and Youth Development Committee of the Association of the Two Toledos.
Appendix A: Faculty and Student Recognition cont.
Appendix B: Falcon Best Recruitment Email

Registration for the FalconBEST 2015 PAYDIRT Robotics Competition is open!

FalconBEST is a robotics competition and much, much more! This year's game is PAYDIRT, which will be revealed at the September Kick-off event. Dates and registration instructions are below!

Follow the instructions below to register. If registration is full, please put your school on the wait list.

Registration Instructions
1. Go to http://www.bestinc.org/
2. Click the “Get Involved” link
3. Select “Register as a team”
4. This year you must register for all three events:
   a. Select 2015 FalconBEST Kickoff Day
   b. Select 2015 FalconBEST Practice Day
   c. Select 2015 FalconBEST Game Day
5. Follow the instructions to register.
6. If registration is full, please add your school to the wait list. If a team drops, we will go to the next team on the wait list.

Schedule of Events
Teacher Workshop - Mon., August 10, 2015. Miete Alumni Center
Kickoff - Sat., Sept. 12, 2015 Olsom Hall Room 101
Practice Day - Sat., Oct. 10, 2015 Woodland Mall, Bowling Green
Game Day - Sat., Oct. 24, 2015, Stroh Center, BGSU

For more information visit the website at: http://bit.ly/Falconbest
Appendix C: iEvolve with STEM Recognition

In response to their research, the pollinator gardens were created by the students in their schools. Students in the participating schools created gardens to help the local ecosystem and to educate the community about the importance of pollinators.

The gardens were designed and built by the students, and they were open to the public. The garden featured local plants that are native to the area, which provided a habitat for local pollinators. The gardens were also used as a teaching tool, with students explaining the importance of pollinators and how they contribute to the ecosystem.

The gardens were part of a larger initiative to promote STEM education and to encourage students to become involved in scientific research. The students were able to learn about the importance of pollinators and how they contribute to the ecosystem, while also learning about the scientific process and how to conduct research.

Overall, the gardens were a great success, and they helped to raise awareness about the importance of pollinators and the need for conservation efforts. The students were able to learn about science and to develop their skills in a hands-on way, which helped to inspire their interest in STEM fields.
Appendix D: iTraining Advertising

Van Wert City Schools

Program Overview

NWO and Bowling Green State University, in conjunction with Van Wert City Schools, Ohio, proudly announce the funding of iTrainingIII, a series of professional development training sessions for teachers of Van Wert City Schools, Ohio.

A three-session training for grades 4-12 teachers will take place. Class size is limited to 35 teachers. This project will provide 35 teachers with thorough professional development designed to train teachers in effective and engaging Google Education software tools for the PBL classroom.

- implementing and using Google tools;
- managing PBL classrooms;
- effective online communication between students and teachers.

Fall session for grades 4-12 teachers: Wednesday November 18, and Wednesday December 9, 2015, from 4:30-7:30 pm at Van Wert High School, 10708 OH-118, Van Wert, OH 45891. Please note: a follow-up session will be added in March, date TBD.

*Must attend all three sessions, registration is FREE
Snacks and beverages will be provided
**Please note this class is not for beginners
Please register at www.nwocenter.org/iTraining

Putnam County Schools

Program Overview

NWO and Bowling Green State University, in conjunction with Putnam County Schools, proudly announce the funding of iTrainingIII, a series of professional development training sessions for teachers.

A three-session training will take place in the Spring of 2016. Class size is limited to 35 teachers. This project will provide 35 teachers with six hours of thorough professional development designed to train teachers in effective and engaging Google Education software tools for the classroom.

- implementing and using Google tools;
- effective online communication between students and teachers.

Sessions will take place on Wednesdays January 20, February 17, & March 16 at Putnam County ESC, 124 Putnam Parkway, Ottawa OH 45875. Please contact Susan Stearns at stearns@bgsu.edu for more information.

