

# ANNUAL REPORT 2017

***Connections • Communication • Collaboration***

Fiscal Year 2017  
(July 1, 2016 - June 30, 2017)

# FY 2017 NWO Staff

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

## 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

## 4 ••• NWO Goals

## 5 ••• NWO Advisory Board

## 6 ••• 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)
- NWO Teacher Ambassador Board

## 10 ••• Faculty Professional Development and Collaborative Education Research

- COSMOS STEM Education Learning Community
- COSMOS Team
- NWO Faculty Participants

## 13 ••• Grant Projects

- Advancing the Science Skills of Elementary Teachers and Students (ASSETS I & II)
- Army Education Outreach Program (AEOP): Support for Ohio Junior Science & Humanities Symposium
- Common Core for Achievement & Middle Grades Mathematical Proficiency (C<sup>2</sup>AM<sup>2</sup>P Middle Grades)
- Common Core for Mathematical Proficiency in Elementary and Middle Schools ((CO)<sup>2</sup>MP Elementary and 6 – 8)
- Inquiry and Engagement to Invigorate and Optimize Learning for Everyone (iEvolve) with STEM
- Ohio Junior Science and Humanities Symposium (OJSHS)

## 20 ••• School and Community Activities and Outreach

- Falcon BEST Robotics
- Math Camp
- STEM in the Park
- Women in STEM
- You Be The Chemist Challenge

## 26 ••• Student Scholarship Programs and Grants

- Academic Investment in Mathematics and Science (AIMS)
- Collaborative Research: AGEP-T: Northern Ohio AGEP Alliance (NOA-AGEP)
- Choose Ohio First (COF)
- Building Ohio’s Sustainable Energy Future (BOSEF)
- Science and Math Education in ACTION

## 30 ••• 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)
- Ohio Lake Erie Commission: Evaluation of Runoff from Manure Treated Agriculture Plots
- Validity Evidence for Measurement in Mathematics Education (V-M2ED)

**33** ••• **FY 2017 NWO Budget**

**38** ••• **Appendices**

A: Faculty, Staff, and Student Recognition

B: Falcon Best Recruitment & Recognition

C: Math Camp Recognition

D: NWO STEM E-Newsletters Sample

E: NWO STEM Inquiry Series Advertising Samples

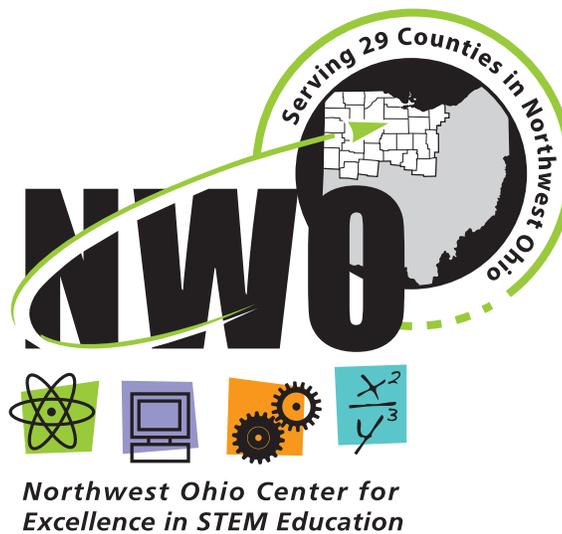
F: NWO Symposium Advertising & Recognition

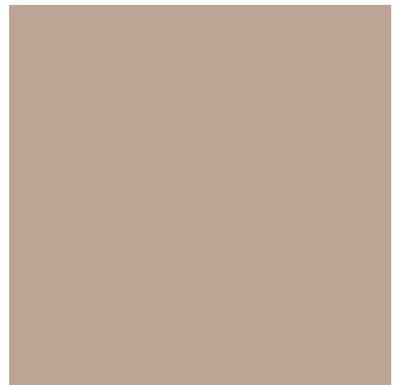
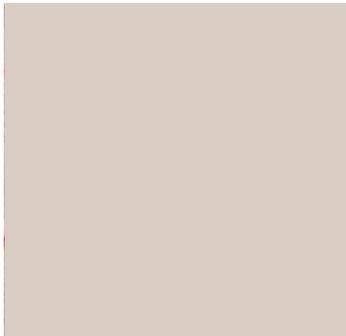
G: OJSHS Advertising & Recognition

H: Army Education Outreach Program (AEOP): Support for Ohio Junior Science & Humanities Symposium Recognition

I: STEM in the Park Advertising & Recognition

J: Women in STEM Advertising





# 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:

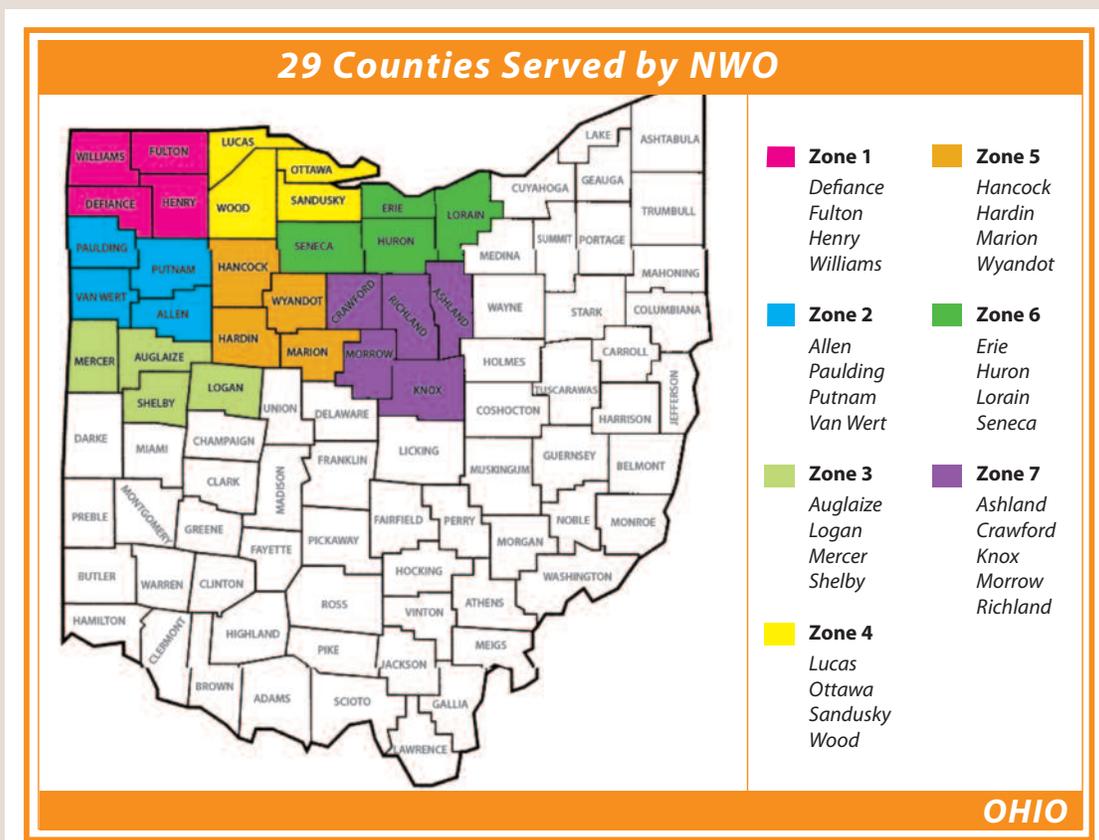
Conduct and communicate collaborative research in STEM and STEM education disciplines.

### 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.

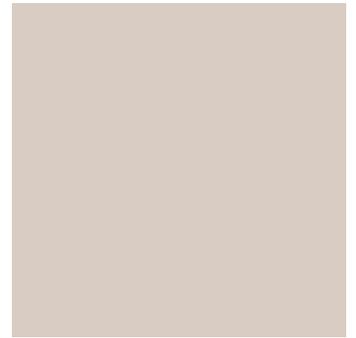
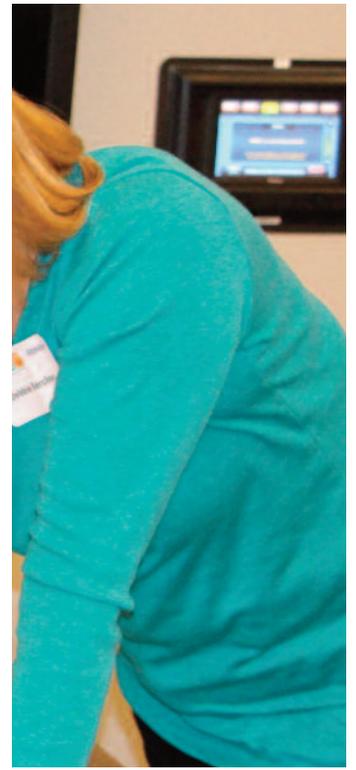
### Goal 5:

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 2017 NWO Advisory Board

<b>Melissa Basinger</b>	Putnam County ESC
<b>Eric Baumgartner</b>	Ohio Northern University
<b>Karl Borko</b>	Toledo Public Schools
<b>Jonathan Bostic</b>	Bowling Green State University
<b>Anne Bullerjahn</b>	Owens Community College
<b>Mary Caprella</b>	BP Refinery, LLC
<b>Emilio Duran</b>	Bowling Green State University
<b>Todd France</b>	Ohio Northern University
<b>Julie Gerke</b>	St. Henry Local Schools
<b>Anjali Gray</b>	Lourdes University
<b>Jim Gunner</b>	eSchoolView (Infinite Cohesion LTD.)
<b>Sonny Hamizadeh</b>	SSOE
<b>Beth Hench</b>	Ayersville Local Schools
<b>Gary Herman</b>	Putnam County ESC
<b>Stephanie Johnson</b>	Battelle
<b>Andy Jorgensen</b>	University of Toledo
<b>Mitchell Magdich</b>	Toledo Zoo
<b>Sloan Mann</b>	Imagination Station
<b>Gabriel Matney</b>	Bowling Green State University
<b>Sara Mattson</b>	WGTE
<b>Bob Mendenhall</b>	Toledo Public Schools
<b>Rod Moorman</b>	Mercer-Auglaize Business Education Alliance
<b>Jan Osborn</b>	Putnam County ESC
<b>Jed Osborn</b>	Ball Corporation
<b>Matt Paquette</b>	Lubrizol
<b>Kevin Parkins</b>	Cardinal Stritch Catholic High School
<b>Julie Payeff</b>	The Andersons
<b>Gwynne Rife</b>	University of Findlay
<b>Brad Rowe</b>	SSOE
<b>Eugene Sanders</b>	Sandusky City Schools
<b>Michelle Shafer</b>	Maumee City Schools
<b>Eric Sieja</b>	Cardinal Stritch Catholic High School
<b>Joel Steinmetz</b>	Lima City Schools
<b>Tom Stuckey</b>	Northwest State Community College
<b>Sybil Truster</b>	Shelby County ESC



# EDUCATOR PROFESSIONAL DEVELOPMENT AND OUTREACH

## “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 D for an example of an e-newsletter for FY 17. **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 2017 Activity Information***

In an effort to reduce the competition for recruiting STEM teachers in northwest Ohio, NWO once again partnered 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 5 times throughout the year for two hours each evening for math teachers of grades K – 16. The dates and attendance data for these meetings is listed on the next page.

The second partnership was with the NASA Glenn Research Center. On two evenings in October 2016 they offered the “Engineering Design Challenge: Let It Glide”. In February 2017 they offered “NASA’s Beginning Engineering, Science and Technology (BEST). The dates and attendance data for these meetings is listed on the next page. See Appendix E for examples of the advertisement materials for this program.

<b>Black Swamp – Math Teachers Circle (BS – MTC)</b>		
<b>Dates</b>	<b>Location</b>	<b>Attendance</b>
September 12, 2016	Bowling Green State University, Bowling Green, OH	23
October 11, 2016	Bowling Green State University, Bowling Green, OH	28
November 16, 2016	Bowling Green State University, Bowling Green, OH	17
January 23, 2017	Bowling Green State University, Bowling Green, OH	21
April 11, 2017	Bowling Green State University, Bowling Green, OH	25

<b>NASA Professional Development</b>		
<b>Dates</b>	<b>Presenters</b>	<b>Attendance</b>
October 10-11, 2016	Bowling Green State University, Bowling Green, OH	12
February 11, 2017	Bowling Green State University, Bowling Green, OH	35

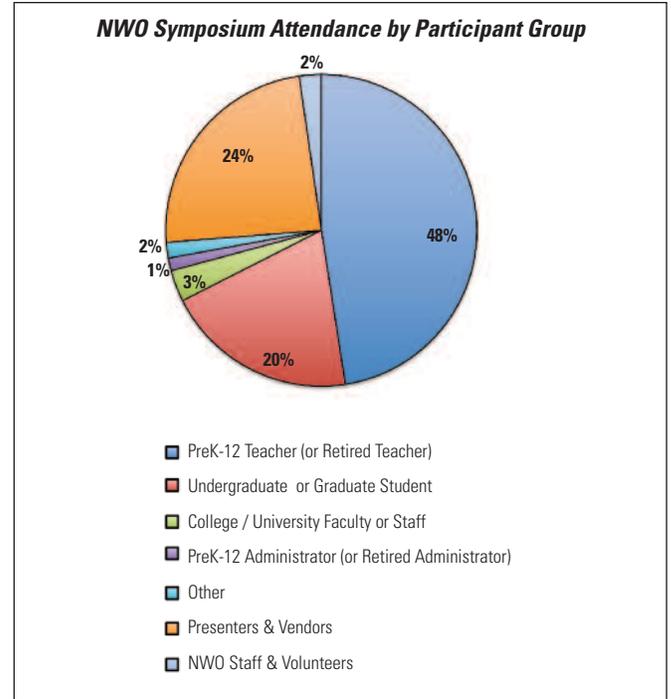
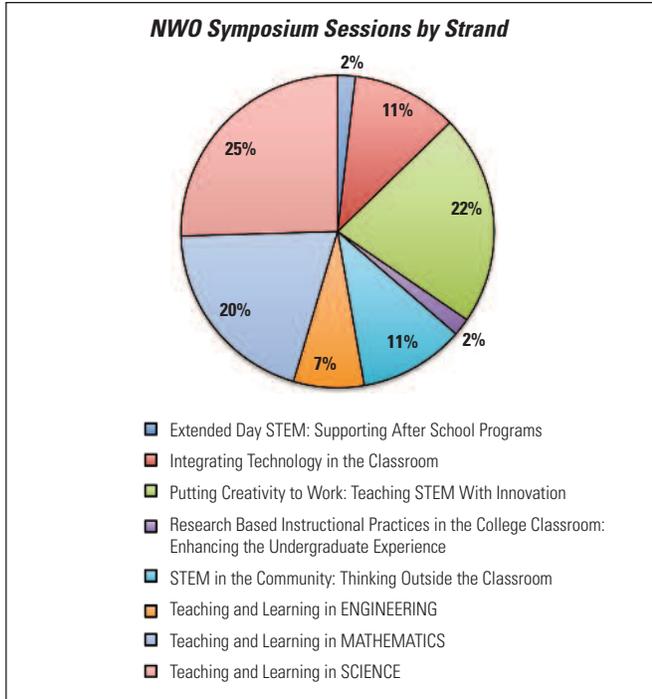
## **NWO Symposium on Science, Technology, Engineering, and Mathematics Teaching (NWO Symposium)**

### ***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 2017 Activity Information***

The 2016 NWO Symposium was held on the BGSU campus on Saturday, November 19. The Symposium began with a keynote address from BGSU Professor Emeritus, Dr. Jodi Haney titled: "STEM Assessment: When the whole is greater than the sum of its parts!" and continued with five one-hour blocks of eight different content strands. The 2016 Symposium also included one new strand titled "Extended Day STEM: Supporting After School Programs" and was a partnership between NWO and the Northwest Ohio Afterschool Alliance. 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. Session strands continued to help participants determine what sessions were ideal for their personal professional development. On the next page is a breakdown of the sessions offered by strand (55 total) and the overall attendance of 305. The evaluation report can be found at: [www.nwocenter.org/reports](http://www.nwocenter.org/reports). See Appendix F for examples of the advertisement materials for this program.



## NWO Teacher Ambassador Board

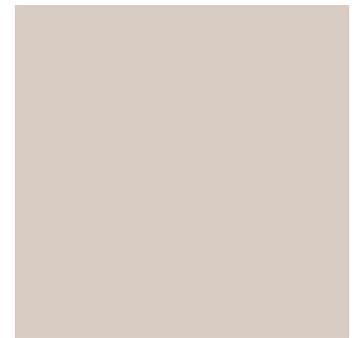
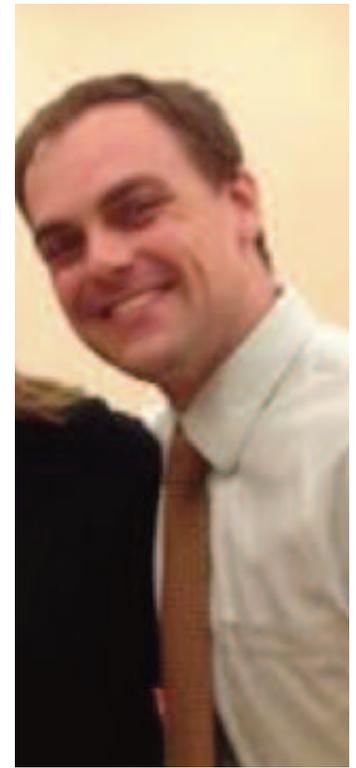
### **Brief Description**

In FY 2017 NWO assembled a Teacher Ambassador Board (TAB) and invited many area educators to participate in this unique opportunity. We selected educators who are proven leaders in NW Ohio and who have been involved in and contributed to our programs. The goal of the TAB is to stay connected with the needs of the educators that we serve in order to guide future NWO programming and to continue to provide high quality programs in STEM teaching and learning. **Meets NWO Goal: 1, 2, 3, 4, & 5**

### **FY 2017 Activity Information**

We held an initial meeting of the TAB on May 2, 2017 with the objective to gain members' feedback on desired topics/content for professional development sessions, emerging challenges and needs of K-12 teachers in STEM, and ideas for grant projects as well as seek input on timing of PD opportunities and STEM events. Attendees of the first ever TAB are listed below.

Name	School District(s) or Organization	Name	School District(s) or Organization
<b>Jodi Anderson</b>	Bowling Green City Schools	<b>Shannon Gladieux</b>	Toledo Public Schools
<b>Kadee Anstadt</b>	Perrysburg Schools	<b>Emily Haynes</b>	Maumee City Schools
<b>Nate Ash</b>	Perrysburg Schools	<b>Zeb Kellough</b>	Bowling Green City Schools
<b>Jennifer Baumgartner</b>	Columbus Grove Schools	<b>Stacey Kessler</b>	Washington Local Schools
<b>Kelisa Boden</b>	Perrysburg Schools	<b>Penny Kidd</b>	Maumee City Schools
<b>Amy Boros</b>	Perrysburg Schools	<b>Taryn Miley</b>	Springfield Local Schools
<b>Laura Davidson</b>	Perrysburg Schools	<b>Adam Millikan</b>	Miller City Schools
<b>Kristy DiSalle</b>	Springfield Local Schools	<b>Annie Nelson</b>	Wood Co. ESC
<b>Bryan Ellis</b>	Toledo Public Schools	<b>Steve Oswanski</b>	Toledo Public Schools



**FACULTY PROFESSIONAL  
DEVELOPMENT AND COLLABORATIVE  
EDUCATION RESEARCH**

## 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 2017 Activity Information***

This learning community was a continuation of the 'Understanding Student Motivation and Attitudes to Enhance Learning in STEM' community from last year. Motivations and attitudes about learning can influence student conceptual gains and course performance. Last year the group began examining the fixed mindset versus growth mindset model for learners. Are there differences in motivation between high and low growth mindset individuals? To begin examining this question, last year the group administered selected scales from the Motivated Strategies for Learning Questionnaire (MSLQ) and Growth Mindset Assessment instruments to students in our classes. This year the group continued to develop and test a path model relating academic achievement to factors such as growth mindset, motivation, and study strategies. They also tested the effectiveness of a brief intervention to enhance a growth mindset in our students. The instruments were administered at the beginning of each semester as well as after the intervention to examine changes in mindset. This research is being conducted with the goal that it will be suitable for publication.

The 2016-2017 research faculty learning community was led by Dr. Kate Dellenbusch of the Department of Physics and Astronomy and Dr. Matthew Partin of the Department of Biological Sciences. The community consisted of 12 regular attendees and met consistently throughout the academic year.

## COSMOS Team

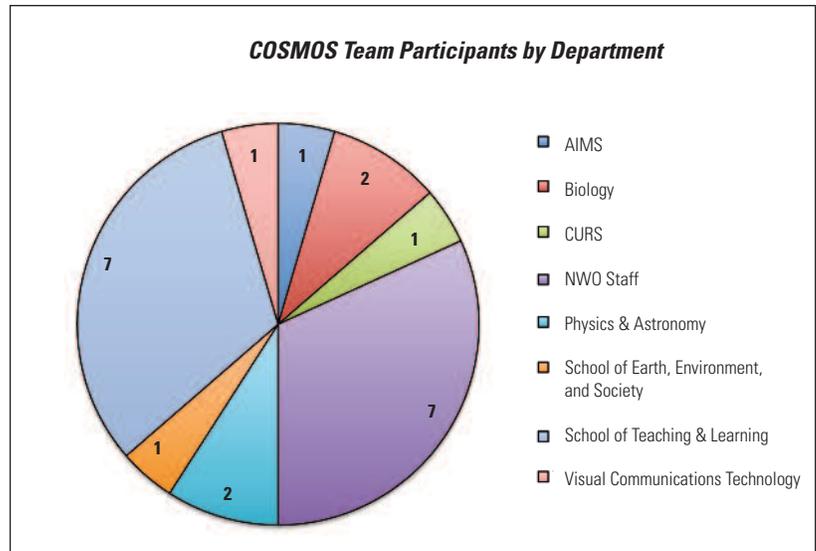
### ***Brief Description***

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 2017 Activity Information***

Participation in the COSMOS Team demonstrates a diverse group of faculty participants from 5 university academic 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) departments were also in attendance at each meeting. The team consisted of 22 total attendees and met once in Fall 2016 and once in Spring 2017.



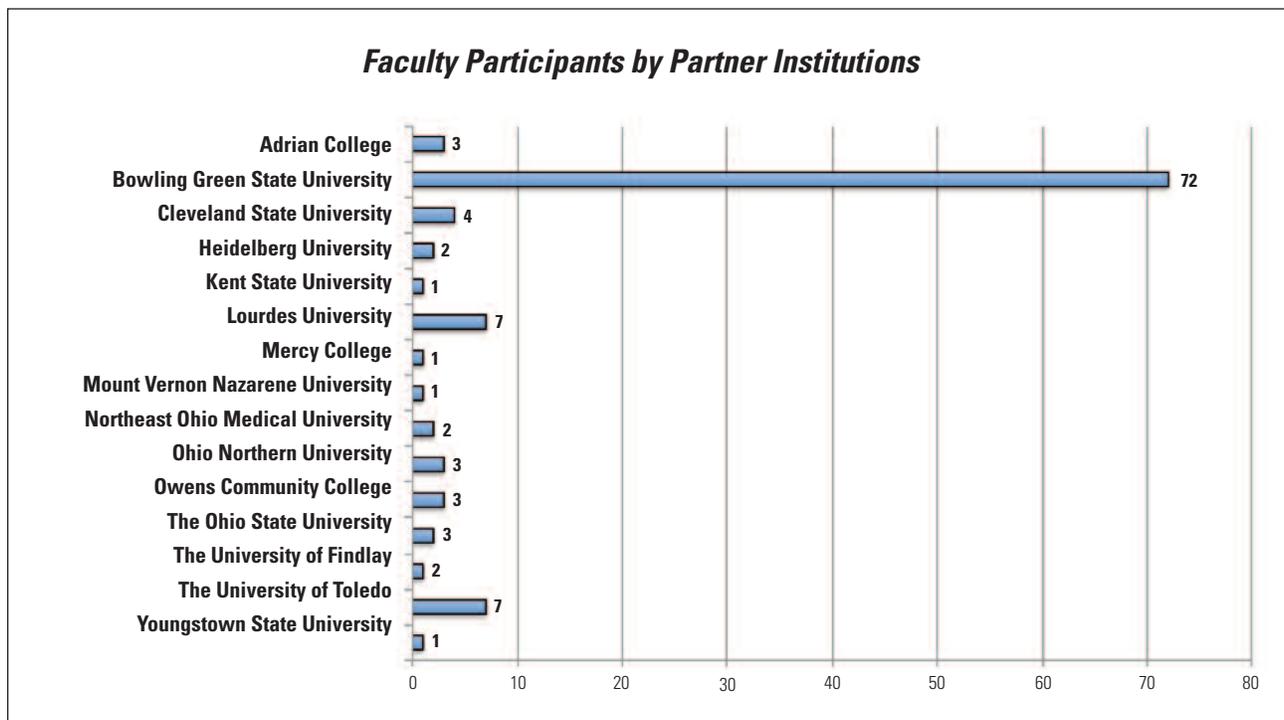
## NWO Faculty Participants

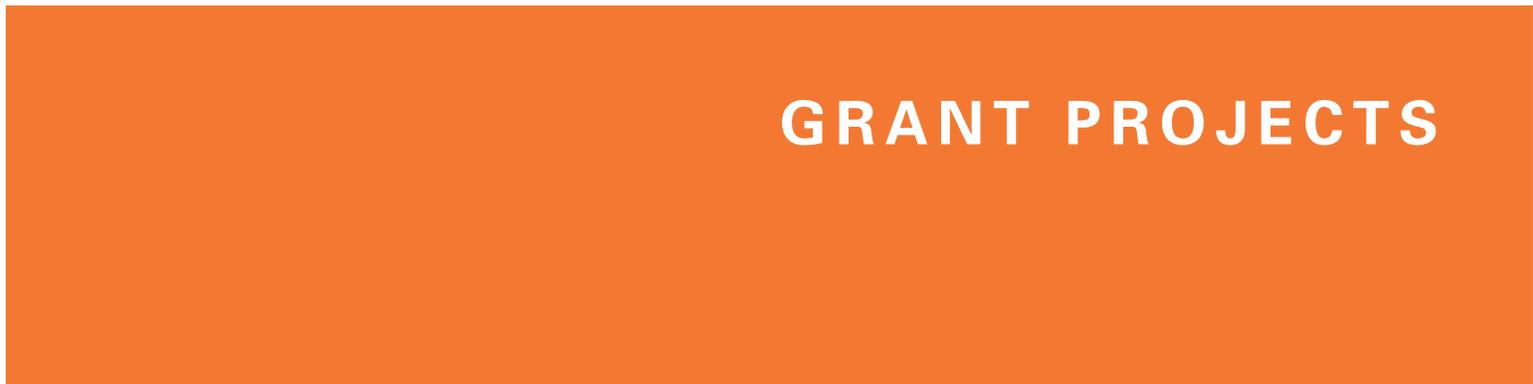
### **Brief Description**

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 2017 Activity Information**





## Why is the Water Green?

Kacie Smith, Lauren Smith, & Amya Strong  
Robert S. Rogers High School

**BGSU** **aecop**  
ARMY EDUCATIONAL OUTREACH PROGRAM

### Introduction

After life on Earth could not exist, it is one of the most precious of life, and still we take it for granted. Whether it be for industrial use, recreational use or drinking, water plays an essential role in our everyday lives. Unfortunately, most of the water is not available to us for use, therefore, we have to protect the water that is available to us. For many freshwater ecosystems, the depletion of oxygen is a leading cause of concern (Chicklock, Dioster & ...)