*Must attend all three sessions, registration is FREE
Snacks and beverages will be provided
**Please note this class is not for beginners
Please register at www.nwocenter.org/iTraining
CULTURE AND LEARNING COURSE EXPLORES MATH EDUCATION

BGSU students gain invaluable teaching experience in Thailand

Math Camp Facebook Post

Check out this video from Napoleon Elem. School of our Bowling Green State University preservice teachers at Math Camp (https://www.youtube.com/watch?v=TQyB-WmynyWY&feature=youtu.be). Interested in setting up a Math Camp at your school? Contact gmatney@bgsu.edu or visit the website.

Math Camp

Math Camp is an energetic and active day of team work, problem solving, and development of skills. Students engage in fun filled experiences about teamwork, problem solving, mathematics, and the connections between mathematics and...
Appendix F: NWO STEM E-Newsletters

STEM Opportunities

Join us for STEM in the Park!
Saturday, September 30, 2017, 10:00 – 1:00pm
at the Fair Park, Big Tex Pavilion

- Free food for all!
- Free STEM hands-on activities
- Free STEM games
- Free STEM workshops
- Free STEM rentals
- Free STEM vehicles

Save the date and share with your friends!

STEM in the Park is a free event for families that includes activities and demonstrations that are related to STEM. This event is a great way to introduce children to STEM careers and to show how STEM is used in everyday life.

Verizon INNOVATION APP CHALLENGE

The Verizon Innovation App Challenge is a competition for high school students to design and develop an app that addresses a problem in their community. The deadline for submissions is October 31, 2017. More information can be found at https://www.verizon.com/innovationappchallenge/

New Rcrets

- MWM
- STEM E-Newsletters

Announcing the 2015 NWO Symposium on STEM Teaching

The NWO Symposium on STEM Teaching is an annual event that brings together educators from across the country to discuss and share best practices for teaching STEM. This year’s symposium will be held on October 22-24, 2017, in Chicago, Illinois. More information can be found at https://www.nwo.org/symposium/

INFOhio

INFOhio is a pre-service online course for STEM teachers that covers the latest research and best practices in STEM education. The course is available for free at https://inf ohio.org/

Integrating STEM Activities into the Elementary School Curriculum

This article will provide ideas for integrating STEM activities into the elementary school curriculum. It will cover topics such as project-based learning, STEAM (Science, Technology, Engineering, Arts, and Mathematics) activities, and hands-on experiments. The article will also provide tips for creating a safe and engaging learning environment for students.

AYEP

AYEP is an after-school program that provides STEM education to middle school students. The program is free and open to all students who are interested in learning about STEM. More information can be found at https://www.ayep.org/

YMS

YMS is a non-profit organization that provides STEM education to students in underserved communities. The organization offers a variety of programs, including after-school clubs, summer camps, and professional development for teachers. More information can be found at https://www.ymsci.org/
Appendix G: NWO STEM Inquiry Series Advertising

Key Professional Development Learning Targets:

- Learn how to effectively use all of these tools and build a repertoire of strategies that are not only promote learning, but also change the culture of your classroom.

- Execute the learning plan (which is a learning plan for the entire series) from the teaching and learning perspectives, and then use the learning plan to help students understand the concepts.

- Do you need strategies to improve your students’ understanding and teaching? If so, we will share a few strategies that we have implemented.

- If so, you will want to be a part of this Science Mini-Series!

Dated and Times: A two day workshop: 8:30 am - 3:30 pm (14 hours total).

Thursday, January 28 & Friday, January 29, 2016

Topics Covered:

- Science Inquiry (Observational/Inference/Dealing Experimentation)
- Life Science (Cellular Life, Energy Flow, Ecosystems)
- Physical Science (Points & Motion, Electrical Circuits)
- Earth/Space Science (Earth’s Resources)

Registration Fee and Space Limitations:

- $25 (participant) $225 (participant for teens or 2 or more districts)
- Light breakfast, lunch, beverages, and snacks provided
- Each participant receives a science activity book and hands-on science classroom materials valued at $55.

- Space is limited to 30 participants.

Register today to guarantee your spot in the training!

Location:
The STF Foundation - Main House
577 East Front St.
Pennsylvania, OH 43860

Facilitators:

Jodi Haney: Jodi Haney is a Professor Emeritus from Bowling Green State University where she holds a joint appointment in the departments of Teaching and Learning and Environmental Sustainability. She is now an educational consultant and owner of NWO Learning. Jodi’s journey is education based as a middle and high school science teacher in the public schools where she served for nearly two decades. Jodi believes that teaching is the essence of her identity and she is passionate about her role to inspire the love of learning through active, engaged, and authentic experiences within the classroom and the local community. Her favorite hobbies include spending time with her family and all things outdoors (biking, gardening, hiking, and traveling in warm places).

Jodi Pollock: Jodi has been employed at BGSU for 15 years, and is currently working with NWO. The Northwest Ohio Center for Excellence in STEM (NWO) is a UNO of NWO. Jodi holds a Bachelor’s degree in Elementary Education from the University of Toledo. Her graduate degree in elementary educational teaching and curriculum led her back to BGSU (where she received her undergraduate degree) to be involved in a multi million dollar National Science Foundation grant. JOSTEPs. Through JOSTEPs she served as a Science Support Teacher and Curriculum Specialist for local school districts and gained much experience in facilitating teacher professional development events and writing and managing professional development grant projects. Her work at BGSU/JOSTEPs now focuses on educational outreach and developing partnerships with other departments on campus, local businesses, informal education institutes and other local higher education institutions for the shared interest in promoting STEM education to educators and the community. She is also a liaison between NWO and the Ohio Department of Education through her Network Regional Leader role to stay current in educational policy and reform. Jodi’s favorite role however is being a mom to three science-loving children (10th grade, 8th, and 5th).

Registration Information:

- $250 (participant) $225 (participant for teens or 2 or more districts)
- The registration fee must be received in full 5 business days before the first meeting date.
- Check with your district to see if you can use Title I or Part A funds. Title II funds or School Improvement Funds to pay for the training.

Payment Information:

If you have any questions, please contact Jodi Haney (haney@bgsu.edu) or 419-353-6860.

Registration Fee Includes:

- Light breakfast, lunch, beverages, and snacks each morning.
- Contact Hour Certificate for the 14 hour series.
- $250 (participant) learning experiences and hands-on science classroom materials. All participants will receive “Science For Everyone Science Lessons” an award-winning program designed with science lessons that combine science and reading in a natural way and provide easy-to-read background in physical science, life science, and Earth and space sciences. The classroom-tested lessons are aligned with both national and state science standards.

Click here to REGISTRATION TODAY for the Supercharged Science Mini-Series.

For more information contact Jodi Haney (haney@bgsu.edu).
Black Swamp 
Math Teachers’ Circle 
( BS - MTC)

We are very happy to be bringing Math Teachers’ Circles to Northwest Ohio!

Math Teachers’ Circles started in 2006 and have since spread across the United States. Math Teachers’ Circles bring together teachers and mathematicians to enrich the teachers’ experience of mathematical problem solving. There are four goals:

1. Increase the confidence of math teachers in problem solving.
2. Deepen teachers’ content knowledge through exploring mathematically rich problems and develop an arsenal of techniques to solving unfamiliar and challenging problems.
3. Build long-term professional relationships among teachers and mathematicians, through regular, highly interactive meetings.
4. Provide support for teachers who want to bring richer mathematical experiences to their students.

We would love to have you be part of this great adventure in mathematics. The fall sessions are FREE and open to K - 12 math teachers in northwest Ohio. Space is limited so register today to secure your spot.

Participants will receive:

1. Great professional development.
2. Networking with mathematicians, higher education faculty, and other classroom teachers.

The final BS-MTC meeting for Fall 2015 will be on November 17, 2015 from 6:30 - 8:30 PM (snacks provided).

All meetings will be held at:
Powell Elementary
902 North Main Street
North Baltimore, OH

https://goo.gl/forms/nv4OjZz6N72Uwcc7gR
NWO Symposium

Northwest Ohio Symposium on Science, Technology, Engineering, and Mathematics Teaching

Saturday
November 21, 2015
8:30 am - 4:00 pm Olscamp Hall
Bowling Green State University

http://nwocenter.org/nwoSymposium

A STEM Education Professional Development Conference for preK-12 in-service and pre-service teachers, informal educators, and college faculty.