### Objective

Cyanobacteria levels and dissolved oxygen levels were done for a year to determine the effect of algae blooms on dissolved oxygen in a water body. Dissolved oxygen will be at low levels when algae blooms occur.

### Methods

U.S. Geological Survey (USGS) website was obtained. Data was collected for the Maumee River site in Waterville, Ohio. Dissolved oxygen and cyanobacteria cell counts were downloaded for the month of May and day (2<sup>nd</sup>) of each month covering the period of 2011-2017.

### Acknowledgements

Thank Army Educational Outreach Program (AECOP) for providing the opportunity at Bowling Green State University (BGSU) for this opportunity.

### Abstract

Eutrophication is a major concern for many freshwater ecosystems around the world. A major cause of eutrophication is from phosphorus and nitrogen washed into the water from fertilizers. Lake Erie has been faced with issues of algae blooms over the years. Increased nutrients from fertilizers and warmer temperatures have caused spikes in algae blooms over the years. Algae blooms can lead to low levels of oxygen as well as low water quality. As algae levels increase, dissolved oxygen decreases, potentially harming ecosystems.

### Results/Graph(s)

**Dissolved Oxygen Measurements, Maumee River, Waterville, OH 2011 through 2017**

Year	Dissolved Oxygen (mg/L)
2011	~1.5
2012	~1.8
2013	~1.2
2014	~1.5
2015	~1.8
2016	~1.5
2017	~1.8

**Cyanobacteria Counts, Maumee River, Waterville, OH 2011 through 2017**

Year	Cyanobacteria Count (cells/L)
2011	~100
2012	~200
2013	~100
2014	~150
2015	~300
2016	~500
2017	~200

### Conclusions

The graphed data shows that in the month of August, 2016 when cyanobacteria counts were highest, the dissolved oxygen counts were at their lowest level. With more algae, there will be more decomposition, and more decomposition requires more oxygen. As a result of increased amounts of decomposition, oxygen is rapidly used up. Using up the oxygen in the water has harmful effects on the health of the ecosystem by lowering the amount of oxygen available to the other living things in the system. This can result in fish kills, possibly create "dead zones".

### References



## Advancing the Science Skills of Elementary Teachers and Students (ASSETS I & II)

### **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 2017 Activity Information**

During 2016-17 Project ASSETS Cohort 1 teachers participated in Phase 3 of the project where teacher participants implemented their 6E Model lesson plans developed during the summer workshop, in their classrooms. They observed their students' level of engagement as well as examined student knowledge gained through their work and responses to formative assessments. This cohort continued their professional growth by participating in other opportunities such as the NWO Symposium and NASA's BEST program. Cohort 1 teachers shared their reflections and growth statements at the wrap-up meeting in May as well as engaged in a new 6E model lesson alongside the new 2017-18 Cohort of ASSETS teachers.

The Project ASSETS II cohort of 27 grades three, four, and five teachers started their participation in the three-phase high quality professional development program in May and June 2017. Phase 1, a Spring Kick-Off, was held in May 2017 in tandem with the ASSETS I cohort's final meeting. This was a meaningful time of interaction between the two cohorts. Teacher participants were also introduced to their grade level facilitator teams and given an overview of the rest of the project. Phase 2, a Summer Workshop in June 2017, consisted of an eight-day rigorous and engaging learning experience devoted to grade level specific content standards in Earth and Physical science as well as general education topic sessions. Unique to this phase is the highly successful model of co-teaching teams of three (classroom educator, special educator, and content expert) at each grade level. General session topics included formative assessment, technology tools, growth mind-set, student motivation and engagement, text-set design, and differentiation. Phase 3, an Academic Year program, will take place in FY 18.

### **NWO Role in ASSETS**

- Grant project management
- Financial management of the grant budget
- Instruction of grant professional development

## Army Education Outreach Program (AEOP): Support for Ohio Junior Science & Humanities Symposium

### ***Brief Description***

The Army Educational Outreach Program (AEOP) provided an opportunity through a strategic outreach grant project for students to conduct scientific research, analyze data, and present their work in the poster format of the Ohio Junior Science and Humanities Symposium (OJSHS). One of the goals of the grant project is to further the reach of students exposed to scientific research. The AEOP, in collaboration with Battelle, awarded grants to three organizations and institutions to expand student participation in enriching STEM exploration and learning, particularly for underserved students. AEOP offers students and teachers Army-sponsored programs that effectively engage, inspire and attract the next generation of STEM talent. **Meets NWO Goals: 2**

### ***FY 2017 Activity Information***

Forty-four students from Toledo Public Schools and their teachers participated in a non-competitive poster showcase. The program afforded the teachers funding for research supplies, elevating their capacity to conduct research and create, with their students, research projects to participate in OJSHS, a top tier symposium annually held at BGSU. Under the guidance of BGSU faculty Dr. Emilio Duran, Associate Professor, and Dr. Jodi Haney, Professor Emeritus, five teachers participated in workshops to learn the mechanics of what it takes to guide their students to create a research project of symposium caliber. This opportunity allowed the students to conduct real scientific research (using the latest technology), analyze data, and present their work, gaining not only confidence and presentation skills, but research skills as well. See Appendix H for examples of recognition.

## Common Core for Achievement & Middle Grades Mathematical Proficiency (C<sup>2</sup>AM<sup>2</sup>P Middle Grades)

### ***Brief Description***

C<sup>2</sup>AM<sup>2</sup>P Middle Grades is a Math Science Partnership project funded by the Ohio Department of Education. C<sup>2</sup>AM<sup>2</sup>P 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 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. **Meets NWO Goals: 1, 3, 4, & 5**

### ***FY 2017 Activity Information***

C<sup>2</sup>AM<sup>2</sup>P Middle Grades is a Math Science Partnership project funded by the Ohio Department of Education. C<sup>2</sup>AM<sup>2</sup>P served 20 grades 6-8 mathematics teachers from Elida, Findlay, Lima, McComb, Sidney, Upper Sandusky, Vanlue, and Wapakoneta Schools during its third year of programming from August 2016 – August 2017. Teachers worked to 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. Teachers met with the instructional team eight times during the academic year 2016 – 17 and conducted two lesson studies (one in the Fall of 2016 at Findlay City Schools and one in the Spring of 2017 at Sidney City Schools). The teachers concluded their year three work with an eight-day summer institute in June 2017 where they worked on writing a series of lessons for use by their entire grade level team.

### ***NWO Role in C<sup>2</sup>AM<sup>2</sup>P Middle Grades***

- Financial management of the grant budget
- Grant project management assistance

## **Common Core for Mathematical Proficiency in Elementary and Middle Schools ((CO)<sup>2</sup>MP Elementary and 6-8)**

### ***Brief Description***

(CO)<sup>2</sup>MP is a Math Science Partnership project funded by the Ohio Department of Education. (CO)<sup>2</sup>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. **Meets NWO Goals: 1, 3, 4, & 5**

### ***FY 2016 Activity Information***

Twenty elementary and fifteen 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 in person and via remote connections several times during the 2016 – 17 academic year and conducted two lesson studies (one in the Fall of 2016 and one in the Spring of 2017). The teachers concluded their year three work with an eight-day summer institute in June 2017.

### ***NWO Role in (CO)<sup>2</sup>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 2017 Activity Information***

The second cohort of 42 middle school teachers completed their second year of their 3-year cycle of participation in the iEvolve project. This year was devoted to training teachers to lead students in citizen science research. Partner scientists were a significant part of this training, which began with a 6-day summer institute, followed by regular sessions throughout the school year. Scientists came from several partner agencies, including the Erie Soil and Water Conservation District, the Metroparks of the Toledo Area, Toledo Zoo and The Ohio State University's Stone Lab. Sixth grade classrooms were involved in soil studies and water quality work, while Seventh graders studied vernal pool ecology, water quality and macroinvertebrates found in local streams. Eighth grade classrooms studied the pollinators found in native prairie, old field and garden environments. Except for the pollinator project, all other projects had the opportunity to enter data into NASA's GLOBE website, which also allowed for other data to be accessed from around the world. The pollinator project utilized eButterfly and Bee Watch for its databases. All students participated in student symposia, which provided opportunities for student researchers to share their findings with their local communities.

Another important part of project activities included cross-curricular work to connect each grade level's science themes to other content areas, as well as align to state learning standards. Master teachers from other districts worked with project teachers to support on-going inquiry instruction in science, along with English/Language Arts, Math and Social Studies.

Although the first elementary cohort officially completed its 3-year cycle with the project, due to continued interest and need, some supports were provided this year, including three evening sessions focused on formative assessment, continued citizen science research, and dissemination. Many cohort 1 teachers continued to assist with teacher and student data collection, providing a rare chance to gather project data beyond the original three years.

Both cohorts' Curriculum Design Teams met throughout the year, with representative teachers from all grade levels and content areas. The elementary team worked to continue creating cross-curricular connections and 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 this same process. Both Curriculum Design Teams will continue this work throughout the coming year, with the middle school team also aligning their citizen science research projects with the rest of the curriculum.

Next year will be the final year of the project, so working toward sustainability will be a top priority.

## 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 2017 Activity Information***

Bowling Green State University hosted the 3-day event for the ninth year in a row from March 15 – 17, 2017. This year marked the 54th Anniversary of the OJSHS program. Dr. Andy Jorgensen, Associate Professor of Chemistry & Environmental Sciences at the University of Toledo, gave the keynote address on “Climate Change”. There were 25 paper presentations and 62 poster presentations. Arman Serpen from Sylvania Southview High School was the 1st place winner for paper presentations. Arman, along with 4 other, OJSHS winners traveled to the National JSHS in San Diego, CA in April 2017. Srinath Seshadri from University School won 1st place in the Life Sciences oral presentation category and Jordan Skates from Pettisville High School won 3rd place in the Environmental Sciences poster presentation category at National JSHS. A complete program and other information about the 2017 OJSHS can be found at [www.ojshs.org](http://www.ojshs.org). Below is a breakdown of attendance data for the 2017 Symposium. The 2017 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 G for an example of recruitment materials and recognition.

<b>Participant Group</b>	<b>Total Attendance for 2016</b>
High School and Middle School Students	105
K-12 Educators	19
Higher Ed Faculty (Poster & Paper Judges)	40
Staff and Volunteers	15
Parents and Guests	20
<b>TOTAL</b>	<b>199</b>



**SCHOOL AND COMMUNITY  
ACTIVITIES AND OUTREACH**

## 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 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 2017 Activity Information***

The fourth annual Falcon BEST Robotics Competition was held in the Fall of 2016 and started with 17 teams. The six-week competition called “Bet the Farm” started on August 27 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 Practice Day on September 24. 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 8. One team was not able to complete their robot before Game Day and as a result only 16 teams competed. The first place “BEST Award” and the first place “Robotics Game Award” were earned by to the team from Hamilton Southeastern High School for the second year in a row. The top teams performed well at the Northern Plains Regional BEST in Fargo, ND December 1st – 3rd with the following wins:

- Hamilton Southeastern: Founders Award for Creative Design, 1st in Most Photogenic Robot, 2nd in Best Team Website, & 1st in Best Engineering Notebook;
- Cardinal Stritch: 3rd place in the Robotics Game Competition, 3rd in Best Team Website, & 3rd in Best Marketing Presentation;

- Maumee Valley Country Day: 2nd in Most Photogenic Robot & 3rd in Best Team Mascot; and
- St. Ursula Academy: 1st in the Teamwork Award.

This is by far the best showing the Falcon BEST teams have done at regionals bringing home a total of 10 awards. 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/college-overview/falcon-best-robotics-competition.html> See Appendix B for an example of recruitment materials and recognition.