Featuring a keynote presentation by BGSU Professor of Teaching Excellence, Dr. Daniel Brahier! A passionate and dedicated educator for 27 years, Dr. Brahier continues to have a tremendous impact on mathematics education nationwide. He has written several books, including the top-selling textbook for middle and high school mathematics teacher preparation, and is the co-author of Principles to Action, an NCTM-published guidebook centered on mastering teaching practices with core principles for today’s educators.

Dr. Brahier has taught mathematics and science at many levels during his career. He currently teaches mathematics education courses at BGSU, and serves as the Director of Science and Math Education in ACTION, a program designed to train STEM teachers in current and effective teaching methods.

Pre-Registration Fee $35 (deadline Nov. 15); $45 on-site • $5 Undergraduate Students
Multiple Participant Discount ($30/person) for 5 or more participants from the same school

Registration Fee Includes:
• 7 hours of high quality professional development
• Keynote address by Dr. Daniel Brahier, BGSU Professor
• Conference bag
• Light breakfast & full lunch

Contact Hour Certificate Available

For more information or to register visit: http://nwocenter.org/nwoSymposium

Sponsored in part by
Appendix H: NWO Symposium Advertising cont.

Recruitment Email - Attendee

Featuring a keynote presentation by BGSU Professor of Teaching Excellence, Dr. Daniel Brahier!

A passionate and dedicated educator for 27 years, Dr. Brahier continues to have a tremendous impact on mathematics education nationwide. He has written several books, including the top-selling textbook for middle and high school mathematics teacher preparation, and is the co-author of Principles to Action, an NCTM-published guidebook centered on mastering teaching practices with core principles for today’s educators.

Dr. Brahier has taught mathematics and science at many levels during his career. He currently teaches mathematics education courses at BGSU, and serves as the Director of Science and Math Education in AGTION, a program designed to train STEM teachers in current and effective teaching methods.

For more information or to register visit:
http://nwocenter.org/nwoSymposium

Sponsored in part by
Appendix H: NWO Symposium Advertising cont.

Recruitment Email - Presenter

**Deadline: September 20, 2015**

The Northwest Ohio Center for Excellence in STEM Education

brings you the 2015 NWO Symposium on Science, Technology, Engineering, and Mathematics Teaching

Saturday, November 21, 2015
8:30 AM - 4:00 PM
Oscamp Hall, Bowling Green State University
Bowling Green, OH 43403

Featuring the 2015 keynote speaker:
Dr. Daniel Braze, BGUO Professor of Teaching Excellence

**Presentation Proposal Information**

Thank you for your interest in presenting at the 2015 NWO Symposium on Saturday, November 21st at Bowling Green State University. To submit a presentation proposal, please click the link below and complete the online form. Please review the Symposium Strands listed below, you will need to choose one of these strands for your presentation.

**Click Here To Apply by September 20**

All presentation proposals must be submitted by SEPTEMBER 20th at 5:00PM. Beginning September 21st, NWO staff will review the proposals and notify prospective presenters if their proposal has been accepted. Accepted presenters will be notified of their registration fee.

For more information visit the Symposium website at nwo@bgsu.edu

**2015 NWO Symposium Strands**

1. Inquiry in the College Classroom: Enhancing the Undergraduate Experience
   Inquiry-based teaching practices and active learning strategies are often difficult to implement in the high-enrollment courses that tend to make up much of the early undergraduate experience. These difficulties, however, are not insurmountable. Sessions in this strand will demonstrate how inquiry-based practices and active learning strategies can effectively be implemented in undergraduate STEM courses, especially those that are high-enrollment.

2. STEM in the Community: Thinking Outside the Classroom
   Making STEM relevant for students serves an instrumental purpose in improving motivation and learning. Showing students the applications of STEM outside the classroom is a great way to get them engaged. There are dozens of valuable community resources in North Ohio that can supplement and support your STEM teaching efforts. Sessions in this strand will demonstrate some of the community resources that are available, and how they can be integrated into the classroom.

3. Putting Creativity to Work: Teaching STEM with Innovation
   Creativity and innovation might easily be described as the drivers of educational growth and success. New and innovative approaches to STEM teaching and learning result in deeper and more meaningful STEM learning for students. Sessions in this strand will explore some innovative ways to teach STEM.

4. Integrating Technology in the Classroom
   Sessions in this strand will focus on how to use technology in STEM teaching focusing more on the technology being used than a specific content area.

5. Teaching and Learning In SCIENCE
   Sessions in this strand will focus on deepening science content and/or exploring interesting and effective ways to teach science.

6. Teaching and Learning In MATHEMATICS
   Sessions in this strand will focus on deepening mathematics content and/or exploring interesting and effective ways to teach mathematics.

7. Teaching and Learning In ENGINEERING
   Sessions in this strand will focus on deepening engineering content and/or exploring interesting and effective ways to teach engineering.
Appendix I: OJSHS Advertising & Recognition

Recruitment Email Sample

Registration is now OPEN!

Join us for the 53rd Ohio Junior Science and Humanities Symposium.

March 16-18, 2016
at Bowling Green State University

Student Presenter and Delegate Registration Deadline is Friday, Feb. 21, 2016
Ohio JSHS Student Presenters and Delegates - Click here to register.

Teacher Registration Deadline is Friday, Feb. 21, 2016
Ohio JSHS Teacher Chaperones/Advisors - Click here to register.

Parents and Guests Registration Deadline is Friday, Feb. 21, 2016
Ohio JSHS Parents and Guests - Click here to register.

More information on the 2016 Ohio JSHS can be found at:
http://cosmoe.bgsu.edu/nwo_ojshs/

Questions should be directed to NWO (nwo@bgsu.edu).
OJSHS Recognition

Ohio's young scholars meet for competition

Posted on March 30, 2016 in Events, Students, Teachers

Ohio's young scholars meet for competition.

"Water Quality in Aquaponic Systems," "Bacteriophage Proliferation Dynamics," "Acute Morphological Effects of Cosmetics- Derived Microplastics Exposure." These aren't articles from a science journal. They are papers by students presenting at the 13th Ohio Junior Science and Humanities Symposium.

The event gives Ohio middle and high school students the chance to show off the incredible science they can do, all before even graduating!

Keep reading to see what Ohio teachers and our staff saw at the event. Want to get involved? Contact Dr. Evinio Duran at Bowling Green State University.

And stay tuned for more photos and updates from the national competition in April, held in Dayton, Ohio.
Appendix I: OJSHS Advertising & Recognition cont.

OJSHS Recognition

Science Fair 2016: Meet the Next Generation of America's Innovators

APRIL 8, 2016 AT 9:00 AM ET BY AMANDA STONE

Summary: Meet the students who will be exhibiting their fascinating and innovative projects at the 2016 White House Science Fair.

This Wednesday the White House will transform for the day into a hands-on showcase of student innovation: robots, prototypes, tools to help us fight climate change and cancer - all researched, built, and designed by the next generation of America's scientists.

On April 13th, President Obama will host his sixth and final White House Science Fair, welcoming more than 100 top science, technology, engineering and math students from across the country to show us how they are going to change the future of America.

Find out more below about the students participating in this year's Science Fair, and share YOUR science projects on social media using #WHScienceFair.

Meet This Year's Exhibitors

This Team Is (Intentionally Not) On Fire!

Team FireArmor is one of the five winners of the 2015 Conrad Spirit of Innovation Challenge, an honor bestowed upon a team of high-school inventors and entrepreneurs. The competition challenges high-school students to use science, technology, engineering, and math (STEM) skills to develop commercially viable, technology-based products that address real-world challenges. FireArmor is an innovative protective apparel designed to protect firefighters or anyone who faces extreme temperatures. It was created by then Centreville, Virginia, and Gahanna, Ohio team members, Savannah Cofer, 18, Valerie Chen, 18, Matthew Sun, 17, and Varun Vallabhaneni, 17. Unlike any protective apparel on the market today, FireArmor is composed of an inorganic, endothermic fiber that absorbs heat from its environment and keeps the firefighter safe even at dangerously high temperatures.