## 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 2017 Activity Information*

The 2016 Collegiate Training Camp took place at Imagine Clay Avenue School in Toledo, OH November 18 – 19 with around 60 college students in attendance. A record six K – 12 camps were held during the 2017 spring semester; Ottawa Hills on February 4, Sandusky on February 11, Springfield & Napoleon on February 25, McComb on March 18, and Imagine Clay on March 25. The six K – 12 camps were each organized and enacted by teams of college students who were trained at the fall training camp. See Appendix C for examples of recognition.

### *NWO Role in Math Camp*

- Financial management of the camp funds
- Assistance purchasing materials for camps
- Advertising assistance

### ***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 2017 Activity Information***

The Seventh Annual STEM in the Park event was held on September 24, 2016 and showcased 163 hands-on activities from 109 unique activity station providers from many NWO community and business partners and university departments. This year's theme was 'Make a Splash at STEM in the Park' and featured the all new H<sub>2</sub>O Zone. Other popular zones included the new Food Science Zone sponsored in part by Food For Thought and expanded zones, the Science of Sports and the Science and Technology of Digital Media Zone. A crowd favorite, the STEM Stage, entertained families with super-sized demonstrations by the Toledo Zoo and Imagination Station.

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, First Solar, Lubrizol Foundation, PPG and Verizon. Community Sponsors included NWO, Perrysburg Rotary, Spectra Group, SSOE, Thayer Family Dealership, and The Andersons with General Sponsorship support encompassing AT&T, Bowling Green Community Foundation, Environmental Water, Giant Industries, and Master Chemical. In-kind donations were provided by Biggby Coffee, Bostdorff's Greenhouse, Carolina Biological, Costco, Food For Thought, Kroger, Lowes, The Home Depot and Tony Packo's.

The event was held at the Perry Field House for the sixth consecutive year. The attendance was the largest to date, with a total of 4,760 attendees/exhibitors/staff/volunteers. The event attracted families from 117 different cities and towns 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). See Appendix I for examples of the advertising and recognition.

## 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. Additional information can be found on the NWO website at <http://www.bgsu.edu/nwo/programs/women-in-stem.html>. **Meets NWO Goal: 2**

### *FY 2017 Activity Information*

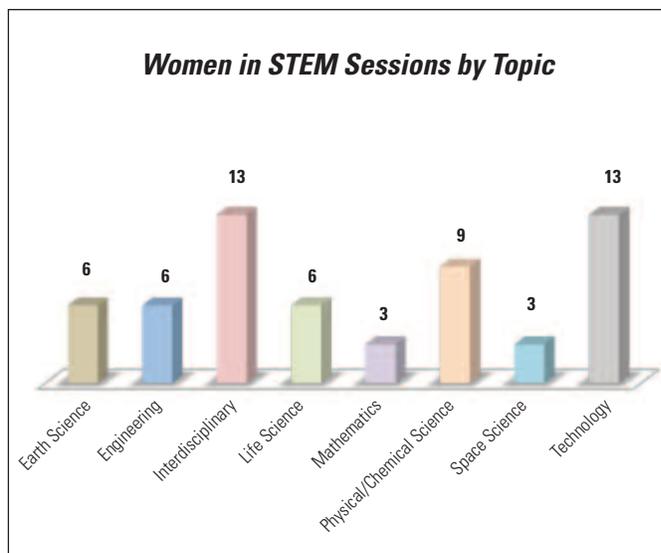
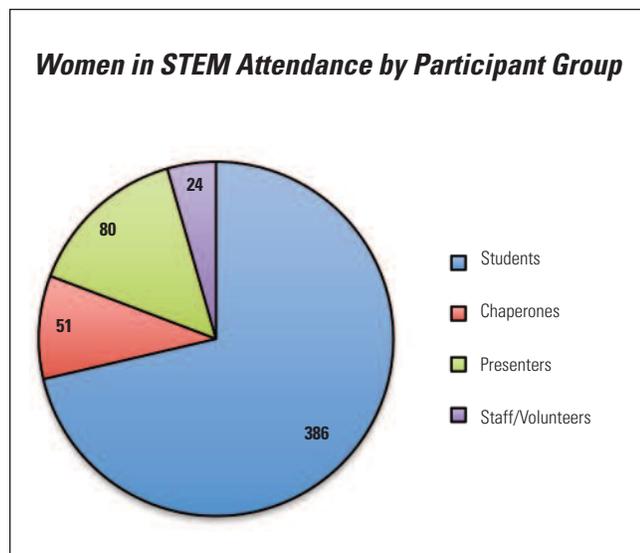
The 2016 Women in STEM program was held on the Bowling Green State University main campus on October 21st. The program attracted 541 people, including 51 chaperones/teachers, 80 session presenters, 24 staff/volunteers/guests, and 386 sixth – eighth grade students. A program fee of \$20 was charged for all student attendees and \$15 for school chaperones. BP sponsored free registration and travel grants for underserved and/or low-income schools in Ohio to attend. The keynote presenter was Abby Knowles from Verizon; her company covered the costs of her travel and speaker fee.

Students remained in their 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.

8:30 AM – 9:05 AM	9:05 AM – 9:45 AM	9:55 AM – 10:40 AM	10:50 AM – 11:35 AM	11:45 AM – 12:30 PM	12:40 PM – 1:25 PM	1:35 PM – 2:15 PM
Check-in and Welcome	Keynote Address by Abby Knowles	Session 1	Lunch (students split)	Lunch (students split)	Session 4	Closing Remarks, Admissions Raffle, Imagination Station Presentation
			Session 2 (students split)	Session 3 (students split)		

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. Eighty STEM professional role models from BGSU faculty, students, and the surrounding community facilitated the hands-on workshops.

On the next page is a breakdown of the sessions offered by content area and the overall attendance (541). 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 J for examples of advertising.



## You Be The Chemist Challenge

### Brief Description

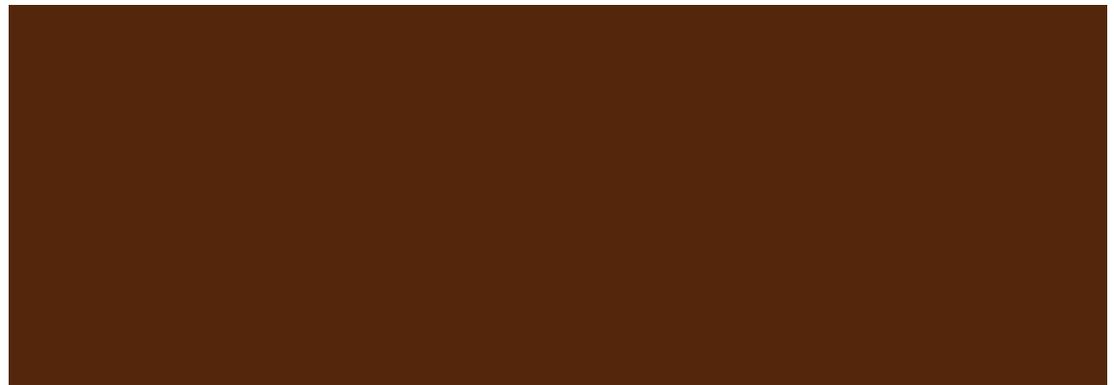
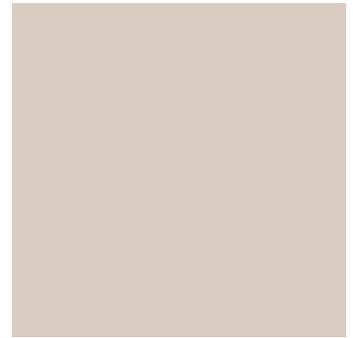
The You be the Chemist (YBTC) Challenge is a fun and innovative academic competition that engages 5th – 8th grade students in learning about important chemistry concepts, discoveries and chemical safety. Challenge competitions are exciting events that take place across the country, encouraging the collaboration 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 2017 Activity Information

This year's statewide competition took place at Rogers High School in Toledo on April 29. Students from all over Ohio came together to try and earn the top prize of representing Ohio at the National YBTC in Philadelphia in June. This year's winner was Aristo Liu from Copley-Fairlawn Middle School and the runner-up was Lee Garber-Ford from Taylor Middle School in Cleves. All participants earned certificates, and trophies were also awarded to the top two students.

### NWO Role in YBTC

- Advertisement/recruitment via Constant Contact to 8,000+ regional K –16 contacts
- Announcement in NWO e-newsletter



# STUDENT SCHOLARSHIP PROGRAMS AND GRANTS

## 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**

### **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). See Appendix H for examples of recognition. **Meets NWO Goals: 1, 2, & 3**

### **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 budget

## Choose Ohio First

### ***Brief Description***

The Choose Ohio First (COF) program provides grants funded by the State of Ohio to colleges and universities to award scholarships to Ohio resident undergraduate students in STEM degree programs. The purpose is to persuade more Ohio students to attend college in Ohio and earn degrees in STEM fields with the hope that they will be more likely to stay in Ohio to pursue their careers. Because STEM disciplines tend to promote economic growth more than other fields, this is expected to help strengthen Ohio's economy and promote economic prosperity.

The State held a competition among all Ohio colleges and universities to award grants to those institutions who best drew on their strengths and the strengths of their region in specific STEM fields and who offered the most promising plans for innovative scholarship programs. NWO worked with several departments and programs to prepare and submit proposals for this competition and four new grants were awarded which will provide funding for the foreseeable future. Two grants are for existing COF projects: BOSEF and Science & Math Education in Action. Two grants are for new COF projects: Technology Works which funds scholarships for all of the degree programs in the College of Technology, Architecture, and Applied Engineering; and Forensic Science which provides scholarships for students in BGSU's three new forensic science degree programs.

### **Funding for 2017-18 Academic Year**

Science & Mathematics Education in Action \$505,722

Technology Works \$375,000

Forensic Science \$70,000

BOSEF \$76,750

### **NWO Role in COF**

- Advise, assist, and support the development of grant proposals
- Serve as a liaison and coordinator for communication with ODHE regarding all COF projects and the issues associated with those
- Coordinate submission of requests to ODHE for scholarship reimbursements at the end of each term
- Advise, assist, and support the preparation of annual reports
- Coordinate and facilitate site visits for all of the BGSU COF projects

## 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, 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

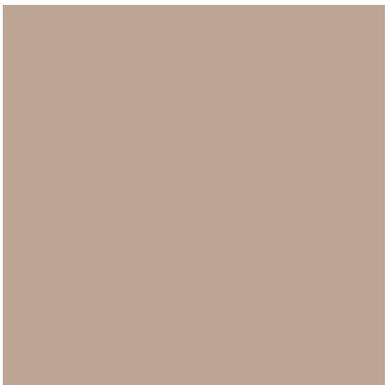
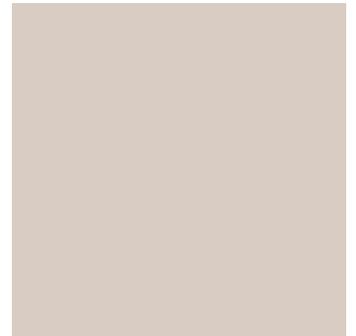
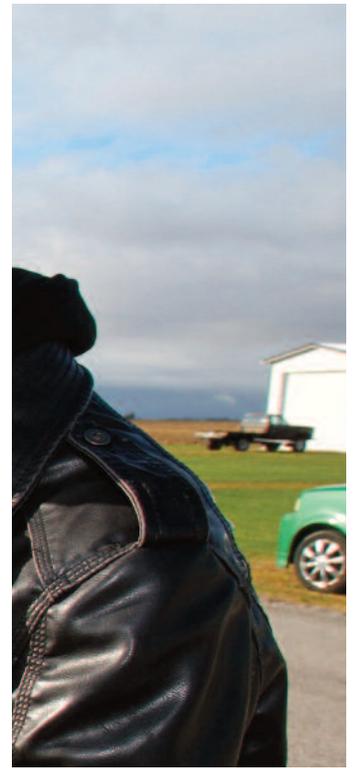
## **Science and Math Education in ACTION (ACTION)**

#### ***Brief Description***

BGSU received \$505,722 in funding for the 2017-18 academic year from the Ohio Board of Regents through the Choose Ohio First program to recruit and train undergraduates to become Ohio mathematics and science teachers. Similar levels of funding are expected in subsequent years. 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



# 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)

### **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. **Meets NWO Goals: 2 & 3**

### **NWO Role in Grant Project**

- Identify sampling locations in the Portage River Watershed that will meet the survey objectives
- Conduct water sampling after rain events of 0.5 inches or more
- Perform chemical analysis of water samples
- Compute nutrient loads following significant rain events

## 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 determine baseline nutrient and runoff conditions; phase 2 is to test treated manure compared to raw manure on plots, 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 from FY 2015 to FY 2017. Phase 2 was started in FY 2017 and will continue in FY2018. **Meets NWO Goals: 2 & 3**

### **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.

## Ohio Lake Erie Commission: Evaluation of Runoff from Manure Treated Agriculture Plots

### ***Brief Description***

The Lake Erie Protection Fund (LEPF) Grant supplements another grant to study the effectiveness of manure treatment in reducing nutrient amounts in runoff. When the original project was proposed, the test plots for the research were expected to be very similar in grading and nutrient content. However, differences in the plots were discovered and required modifications delaying the pilot test study. The LEPF grant has allowed for more runoff sampling since the plot modifications were made. The LEPF grant has also allowed for further development of the treatment protocol for the manure. When the treatment was originally being planned, slaked lime was used to treat the manure. As the research progressed, it was discovered that the slaked lime, if used at all, would be used at a different time in the treatment process. This discovery has led to the testing of new treatments. With the LEPF grant more lab-scale testing is being done on the new treatments. The LEPF grant has also funded undergraduate research students, as well as, consumable supplies and use and maintenance of already existing lab equipment.

**Meets NWO Goals: 2 & 3**

### ***NWO Role in Grant Project***

- Conduct lab-scale experiments to optimize manure treatment protocol.
- Evaluate test plot runoff water samples and flow during significant rain events.
- Hire and supervise undergraduate students to assist with research activities (10 hours per week total).

## Validity Evidence for Measurement in Mathematics Education (V-M<sup>2</sup>ED)

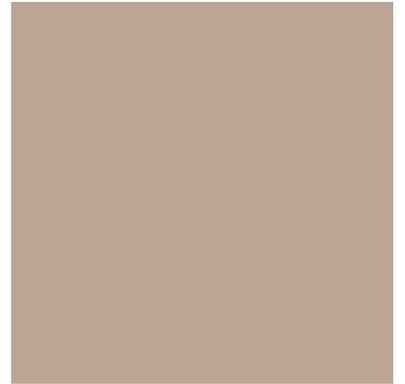
### ***Brief Description***

Validity Evidence for Measurement in Mathematics Education (V-M<sup>2</sup>ED) is a National Science Foundation conference grant. It was aimed at examining validity-related measurement issues germane to mathematics education and to set a clear pathway for scholars to discuss quantitative measurement within mathematics education. V-M<sup>2</sup>ED funding began September 2016. Jonathan Bostic (PI; Bowling Green State University) and Michele Carney (Co-I; Boise State University) convened 35 scholars from around the world in San Antonio, Texas on April 2-3. Further work from this

conference funding may include publications, working groups at other conferences, a book, or other professional collaborations. **Meets NWO Goals: 1, 3, & 5**

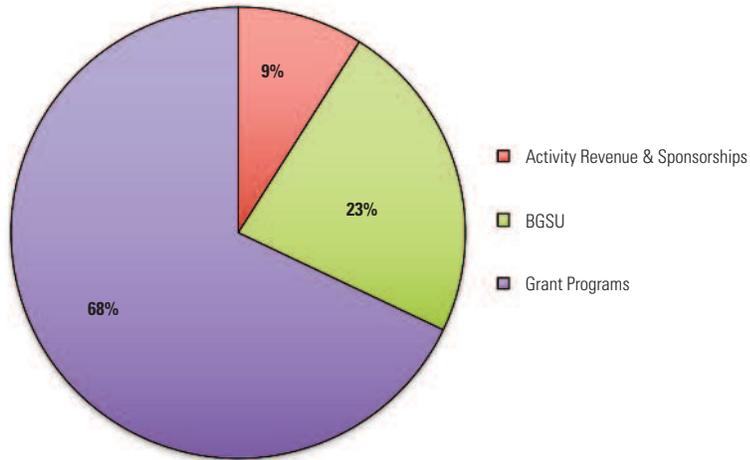
### ***NWO Role in Grant Project***

- Management of the project including financial management of the budget
- Support in planning and organizing the conference supported by this grant



# FY 2017 NWO BUDGET

**FY 2017 Income Sources**



**TOTAL INCOME FOR FY 2017** **\$2,870,034.18**

34

The table below shows funding provided by Bowling Green State University for FY 2017.

BGSU FUNDS	
Agency: Program	Award Amount
Green State University Fiscal Support for NWO	\$244,066.82



The table below shows funding sources that supported FY 2017 NWO Activities.

<b>GRANT PROGRAMS</b>		
<b>*Funding amount listed is for the grant award period which could be longer or shorter than the NWO fiscal year.</b>		
<b>Agency: Program</b>	<b>Description</b>	<b>Award Amount</b>
Academy of Applied Science	Ohio Junior Science & Humanities Symposium	\$20,000.00
Battelle Memorial Institute	Support for Ohio Junior Science & Humanities Symposium	\$50,000.00
National Science Foundation	Collaborative Research: AGEP-T: Northern Ohio AGEP Alliance (NOA-AGEP) (Year 2 of 3)	\$103,685.00
National Science Foundation	Collaborative Research: Validity Evidence for Measurement in Mathematics Education	\$87,055.00
National Science Foundation	iEvolve: Inquiry and Engagement to Invigorate and Optimize Learning for Everyone (Year 5 of 5)	\$1,331,206.00
Ohio Department of Higher Education	Advancing the Science Skills of Elementary Teachers and Students (ASSETS)	\$92,041.00
	Advancing the Science Skills of Elementary Teachers and Students (ASSETS II)	\$103,564.00
Ohio Department of Higher Education	BOSEF: Building Ohio's Sustainable Energy Future	\$95,780.00
Ohio Department of Higher Education	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 2 of 2)	\$51,239.00
Ohio Department of Higher Education	Survey of Local Sources of Nutrients in the Upper Portage River Watershed (Year 1 of 2)	\$53,223.00
Ohio Department of Education	Common Core for Mathematical Proficiency in Elementary and Middle Schools ((CO)2MP Elementary and 6 – 8) (Year 3)	\$496,173.00
	Common Core for Achievement & Middle Grades Mathematical Proficiency (C2AM2P Middle Grades) (Year 3)	\$295,482.00
Ohio Lake Erie Commission	Evaluation of Runoff from Manure Treated Agriculture Plots	\$18,750.00
Ohio Water Development Authority	Mitigation of Agricultural Nutrient Loss by Novel Manure Treatment #1 (Year 2 of 2)	\$171,835.00
	Mitigation of Agricultural Nutrient Loss by Novel Manure Treatment #2 (Year 2 of 2)	\$277,796.00
OSLN/Battelle Foundation	Battelle Hub Grant	\$25,000.00

**We wish to thank the following for their support of  
NWO activities during FY 17!**







- A: Faculty, Staff, and Student Recognition
- B: Falcon Best Recruitment & Recognition
- C: Math Camp Recognition
- D: NWO STEM E-Newsletters Sample
- E: NWO STEM Inquiry Series Advertising Samples
- F: NWO Symposium Advertising & Recognition
- G: OJSHS Advertising & Recognition
- H: Army Education Outreach Program (AEOP): Support for Ohio Junior Science & Humanities Symposium Recognition
- I: STEM in the Park Advertising & Recognition
- J: Women in STEM Advertising

# APPENDICES

# Appendix A: Faculty, Staff, and Student Recognition

**Sentinel-Tribune**  
HOME - NEWS - SPORTS - OBITUARIES - COMMUNITY - A&E - OPINION - MULTIMEDIA

## Instructor gets the groove of learning through playing

By **CHRISTINE HODGINS**, Sentinel-Tribune Staff Writer  
All work and no play?  
Rick Worth won't hear of it.

The associate professor of education at Bowling Green State University specializes in all things play.

"I think learning happens when you play," said Worth, who teaches BGSU students who are studying to be educators. "If you can get people excited about what they're doing, they'll put in a little extra effort."

Worth's play research includes membership in the Association for the Study of Play and Play Naturally Today, which founded the 2017 Foundation for Playmaking, the Toledo Museum and the Toledo Zoo. He also had a hand in making the Museum's neighborhood children play area at the Zoo.

One of the goals of some of his groups is to make green spaces more playful. That could entail creating an obstacle course in a rocky fall for climbing and sliding down.

When Worth isn't "playing," he's usually moving and grooving — specifically drumming.

Worth learned from Laura Shaid, who had her own studio in Bowling Green before teaching at Julie's Dance Studio in the Woodland Mall.

"My wife and daughter took dance classes from Laura," he said. "Laura asked me if I would play the drum and she taught me. That was maybe eight years ago."

Worth said he has little music experience — he did play in the high school band — but he can't resist the pull of a good beat.

"When I hear music I like, I just sort of start moving. I like jazz. I cannot sit down when I hear jazz."

He recalled being on a field course in Costa Rica.

"I was the gingo who couldn't dance, but I had fun!"

His favorites are Middle Eastern and Eastern European music.

At home, he and his wife, Susan Woodard, play Indian music including the harmonium and tabla, an Indian stringed instrument. Woodard is an artist; their daughter Emily is a seventh grader.

"I've really into the diversity part of this," Worth said.

When Shaid moved out of the area, he took over her World Rhythms dance class at Julie's. The class is for third- to sixth-graders, but Worth said if there was enough interest he would teach an adult class.

"It's fun. We're not trying to impress anyone," he said. "I like to play. I just like to goof around."

And anyone — even people without that innate sense of rhythm — can participate.

"A lot of it's repetition. Even if you don't feel it, through repetition, you can get it," he said. "And there are lots of rhythms. I have a difficult time with it."

For example, a typical American team is a 4-4, 2-4 or 3-4 (watts) court. Worth said he once tried to learn a 6-6 court, but it was just too challenging.

Worth wasn't always so free-wheeling and into play.

He was a high school and middle school science teacher in Indiana for years, and said he would probably be getting to retire from that job, if it wasn't for a car crash. The accident left him with a back injury that prevented him from teaching.

Worth went back to school to get his doctorate in science education. It was a life changer.

During his studies, he went to Uganda to research primates. A photo of his encounter with Rosa, an infant orang, is framed in his office. She initially resisted meeting Worth in the field and crossed a line to consume him. The line, though, wouldn't hold her weight and Rosa swung up directly above Worth. She proceeded to pull his hair.

Worth said it was a light bulb moment for him, bridging the gap between learning and playing.

It's not much of a bullet to teach his BGSU students about the correlation between playing and learning, it's what they do with it when they graduate to the real world and classroom.

"I know that's a difficult call these days with high-stakes testing, but I'm confident ... kids learn more through play!"

Worth also urged parents to avoid rigorously scheduling their children's lives, and to leave time for play. Above all, he said, research shows more play — especially outdoors — creates better eyesight, increases critical thinking, reduces anxiety and decreases anxiety disorders.

"We program life for kids too much," he said. "Kids are losing the opportunity to make all those choices. We program the opportunity for choices and this right out of life."

A

## Appendix A: Faculty, Staff, and Student Recognition cont.

ROWLING GREEN STATE UNIVERSITY

# BGSU NEWS

ACADEMICS | ADMISSIONS | ABOUT | ATHLETICS | ADMIN | LIBRARIES

DATE | MY BGSU | EMAIL

## ASH TAKES INITIATIVE TO MEET STUDENT NEEDS

Rowling Green State University | News | 2017 | May | Ash takes initiative to meet student needs

Twitter | Like | Share

Beginning a new job is challenging enough, but Gethary Ash, research program manager for COGMOS (Northwest Ohio Center of Excellence in STEM Education), has not only mastered her own duties since joining the University in February 2016, she has already made improvements to the program to further benefit students. She has also taken on an additional role left vacant by a departing staff member.

Ash was recognized for her many contributions with the 2017 Rookie of the Year Award of the Administrative Staff spring reception and awards. The Rookie of the Year is awarded annually by Administrative Staff Council in recognition of an administrative staff member who has played an integral part in implementing an idea, program or procedure designed to enhance or improve student recruitment, retention and/or engagement. To be eligible for the award, employees must have worked at BGSU a minimum of one year but no more than three years.

As manager of the research program, Ash works on multiple projects and grant programs. She works very closely with students who conduct water quality research, providing them with an experiential learning opportunity and a chance to be a part of local, state and national discussions surrounding water quality and farm run-off.



"In mid-2016 Beth learned that the grants covering the research did not have funding for students to work in the lab and that the students were volunteering their time," said her nominator, Jessica Belcher, COGMOS associate director. "She took it upon herself to write a grant specifically to fund the students' work. Because of her efforts these students now receive funding to pay for their time in the lab and the materials needed to conduct their own research. She went above and beyond to ensure that these students can succeed at BGSU. She is not funded in any way by this new grant but has to do the work to manage it. She added work to her own plate in order to help students and ensure their success."

"That is a true sign of an amazing BGSU staff member!"

In addition to her primary role in the department, Ash assists in the coordination of the **Academic Investment in Mathematics and Science** scholarship program. "Beth has made countless improvements to the AMS program including a restructuring of the AMS summer bridge program to make it more cohesive and beneficial to the incoming freshmen," Belcher said. "She regularly meets with AMS scholarship students to guide them in their academic goals and keep them on track to meet the scholarship requirements."

Although she was not hired to work on AMS, during Ash's employment it became clear that the program needed a lot of help, Belcher said. Ash stepped up and once again took on extra work to ensure the success of this program. In February 2017, the assistant director of the AMS program left BGSU, and for the past several months the program has been without this position.

But once again, Ash has stepped up to help out. "Her work on AMS ensures that the AMS scholarship students are given the support they need to be successful at BGSU and meet the scholarship requirements for next year," Belcher said.

Recently Ash worked with several faculty members to submit a new grant program that would provide scholarships for underserved populations to ensure that next year deserving, high-need students have the resources needed to attend and be successful at BGSU.

"Beth is an amazing asset to not only our department, but the University as a whole," Belcher said. "She has the respect of the staff, but more importantly, the respect of the students in the research project and AMS. Beth is an amazing collaborator who works hard to help anyone in need. She goes out of her way to help students, staff and faculty achieve success."