Current firefighter turnout gear rapidly degrades above 300 degrees Celsius and provides less than six seconds of protection in flash fire conditions. In contrast, FireArmor keeps the firefighter safe even above 1000 degrees Celsius and provides up to five minutes of protection in flash fire conditions. The team was inspired to create FireArmor two years ago, when 19 Arizona firefighters were surrounded and killed during a flash fire. After the Arizona tragedy, the team started thinking about whether an endothermic chemical reaction like that used in instant ice packs could be used to offer a dramatic improvement in firefighter apparel. Team FireArmor is currently working on both a patent and a trademark.
Appendix J: STEM in the Park Advertising

Free Family Event

SAVE TIME... Pre-register online!
a at www.STEMinthepark.org

Saturday, Sept. 26, 2015
10 am – 2 pm at BGSU
Perry Field House

STEM in the Park is moving full STEAM ahead!
Science, Technology, Engineering and Mathematics meet up with the Arts! #GetYourSTEMon

STEM in the Park will feature interactive displays and activities created by area universities, community partners, and local businesses to engage children of all ages in science, technology, engineering, and mathematics.

Join us for a family day of hands-on fun at Bowling Green State University, featuring everything from giant bubbles to edible DNA. Families will receive take-home STEM activities and a free lunch. You won't want to miss it!

FREE Lunch catered by Tony Packo’s (while supplies last)

Visit the website for more info at www.SCIENTIFICOFSPORTS.org

Visit the website for more info at www.STEMinthepark.org
Appendix J: STEM in the Park Advertising cont.

Recruitment Email - Attendee

MEET US
AT THE PARK

For The 6th Annual
STEM in the Park

Saturday, September 26, 2015
10:00am-2:00pm

Hold at the Perry Field House
Bowling Green State University

FREE Lunch catered by Tony Packo's (while supplies last)

SAVE TIME... Pre-Register Online!

BGSU Campus Map

STEM in the Park is moving full STEAM ahead!

STEM in the Park will feature interactive displays and activities created by area universities, community partners, and local businesses to engage children of all ages in science, technology, engineering, and mathematics.

Join us for a family day of hands-on fun at Bowling Green State University, featuring everything from giant bubbles to edible DNA. Families will receive take-home STEM activities and a free lunch. You won't want to miss it!

NEW This Year!

The STEM Stages

Two STEM Stages featuring Super-Sized Demos from the Toledo Zoo and Imagination Station along with several performances by popular musical groups.

Rexie the T-Rex

Get up close and personal with a life-size dinosaur!

Rexie the T-Rex will be there live!

Back by Popular Demand in 2015!

The Science of Sports

Check out our new featured zone dedicated to the Science of Sports!

How fast can you run?
How high can you jump?
How far can you throw a ball?
Analyze your golf or tennis swing.

You can do all of that and more in this new and exciting addition to STEM in the Park!
Appendix J: STEM in the Park Advertising cont.

Roots 2 STEM
Pre-K-2 Zone

Featuring activities that cater specifically to younger children

HopeLine from Verizon

Donate your no-longer-used wireless phones, batteries and accessories in any condition from any service provider to benefit victims of domestic violence. HopeLine will have boxes at STEM in the Park for your donations.

Computer Equipment Recycling

Please bring your unwanted computer hardware equipment to recycle with ERG Environmental Services (i.e. laptop, keyboard, printer, mouse, tower)

PLEASE NO MONITORS

THANK YOU to the following organizations hosting Activity Stations this year!

For a complete list, please visit our website.

www.STEMinthepark.org

AIMS
American Chemical Society Toledo Local Section
Aviation Studies
BG Science Education Council
BSG - Many Colleges and Departments
BSGU Freiheits
BOF: Building Ohio's Sustainable Energy Future
BP
Biology Graduate Student Association
Bowling Green Council of Teachers of Mathematics (BGCTM)
Bowling Green Early Childhood Learning Center: My Neighborhood
Bowling Green Fire Division
Challenger Learning Center of Lake Erie West
Costco
Crazy Craig
E.S. Wagner
ECO Discover!
ERG Environmental Services
Fifth Street, Inc.
Girl Scouts
Horizon Science Academy of Toledo
Imagine Madison Avenue School of Arts
K-12 ORVA ISOH
Kumon math & reading of Sylvania
Lake Erie Adventure Play (LEAP)
Leaf No Child Inside NW Ohio
LiveIT
Lourdes University
Lubricon & Big Fun Lab
Maloney Middle with Perrysburg STEM
Maumee Valley Country Day School
Maumee Valley Historical Society
NUOET
Nature's Nursery
New York Life
Ohio Northern University Engineering Education
Owens Community College
PREF Initials
Rainbow Cooperative PreSchool
Rita the Balloon Lady
Robinson Elementary, Toledo Public Schools
ANNOUNCING STEM in the Park 2015