A |

# Appendix B: Falcon Best Recruitment & Recognition

Recruitment Email

## FALCON BEST ROBOTICS

### Registration for the FalconBEST 2016 Robotics Competition is open!

FalconBEST is a robotics competition and much, much more!

Are you ready to "Bet the Farm"? Watch the 2016 game teaser now at: <http://www.bestinc.org/>

We have a lot of new planning team members for 2016 including a new Hub Director. Please visit <http://www.bgsu.edu/technology-architecture-and-applied-engineering/about/falcon-best-robotics-competition.html> to get contact information for the new planning team.

Dates and registration instructions are below! You have until 5:00pm on Friday, April 29 to register for the 2016 competition.

#### Registration Instructions

*\*Please be sure your school can participate before you register.*

*\*We would like to have all 20 slots filled on game day.*

**If registration is full, please put your school on the wait list.**

1. Go to <http://www.eventbrite.com/e/2016-falcon-best-season-team-registration-registration-23931897951>
2. Follow the instructions to register.
3. 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

- Kickoff: Saturday, August 27, 2016 - Perry Field House, BGSU
- Practice Day: Saturday, September 24, 2016, TBD, BGSU
- GAME DAY: SATURDAY, OCTOBER 8, 2016 - Stroh center, BGSU

**BGSU** | THE COLLEGE OF  
TECHNOLOGY ARCHITECTURE  
AND APPLIED ENGINEERING  
BOWLING GREEN STATE UNIVERSITY



B

# Appendix B: Falcon Best Recruitment & Recognition cont.

## Falcon Best Recognition



**WTOL 11**

NEWS WEATHER SPORTS VIDEO TRAFFIC THIS MORNING

### BG robotics competition hosts 300 area students

Published: Sunday, October 8th 2016, 6:15 pm EST  
Updated: Sunday, October 8th 2016, 6:15 pm EST  
By Mark Bickle, Digital Content Producer | 9299111

**BOWLING GREEN, OH (WTOL)** - Hundreds of high school students "bot the farm" that they had the best robotics team in the area on Saturday.

The students were competing in the fourth annual Falcon BEST event at Bowling Green State University.

300 students from seventeen area middle schools and high schools took part in the daylong event.

Each team built a remote-controlled robot that had to navigate a cornfield that BGSU management majors had built.

Identical kits were provided to each team who were challenged to outperform each other.

But it's not just about technology. The competition also encourages teamwork.

"We're learning more than using tools to build something. We're learning how to implement each other's ideas and work together to create a robot that's unique and special to us," said Alexandra Demer, a student at Cardinal Stritch.

The three top teams at the event will advance to additional contests across the country and eventually the finals in Fargo, North Dakota.

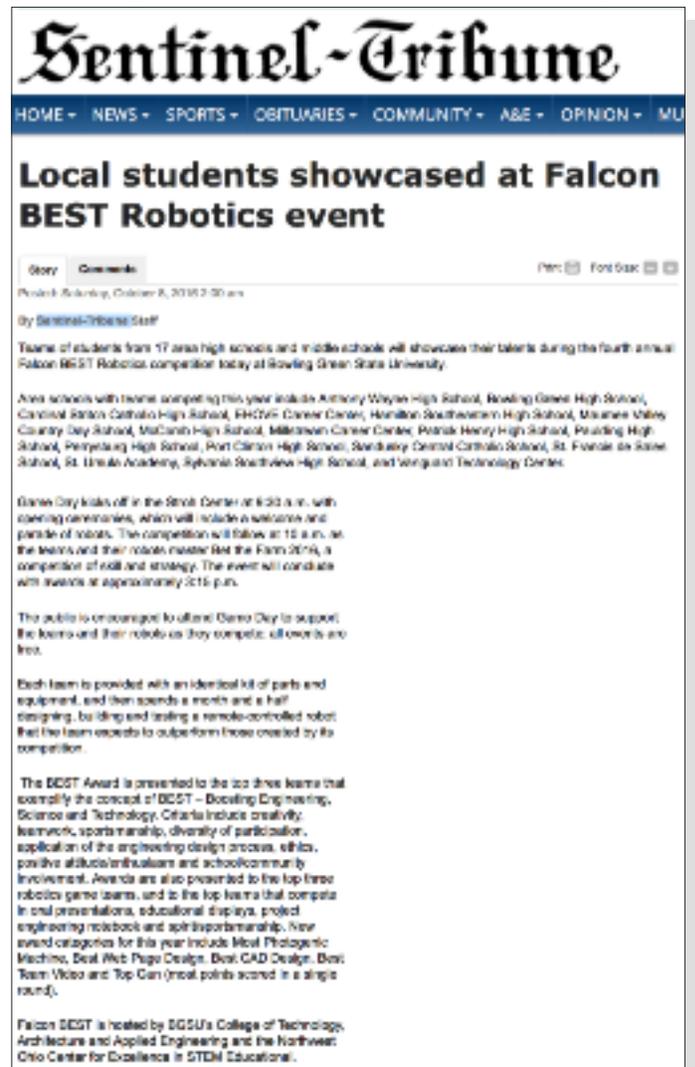
Schools competing in the event included:

- Anthony Wayne Local Schools
- Bowling Green High Schools
- Cardinal Stritch Catholic High School
- EHOVE Career Center
- Hamilton Southwestern High School
- Maumee Valley Country Day School
- McComb High School
- Millstream Career Center
- Patrick Henry High School
- Paulding High School
- Perrysburg High School
- Port Clinton High School
- Sandusky Central Catholic High School
- St. Ursula Academy
- Sylvan Southview
- Vanguard Technology Center

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**Sentinel-Tribune**

HOME - NEWS - SPORTS - OBITUARIES - COMMUNITY - A&E - OPINION - MU

### Local students showcased at Falcon BEST Robotics event

Story Comments Print Font Size

Posted: Saturday, October 8, 2016 7:30 am  
By Sentinel-Tribune Staff

Teams of students from 17 area high schools and middle schools will showcase their talents during the fourth annual Falcon BEST Robotics competition today at Bowling Green State University.

Area schools with teams competing this year include Anthony Wayne High School, Bowling Green High School, Cardinal Stritch Catholic High School, EHOVE Career Center, Hamilton Southwestern High School, Maumee Valley Country Day School, McComb High School, Millstream Career Center, Patrick Henry High School, Paulding High School, Perrysburg High School, Port Clinton High School, Sandusky Central Catholic School, St. Ursula Academy, Sylvan Southview High School, and Vanguard Technology Center.

Game Day kicks off in the Strick Center at 8:30 a.m. with opening ceremonies, which will include a welcome and parade of robots. The competition will follow at 10 a.m. as the teams and their robots invade the Farm 2016, a competition of skill and strategy. The event will conclude with awards at approximately 2:15 p.m.

The public is encouraged to attend Game Day to support the teams and their robots as they compete, all events are free.

Each team is provided with an identical kit of parts and equipment, and then spends a month and a half designing, building and testing a remote-controlled robot that the team expects to outperform those created by its competition.

The BEST Award is presented to the top three teams that exemplify the concept of BEST – Bowling Engineering, Science and Technology. Criteria include creativity, teamwork, sportsmanship, diversity of participation, application of the engineering design process, ethics, positive attitude/enthusiasm and school/community involvement. Awards are also presented to the top three robotics game teams, and to the top teams that compete in oral presentations, educational displays, project engineering notebook and sportsmanship. New award categories for this year include Most Photogenic Machine, Best Web Page Design, Best CAD Design, Best Team Video and Top Gun (most points scored in a single round).

Falcon BEST is hosted by BGSU's College of Technology, Architecture and Applied Engineering and the Northwest Ohio Center for Excellence in STEM Education.

B

# Appendix B: Falcon Best Recruitment & Recognition cont.

## Falcon Best Recognition

**THE BLADE** News • Sports • Arts • Business • Opinion

**BGSU hosts fourth annual Falcon BEST robotics competition**

Event grows in size, atmosphere; teams work on robots to assist in agriculture

By Tom Heery | BLADE STAFF WRITER

Published: 11/06/2014 | Updated: 11/12/14

Cardinal Stritch fans react to their team earning points while Maumee Valley Country Day School fans watch with worry during the Falcon BEST robot competition at Bowling Green State University's Stryker Center on Saturday.

**BOYUNG GREEN** — Don't look now, but one of northwestern Ohio's largest robotics competitions is making its mark.

The sound of pop bands was, at times, deafening inside Bowling Green State University's Stryker Center Saturday as a record 17 teams competed in the fourth annual Falcon BEST robotics competition.

Dozens of people sitting in the arena stands cheered, clapped, and stomped their feet as action unfolded down in the pit on the main floor, as if they were attending a BGSU basketball game.

**PHOTO GALLERY: Falcon BEST robotics competition**

School mascots waved to the crowd. Flags and banners were carried across the walkway along the top corridor of the arena, stimulating the crowd with more energy and enthusiasm.

Robotics competitions are something unique to begin with, a testament to brain power and ingenuity.

But David Barhite, the event's recruitment coordinator, said this year's electric atmosphere was a bonus, a positive direction Falcon BEST hopes to build on as its competitions keep getting bigger and better each year.

This was the first Falcon BEST competition where pop bands, mascots, and other perks were encouraged, she said.

"This is definitely a newer, more exciting atmosphere this year," she said. "We're glad to see it for science, not just a sporting event."

The 17 area middle schools and high schools included one from Indiana.

It was the largest hub event of the Northern Plains competition, and culminates with a regional event in Fargo, N.D.

That regional event is one of four across the country. Just to facilitate registration and touring coordinator, said.

There is no national competition — yet — she explained.

In past years, Falcon BEST sent four or five teams to the Fargo regional. This year — because of its growth — it gets to send seven, she said.

BEST stands for Boosting Engineering, Science and Technology, the primary mission of the robotics competition.

"They're learning manufacturing, they're learning robotics, they're learning teamwork, and they're even learning a little about corporate structure," Craig Perry, Findlay-based Millstream Career Center's engineering teacher, said of students who participate.

This year's theme was *Let the Farm 2014*. Teams were assigned to develop robots that could be used to assist with agriculture by showing it could herd pigs, harvest and deliver ripe corn, lettuce, and tomatoes; and turn a water valve. Teams score points by how efficient their robots can complete the tasks in three-minute matches at a time.

All supplies are provided by BGSU's College of Technology, Architecture, and Applied Engineering, which hosts the event along with the Northwest Ohio Center for Excellence in STEM Education. Schools are responsible only for their own travel.

The Millstream Career Center last year finished fourth in the regional robotics competition in Fargo. The robot Millstream designed for this year's event, called "The Field Reaper" is a prototype that could assist with harvesting.

"The future is going straight toward robotics," T.J. Wosler, a 17-year-old Millstream senior, said.

"It makes everything a lot easier," agreed Don Tyler, 17, another Millstream senior.

Canden Paulson and Ivan Selersak, both 16-year-old juniors at Cardinal Stritch Catholic High School in Oregon, said the robotic competitions could help them fulfill their dreams of becoming engineers someday.

"I think this will help me figure out what engineering's all about," Camden said.

Hardice Southeastern High School of Fishers, Ind., took first place in both the robotics and BEST categories. St. Francis de Sales School took second in robotics, and Millstream Career Center took second in the BEST category. Port Clinton High School and Maumee Valley Country Day School took third place in the robotics and BEST categories, respectively.

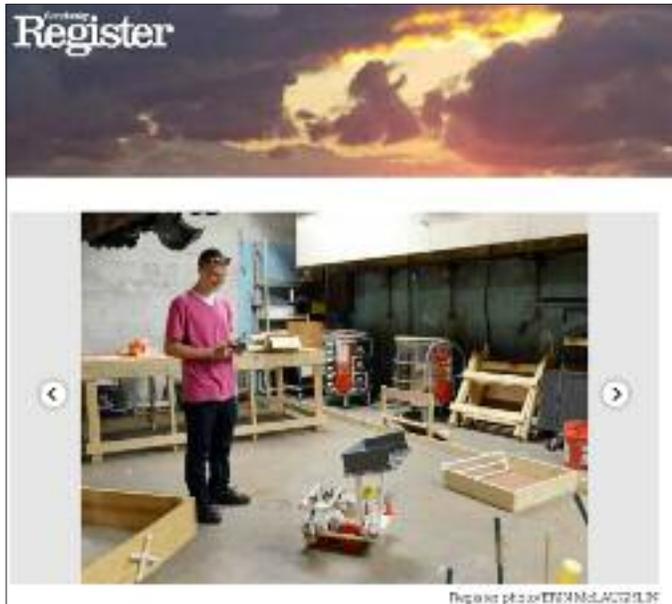
Contact Tom Heery at [ttheery@theblade.com](mailto:ttheery@theblade.com), 419-724-6077, or via Twitter @ttheery1616.

**RELATED ITEMS:** [FALCON BEST SPECIFIC COMPETITION](#), [BOYUNG GREEN STATE UNIVERSITY](#), [JOURNALISM ONLINE](#), [STORY CENTER](#), [BRAND BARRETT](#), [JESSICA BUDGER](#), [ROBOTICS](#), [ROBOTICS TEAM](#), [ROBOTICS CAMP](#)

B

## Appendix B: Falcon Best Recruitment & Recognition cont.

### Falcon Best Recognition



Register photo/EFEM McLAGUE

11:47 am Clinton junior Jerold Sedko navigates the robot on Wednesday, Oct. 6, 2016, at Port Clinton High School.