September 26, 2015
10am-2pm
Perry Field House
BGSU

We are excited to invite you/your organization to participate with NWO at our sixth annual STEM in the Park event! Last year’s event drew over 3,500 people! This is due to amazing exhibitors like YOU! This family day of exciting hands-on STEM activities is growing thanks to your participation!

Exhibitor provides:
- Hands-on activity plus materials for attendees to complete the activity
- The text for a STEM in the Park Take-Home Activity (see example, if desired)
- Take-Home brochures and marketing material featuring your company, department, college or campus organization (if desired)

Registration:
Please click here to complete registration form

Questions? Contact Jenna Pollock at NWO (jpolloc@bgsu.edu) or Dr. Emilio Duran (eduran@bgsu.edu), School of Teaching and Learning.

What is STEM in the Park?

STEM in the Park offers hands-on, family-friendly science, technology, and mathematics activities, displays and/or equipment at a number of stations arranged in an open, festival-like atmosphere. We invite you, your activity or interactive display to bring to the event. In 2014, over 3,500 people including some 1,500+ children attended STEM in the Park with their parents, teachers and neighbors. STEM in the Park is a high-energy, unique opportunity for businesses, universities, colleges, and non-profit organizations to increase awareness and showcase regional STEM offerings and innovation across northwest Ohio. We anticipate close to 4,000 people will be involved in the 2015 event.

Information regarding the previous years’ STEM in the Park events can be found at www.STEMinthePark.org

If this email was forwarded to you and you would like to be placed on our contact list for updates about this particular event, please email Jenna Pollock at jpolloc@bgsu.edu. We will see that you receive future communications regarding STEM in the Park 2015.
Appendix K: Women in STEM Advertising

Recruitment Email - Attendee

Schedule:

8:15 - 8:45 AM  Schools Check-In
8:45 - 9:00 AM  Welcome
9:00 - 10:00 AM Opening Keynote Presentation
10:10 - 11:05 AM Session 1
11:15 - 12:10 PM Session 2/Lunch A
12:20 - 1:15 PM  Session 3/Lunch B
1:25 - 2:00 PM  Closing Keynote Presentation
2:00 - 2:30 PM  Closing Activities/Adjournment and Departure

Fee: (includes lunch)
- Students - $20
- Adults - $15

Notes:
- Groups need to arrive by 8:15 am.
- Each school is limited to 20 students.
- Each group of students must be accompanied by a teacher or parent throughout the day (one adult per 10 students).
- Adults and chaperones need to register and attend all sessions with students.
- Campus maps, parking permits, and additional information will be sent to the registered adults from each school.

Please note: There may be reptiles, including snakes at the hands-on activities.

Students attending this program will:
- Get first hand exposure to STEM education outside of the classroom.
- Have one-on-one interactions with Women in STEM role models from various STEM careers to include engineering, medicine, the sciences and healthcare.
- Engage in fun and exciting hands-on activities throughout the day that demonstrate how science, technology, engineering and mathematics is involved in everyday life experiences.
- Meet other regional students and learn from and with peers.
- Experience STEM programs in a college setting that fosters confidence in academic abilities while creating a greater vision of the STEM fields.
- Learn the facts about women’s roles in STEM fields and see how they can make a difference in the world through STEM education.

School Registration

Please click on the link below to register students.  
https://docs.google.com/forms/d/e/1FAIpQLSf7nflhByljkWhf3Da6DgJ9sRm902TC_en-6SYnN3HkKU/edit?usp=send_form

Registration deadline is October 16, 2015

Women in STEM
Empowering young women in science, technology, engineering, and mathematics. Fostering confidence and inspiration.

For 6th through 8th Grade Girls

NWO is excited to announce the 31st annual Women in STEM program at Bowling Green State University for 6th, 7th and 8th grade girls.