PORT CLINTON SCHOOLS

#### Students join robot competition

PATRICK PFANNER - OCT 6, 2016 AT 1:13 PM

[patrickpfanner@sanduskyregister.com](mailto:patrickpfanner@sanduskyregister.com)

PORT CLINTON — It's easy to call Port Clinton High School's robotics team a well-oiled machine.



The group is comprised of 22 students and lead by teacher Bobby Good. Together they form a team of dedicated, hard-working people focused on achieving their goals.



"I'm sometimes surprised by how much responsibility these kids can take on," Good said. "I suppose it's because they have great parents. We're lucky to have parental support for our team."



The team will compete this weekend in Bowling Green State University's BEST program, which stands for Boosting Engineering, Science and Technology. The theme for this year's match is agriculture.



During the last six months, students designed, programmed and built a fully-functioning robot capable of performing simple tasks for this weekend's competition. Additionally, they built a hydroponic garden, which uses nutrients and water, not soil, to grow plants.



The robot will need to traverse an obstacle course that simulates an actual farm field. The robot will need to plant seeds, pick corn and carry turnips.

The students will be judged on their project planning, marketing presentation, their exhibit, sportsmanship and robot performance.

"It's quite an experience," student Melvin McCord said. McCord, along with Dylan and Caleb Ireland represent the senior members of the team. They were joined by student Jerold Sedko to build this year's robot.

"It's great that we get to do do this hands-on work in school," Caleb Ireland said. "We get to turn nothing into something."

Most of the the robot, including its programming, was made from scratch.

"It's great that we get to do do this hands-on work in school," Caleb Ireland said. "We get to turn nothing into something."

Most of the the robot, including its programming, was made from scratch.

"This isn't just an awesome robot competition, it gets kids to learn," Good said. "We're lucky we don't have to leave Port Clinton to do this kind of work on a daily basis."

Reach reporter Patrick Pfanner at [ppfanner@sanduskyregister.com](mailto:ppfanner@sanduskyregister.com), follow him on Twitter [@PatPfanner](https://twitter.com/PatPfanner) and follow the Register at [facebook.com/SanduskyRegister](https://facebook.com/SanduskyRegister)

# Appendix B: Falcon Best Recruitment & Recognition cont.

## Falcon Best Recognition

**BG INDEPENDENT NEWS**

### High school teams Bet the Farm in BGSU robotics competition

**TOPICS:** Falcon BEST Robotics Competition | BGSU College of Technology | Bowling Green State University



**WRITTEN BY:** DAVID DUPONT | OCTOBER 9, 2016  
**By DAVID DUPONT**

**BG Independent News**

Robots invaded from country Saturday.

They came with only the best intentions though.

Farmland in question was a course set up on the floor of the Smith Center at Bowling Green State University. The robots were miniature farm tractors tricked out by 17 teams from high schools from around the state and Indiana.

The teams came to compete in the fourth Falcon BEST Robotics Game Day... this year the theme was Let the Farm.

The "farm" in this case was divided into four quadrants, one for each team. The teams had to maneuver their machines through the course to collect and plant corn seeds, harvest corn cobs from stalks as well as plant lettuce, and harvest lettuce and pumpkins – all plastic facades.



For Laura Dietz, the advisor for the Bowling Green High School team, the event, gives students an chance "to learn engineering process and problem solving."

For the Dubois team that problem solving involved a working on a last minute adjustment to their robot's arm.

That's all part of the competition, said Brandi Barhite, a member of the Falcon BEST committee.

"If something breaks down you have to make adjustments," she said. In that, the robotics competition is much like a sports event.

That wasn't the only way. Parents were on hand to cheer on the teams. School mascots added to the spirit. And a couple drummers beat out their cadences between the three-minute rounds of competition. Then there were the troubadours contributing timeless bits of encouragement.

The 17 teams, Barhite said, were the most since the competition started in 2013. The university provides all the robotic kits. The cost means it must expand the field slowly, and seek corporate sponsors. Lathrop Corp. And First Solar were this year's sponsors.

She said President Mary Ellen Nacey was key to bringing the program to BGSU. She wanted something to promote the study of science, technology, engineering and math on campus.

More than 300 students competed this year. While the focal point is the robotics competition where teams maneuver through the farm course vying to see who can harvest the most, the competition has other aspects.

Students present marketing plans as well as a design t-shirts, websites and make streaming videos.

"We don't want students to think engineering is only about robotics," she said. "There's a lot of avenues students can take in engineering, including working on marketing and communications for a company."

Teams can range in size from four to 30, with students choosing to specialize in certain activities.

The competition is "definitely a recruiting tool for BGSU," Barhite said.

The dozens of student volunteers helping to run the event, she said, were competitors during their high school days.

One of the Bowling Green team members might be one of those switching from competitor to volunteer next year.

Cameron Roehl has been on the team since he was a freshman, competing in the inaugural event. Next year he plans to attend BGSU to study mechanical in the College of Technology.

As someone long interested in robotics, being on the team is a natural. As the only senior on the team, Roehl had to develop leadership skills.

David Tyson, a seventh grader, it new to the team. He said a teacher who's a family friend encouraged him to join. While the team didn't make it to the semifinals, he said, "we're really proud of what we did... We had fun."

Driving the robot through the course was the most fun, he said, and all four team members on hand Saturday got a chance to drive. The other two team members there were Peyton Norman, a junior, and Gabriel Mehl, a seventh grader.

Roehl said that the team has made improvements every year, and with the young members of the team, he hopes that will continue.

At the end of the day, Hamilton Southeastern High School, from Fishers, Indiana, dominated the awards. Barhite said they are always a strong competitor.

The team took first place for the overall BEST award and in the robotics competition and Top Gun honors, for scoring the most points in a single round, as well as top prizes in CAD design, Founders Award, best marketing presentation, most robust machine, best engineering notebook.

Cardinal Stritch Catholic High School in Oregon also won a number of awards – team video design, web page design, best spirit and sportsmanship, and fourth place in the robotics competition.

Perrysburg High School was honored for most photogenic machine.

Other awards given out were: exhibit and interview, St. Ursula Academy; t-shirt design, Vanguard Technology Center; second place in robotics competition, St. Francis de Sales School; third place in robotics competition, Port Clinton High School; second place BEST Award, Millstream Career Center; and third place BEST Award, Maumee Valley Country Day School.

The seven teams eligible to compete in the regional competition in December in Fargo, North Dakota are:

Hamilton Southeastern; Millstream Career Center; St. Francis de Sales School; Maumee Valley Country Day School; Port Clinton; Cardinal Stritch; and Anthony Wayne.

Posted by: David Dupont on October 9, 2016.

B

# Appendix B: Falcon Best Recruitment & Recognition cont.

## Falcon Best Recognition

### High school robotics teams to compete at BGSU Oct. 8

TOPICS: Falcon BEST Robotics



PHOTO BY SUPERHERO/ISTOCKPHOTO.COM

#### From BGSU OFFICE OF MARKETING & COMMUNICATIONS

Teams of students from 17 area high schools and middle schools will showcase their talents during the fourth annual Falcon BEST Robotics competition Oct. 8 at Bowling Green State University.

Area schools with teams competing this year are: Anthony Wayne High School, Bowling Green High School, Cardinal Strickland Catholic High School, BROVE Career Center, Hamilton Southeastern High School, Maumee Valley Country Day School, McCook High School, Millstream Career Center, Patrick Henry High School, Paulding High School, Perryburg High School, Port Clinton High School, Sandusky Central Catholic School, St. Francis de Sales School, St. Theda Academy, Sylvan Hills (Southview High School), and Vanguard Technology Center.



Game Day kicks off in the Stroh Center at 9:30 a.m. with opening ceremonies, which will include a welcome and parade of robots. The competition will follow at 10 a.m. as the teams and their robots master the Die Faux 2016, a combination of skill and strategy. The event will conclude with awards at approximately 5:15 p.m.

The public is encouraged to attend Game Day to support the teams and their robots as they compete; all events are free.

Students are coached by dedicated and enthusiastic teachers and team members, some of which come from the professional tech community. Each team is provided with an identical kit of parts and equipment, and then spends a month and a half designing, building and testing a remote-controlled robot that the team expects to outperform those created by its competition.

The BEST Award is presented to the top three teams that exemplify the concept of BEST – Boosting Engineering, Science and Technology. Criteria include creativity, teamwork, sportsmanship, diversity of participation, application of the engineering design process, ethics, positive attitude/business and school/community involvement. Awards are also presented to the top three robotics game teams, and to the top teams that compete in oral presentations, educational displays, project engineering notebook and spirit/sportsmanship. Now award categories for this year include: Most Photogenic Machine, Best Web Page Design, Best CAD Design, Best Team Video and Top Gun (most points scored in a single round).

Falcon BEST is hosted by BGSU's College of Technology, Architecture and Applied Engineering and the Northwest Ohio Center for Excellence in STEM Education. Sponsors include BGSU and BGSU's College of Business. Corporate sponsor Lathrop, who has been involved since the first robotics competition, has been joined by First Solar this year. Both corporations have committed to supporting the student competition each year. Support from sponsors ensures students the continued opportunity for early involvement in their field of interest, while preparing them to become the industry's future leaders.





# Appendix C: Math Camp Recognition cont.

## Math Camp Recognition

**BGSU NEWS**  
SCHOOL GENERAL SPORT ARTS/ACTS ALUMNI

### ASPIRING MATH TEACHERS MULTIPLY THEIR LEARNING WITH TRIP TO CHINA

By Amberlye



BGSU teachers had the opportunity to put their teaching careers on a global stage as part of the long and illustrious Mathematics Learned in China course. Led by associate professor Dr. Gerald Haines, 12 aspiring teachers from all over the state took a summer break to study in Beijing, China, where they worked with their Chinese partners to implement their changes in the classroom. The trip was a truly transformative experience.

The journey to the course began three years ago through Haines' collaboration with a group of pre-service teachers who wanted to be able to teach in the field in China. There is a need to get more support for the project, a College Math Center has recruited students and college partners to learn more about the course.

At the time, the group of pre-service teachers had to observe the work being done in the field. When the time came, they asked if a group of students would be willing to travel to Peking Normal University (PNU) and share our ideas about mathematics teaching practices. PNU is one of the best universities in China and has been in the United States.

Haines began the process of putting together a course about Chinese mathematics education which was part of that course being the starting of BGSU's mathematics program with partners at PNU.

This past year was the first course offering in which the students – mostly **Math Education** students at **Mathematics Learning, Math Education** majors who hope to teach mathematics – traveled with faculty to teaching sites and work alongside the Chinese mathematics faculty at PNU.

It was to prepare for the math camps, BGSU students spent two to three days of teaching to prepare their students to put on their camps that were conducted for over 100 Chinese middle school students.

"After running the math camps, we thought it would be beneficial to have more BGSU students get up with some of the PNU students," said GGSU's Haines. "This was the first step that would allow all the other things to be done to build a successful math camp, including visiting local markets, museums, temples and many other things. We also discussed the activities and history that they would be used to be used as a way to get to know the culture while we learned about how to teach a lesson."



In addition to carrying on a tradition of being responsible for providing training, the math camps provided excellent opportunities for working closely with the middle school students.

Learning goal of Math Camps is to represent the problem-solving and teamwork skills of the students," Haines said. "The activities are designed to engage a team, especially what more people think of when they think of math activities. Most are games, decision-making or debate topics that are fun, but also provide a challenge to the students. Many also require the students to work together to solve problems."

After successfully implementing the format of the math camps in the middle school, BGSU students will be able to work with their middle school partners in the next few years to help more students.

"We have experienced there to be a very successful math camp in China and we are able to do it in the United States. The math camps to meet the needs of their students," Haines said. "The history and mathematics of the course is a large part of our curriculum. We believe that PNU professors and students in their countries will continue to do it."

The course provided many students to look through their classes passed for teaching and math.

"As a teacher, I want to bring my own experiences to students," Haines said. "Math camps give us a platform to have fun with students in a different way than doing school. It's important to have different activities that show a sense of math camps that can be really connected."

Not only do the camps provide students with an opportunity for students to develop their teaching and learning skills, it also allowed for the engagement in activities that they find it was not so difficult for a math camp.

"It is good to have more of our own experiences," said Haines' partner teacher. "It was great to have the opportunity to learn about a different culture inside and outside of a classroom. This will be a great experience for me because I will be able to take in my students' different backgrounds and use them as a more effective classroom experience."

The previous teachers also recognized the importance of an experienced working with students of different backgrounds.

"One of the biggest things I have learned is that the students in China are much more active in the classroom than students in America. They are more engaged in the classroom. They are more active in the classroom. They are more engaged in the classroom."



In addition to their own experiences, the math camps, BGSU students had the opportunity to travel to more than 100 sites in China and experience the unique Chinese culture of their partners in the field. In fact, at 21 degrees.

Haines will continue to provide students with the training, from July every year. He will continue to offer the training to students of the BGSU-CTM students, year.

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# Appendix E: NWO STEM Inquiry Series Advertising Samples



**Introducing NWO's Fall STEM Professional Development Series**

**Facilitated by  
NASA  
Glenn Research Center**

**Engineering Design Challenge  
LET IT GLIDE**

**WHO:** 5th-8th Grade Educators (pre-service teachers, classroom teachers, STEM club leaders, informal educators)

**WHAT:** A professional development training facilitated by NASA Education Specialists to engage educators in the Engineering Design Challenge module, Let it Glide.