A full day of fun-filled and interactive learning experiences for young women led by area STEM professionals!

Your school is limited to 20 students, please register by October 16, 2015.

Women in STEM provides young women with a positive experience at BGSU and offers them a variety of engaging hands-on activities that allows them the opportunity to learn and interact with a wide variety of successful STEM role models. The format for the breakout sessions will be to provide hands-on, fun-filled, critical thinking/learning activities. The ultimate goal of this program is to help young women recognize the wide array of options available in STEM fields that inspire them to take classes in the STEM fields throughout their educational careers.
Appendix K: Women in STEM Advertising cont.

Recruitment Email - Presenter

We rely on the support of our presenters and volunteers like you in order to continue to provide this unique experience for this group of girls. We are thrilled to host the 31st annual Women in STEM program at BGSU and look forward to your participation!

Presenters:

- **Keynote**: The Opening Keynote presentation will be approximately one hour. The Closing Keynote presentation will be approximately 30 minutes. All presenters are welcome to attend the keynote presentations and are invited to attend lunch at the Oakes, a BGSU dining facility.

- **Breakout Sessions**: There will be groups of approximately 15-20 girls with adult supervision in each session. Students will attend two breakout sessions and lunch which will last approximately 55 minutes each. Sessions should include innovative and creative hands-on activities that are fun-filled and engaging. We would like to foster a collaborative growth mindset atmosphere in the breakout sessions that gives students opportunities to interact with one another and YOU as a STEM academic/career role model.

We provide classroom and/or lab space, AV equipment and support.

Please click the link below to apply to be a presenter.

[https://docs.google.com/forms/d/1fjV6dB9JH7w-kNvPSdAdzQOSuW93DFFg-TEHJJ03x5k/viewform](https://docs.google.com/forms/d/1fjV6dB9JH7w-kNvPSdAdzQOSuW93DFFg-TEHJJ03x5k/viewform)

Registration Deadline: October 10, 2015

You will be notified of your presentation acceptance to present by October 12, 2015.

Students attending this program will:

- Get first-hand exposure to STEM education outside of the classroom.
- Have one-on-one interactions with Women in STEM role models from various STEM careers to include engineering, medicine, the sciences, and healthcare.
- Engage in fun and exciting hands-on activities throughout the day that demonstrate how science, technology, engineering and mathematics is involved in everyday life experiences.
- Meet other regional students and learn from and with peers.
- Experience STEM programs in a college setting that fosters confidence and academic abilities while creating a greater vision of the STEM fields.
- Learn the facts about women’s roles in STEM fields and see how they can make a difference in the world through STEM education.
Appendix L: You Be The Chemist Challenge
Recruitment Email

You and your students are invited to participate in the You Be The Chemist Challenge®, an interactive academic contest that uses the drama of competition to excite grade 5-8 students about science. The Challenge tests students’ knowledge of chemistry concepts, their real-world applications, and other topics that are included in standard science curriculum, such as:

- the scientific method
- properties of matter
- chemical formulas & equations
- chemistry in the human body

Participating schools and students have an opportunity to receive national recognition, scholarships, and prizes. The Challenge Champion, one chaperone, and one educator from each state even receive an expenses-paid trip to the national competition in Philadelphia in June! There is no cost to participate, and participation requires a minimal time commitment from schools and educators. Study materials are provided free online to help students prepare for the competition. For a listing of school and student participation requirements and to download the study materials, visit www.chemed.org.

The Challenge was created by the Chemical Educational Foundation® (CEF), a national non-profit organization dedicated to enhancing science education for our youth. The 2014-2015 Challenge involved 34 states as well as the District of Columbia and Puerto Rico with nearly 40,000 students. We continue to grow the program each year and hope to get your school involved! Please let me know if you have questions or would like to register your school for the Challenge. For more information please visit www.chemed.org. REGISTRATION CLOSED February 15, 2016.

Please email Bob Mendenhall Curriculum Director at rmendenhall@bps.org or call (419) 671-8320 for more information.

Robert Mendenhall
Curriculum Director
(419) 671-8320
rmendenhall@bps.org

Bob Midden
NWO/COSMOS Director
(419) 372-0563
midden@bpsu.edu

This event is supported by