**WHERE:** BGSU, Olscamp Hall Room 225

**WHEN:** Oct. 10 & 11, 5:00-8:00pm (must attend both evenings)

**AND THEN WHAT?:** Connect your students with real-world engineering experiences! Educators implement the Let it Glide Engineering Design Challenge with their students as it fits into their curriculum or program with support from NASA Glenn Research Center.

**COST:** \$25  
Which covers:

- Meals
- All materials for the training
- Hands-on STEM learning activities with downloadable facilitation guide
- Supporting slide presentation to assist in facilitating the challenge with students
- Exciting video introduction to the challenge and related NASA research
- Live, in-person, and Web-based professional development opportunities on the challenge and the engineering design process
- Opportunities for students to connect LIVE with NASA scientists and engineers
- Ability to submit student design challenge solutions to NASA and share with participants across the country

**WHAT IS THE CHALLENGE?**

**How can you make a glider using a shoebox with the longest glide slope ratio possible?**

Students will work in engineering teams to design and build a glider that incorporates a full-sized shoebox and explore the four forces of flight, aeronautical design, and materials to achieve the longest glider flight.

Using the engineering design process (<https://www.teachengineering.org/12/engineering/designprocess/>), students will improve upon their original design ideas through multiple iterations, simulating real-world engineering challenges.

**What is an Engineering Design Challenge?**  
An engineering design challenge is a detailed yet flexible content package of engaging hands-on activities.

- Students use the Engineering Design Process to solve real-world engineering problems in an authentic, hands-on and meaningful approach to science, technology, engineering, and mathematics (STEM) Learning.

**The Challenge provides:**

- At least 10 hours of instruction/contact time in a STEM learning environment
- Background scientific information
- Student investigation and data sheets
- Assessment options and evaluation rubrics

**Engineering Design Challenges:**

- Can be used in any science, technology, engineering classroom, club, camp, or STEM Out-of-School Time program.
- Are aligned to Ohio Learning Standards in Science Expectations for Technology and Engineering Design Grades 5-8 (Grades 5, 6, 8 Physical Science concepts) and middle school standards for Engineering Design and Forces and Interactions (NGSS).
- Are team-focused to encourage cooperative learning in a collaborative environment rather than a competitive one.

[Click here](http://tinyurl.com/gf5kxpo) to register online! (<http://tinyurl.com/gf5kxpo>)

**Payment Information:**  
After completing the online registration you will be forwarded to a page where you can access the online [Credit Card Payment System](#). You can either pay online through this system or mail a **check or purchase order (made payable to BGSU)** to the following address:

**NASA PD Series**  
241 Math Science Bldg.  
Bowling Green State University  
Bowling Green, OH 43403

Paying by [credit card?](#)

If you are having problems with the above link, please use the following link: <https://commerce.cashnet.com/BGSUCDS>

*Note: You can use Title I Part A Funds, Title III Funds or School Improvement Funds.*

**Questions: contact Jenna Pollock at [polloc@bgsu.edu](mailto:polloc@bgsu.edu)  
Phone: 419.372.2739**



NASA, Glenn Research Center is a partner of NWO

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## Appendix E: NWO STEM Education Inquiry Series Advertising Samples cont.



### **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. Form 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 2016 sessions are FREE and open to K - 12 math teachers and college faculty/staff 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.

**BS-MTC meets from 8:30 - 8:30 PM on the following dates. You can attend 1, 2, or 3 meetings depending on your schedule!**

- Monday, September 12, 2016
- Tuesday, October 11, 2016
- Wednesday, November 16, 2016

#### **All meetings will be held at:**

Room 133 Life Science Building  
Bowling Green State University  
Bowling Green, OH 43403

If you would like more information, please contact Dr. Debra Gallagher, Bowling Green State University, at [dgallag@bgsu.edu](mailto:dgallag@bgsu.edu) or 419-704-1920.

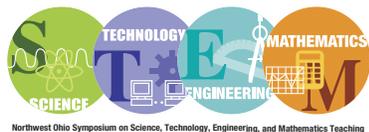
Please use the link below to register for one or more of the 2016 sessions.

<https://goqz.com/forms/gxB3T9Z2U0Mc3J602>



Black Swamp Math Teachers' Circle is a partner of NWO

# Appendix F: NWO Symposium Advertising



## 2016 NWO Symposium

Featuring Keynote Speaker **Dr. Jodi Haney**  
BGSU, Professor Emeritus



**Saturday, November 19, 2016**

8:30 a.m. to 4:00 p.m. | Olscamp Hall  
Bowling Green State University

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

[bgsu.edu/nwosymposium](http://bgsu.edu/nwosymposium)

BOWLING GREEN STATE UNIVERSITY **BGSU**

**Featuring a keynote presentation by Dr. Jodi Haney!** After teaching middle and high school science in the public schools for nearly a decade, Jodi spent the next 20+ years on faculty at Bowling Green State University. She earned her Ph.D. in Curriculum and Instruction from The University of Toledo with a focus in science and middle childhood education and educational psychology. Haney, recently retired, serves as a Professor Emeritus at BGSU with a joint appointment in the College of Education and Human Development and in the College of Arts and Sciences. She has taught numerous science education courses, curriculum courses, technology courses, and courses in environmental sustainability. A productive grant writer, Jodi earned over 20 million dollars in local, state, and federal funding to support science and environmental education programs in K-12 schools throughout the region. Dr. Haney has authored over 30 peer-reviewed publications, made over 50 scholarly presentation, and has served as an educational consultant to well over 100 Ohio schools. Haney believes that teaching is the essence of her identity. She is passionate about her role to inspire joy and the love of learning through active, engaged, and authentic experiences both within the classroom and in the local community.



**Pre-Registration - \$35**  
(deadline November 15)

**On-site Registration - \$45**

**Undergraduate Students - \$5**

Multiple Participant Discount (\$30/person)  
for 5 or more participants from the  
same school

**Registration Fee Includes:**

- 7 hours of high quality professional development
- Conference bag
- Keynote address by Dr. Jodi Haney, BGSU Professor Emeritus
- Morning refreshments & full lunch

**Contact Hour Certificate Available**

Sponsored in part by



**BGSU**

4 x 6 Postcard

For more information or to register visit: [bgsu.edu/nwosymposium](http://bgsu.edu/nwosymposium)

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## Appendix F: NWO Symposium Advertising cont.

### Recruitment Email - Attendee



### 2016 NWO Symposium

Featuring Keynote Speaker Dr. Jodi Haney  
BGSU Professor Emeritus



**Saturday, November 19, 2016**  
8:30 a.m. to 4:00 p.m. | Olscamp Hall  
Bowling Green State University

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

[bgsu.edu/nwosymposium](http://bgsu.edu/nwosymposium) 

**2016 NWO Annual Symposium on Science, Technology, Engineering, and Mathematics Teaching**

**Online registration is now open!**  
[Click here](#) to register

**November 19, 2016**  
**8:30 a.m. to 4:00 p.m.**

**Olscamp Hall @  
Bowling Green State University**

**Registration Fee:**

- \$35 (deadline Nov. 15); \$45 onsite
- \$5 Undergraduate Students
- *Multiple Participant Discount (\$35/person) for 5 or more participants from the same school*

**Registration Fee Includes:**

- 7 hours of high quality professional development
- Conference bag
- Keynote address by Dr. Jodi Haney, BGSU Professor Emeritus
- Morning refreshments & full lunch

**Contact Hour Certificate Available**



### Featuring a keynote presentation by Dr. Jodi Haney!

After teaching middle and high school science in the public schools for nearly a decade, Jodi spent the next 20+ years on faculty at Bowling Green State University. She earned her Ph.D. in Curriculum and Instruction from The University of Toledo with a focus in science and middle childhood education and educational psychology. Haney, recently retired, serves as a Professor Emerita at BGSU with a joint appointment in the College of Education and Human Development and in the College of Arts and Sciences. She has taught numerous science education courses, curriculum courses, technology courses, and courses in environmental sustainability. A productive grant writer, Jodi earned over 20 million dollars in local, state, and federal funding to support science and environmental education programs in K-12 schools throughout the region. Dr. Haney has authored over 30 peer-reviewed publications, made over 60 scholarly presentations, and has served as an educational consultant to well over 100 Ohio schools. Haney believes that teaching is the essence of her identity. She is passionate about her role to inspire joy and the love of learning through active, engaged, and authentic experiences both within the classroom and in the local community.

**For more information or to register visit:**  
[bgsu.edu/nwosymposium](http://bgsu.edu/nwosymposium)

Sponsored in part by:



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## Appendix F: NWO Symposium Advertising cont.

### Recruitment Email - Presenter

**Deadline: September 26, 2016**



**The Northwest Ohio Center for Excellence in STEM Education**

brings you the 2016 NWO Symposium on Science, Technology, Engineering, and Mathematics Teaching

**Saturday, November 16, 2016**  
8:30 AM - 4:00 PM  
Oiscamp Hall, Bowling Green State University  
Bowling Green, OH 43403

Featuring the 2016 keynote speaker:  
Dr. Jodi Hanley  
BGSU, Professor Emerita

### Presentation Proposal Information

Thank you for your interest in presenting at the 2016 NWO Symposium on Saturday, November 16th 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 26](#)

All presentation proposals must be submitted by **SEPTEMBER 26th at 9:00 PM**. Beginning September 27, NWO staff will review the proposals and notify prospective presenters if their proposal has been accepted. Accepted presenters will be not be charged a registration fee.

For more information visit the Symposium website at:  
<http://go.gsu.edu/nwosymposium>

Questions? Contact: [two@go.gsu.edu](mailto:two@go.gsu.edu)

### 2016 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 northwest 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 best 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.

| F

# Appendix G: OJSHS Advertising & Recognition

## Recruitment Email Sample



**Registration is now OPEN!**

**Join us for the 54th Ohio Junior Science and Humanities Symposium.**

**March 15-17, 2017**  
**at Bowling Green State University**

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**Important Dates for the 2017 Regional JSHS!**

Registration is open until **Sunday, February 19, 2017 @ 5:00pm**. Please use the link below to register. The registration link is for all participation levels:

- Student Presenters
- Student Delegates
- Parents
- Teachers
- Guests

No registrations for any of the above groups can be accepted after **February 19, 2017 @ 5:00pm**.

Click here to register: <http://www.cvent.com/d/kvqj37>

- Notification to students to confirm participation in oral presentations will take place the **week of February 27, 2017**
- All students, teachers, guests, parents, and STEM professionals/volunteers must complete registration to attend the **Regional JSHS by February 19, 2017 @ 5:00pm**.

More information on the 2016 Ohio JSHS can be found at [http://cosmos.bgsu.edu/nwo\\_ojshs/](http://cosmos.bgsu.edu/nwo_ojshs/)

Questions should be directed to NWO ([nwo@bgsu.edu](mailto:nwo@bgsu.edu)).

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The National Association of Secondary School Principals sponsored the project in its 2016 National Library of Student Councils and Activities for 2016-17

## Appendix G: OJSHS Advertising & Recognition cont.

### OJSHS Recognition

New post

### Young scientists showcase research at annual symposium

For more than 50 years, the Ohio Junior Science and Humanities Symposium has provided a competitive forum for the state's budding young scientists to present the results of their research, with the chance to advance to national and international contests. The 54th edition of the Ohio symposium will be held March 15-17, 2017, at Bowling Green State University. To learn more about the event, and organizers' efforts to recruit more minorities and girls to participate, we contacted the symposium's regional director, Emilio Duran, associate professor in the university's School of Teaching and Learning and the Department of Biological Sciences, and Susan Marie Stearns, assistant director of programming and development, Northwest Ohio Center for Excellence in STEM Education, a symposium sponsor. The two collaborated on their answer to our questions:

**Q: Give us some background on the Ohio Junior Science and Humanities Symposium.**

A: The Ohio Junior Science and Humanities Symposium (OJSHS) is designed to challenge and engage future scientists and engineers (grades 9-12) in STEM research that advances scientific knowledge. At the OJSHS, students compete for scholarships and recognition by presenting the results of their original research before a panel of judges and an audience of their peers.



Emilio Duran at BGSU and Susan Marie Stearns from Northwest Ohio Center for Excellence in STEM Education chat with us about a research opportunity for Ohio students.

Junior Science and Humanities Symposia are held throughout the United States. In Ohio, the JSHS is sponsored by Bowling Green State University (BGSU) and the Northwest Ohio Center for Excellence in STEM Education (NWO), with continued support of the U.S. Army Research Office, U.S. Office of Naval Research and U.S. Air Force Office of Scientific Research.

**Q: What kind of projects do the students submit?**

A: Students complete original research on a variety of scientific topics and present their findings in a paper or poster presentation.

**Q: What prizes go to the winners? Can they go on to a higher level of competition?**

A: For the Ohio regional finalists:

- Five will receive expense-paid trips to the National JSHS to be held April 26-30, 2017, in San Diego, Calif. The National brings together more than 400 participants in a program of educational and scientific exchange.
- The first-place and second-place Ohio regional finalists will be invited to present their original research at the National JSHS.
- A total of \$4,500 in undergraduate tuition scholarships, awarded in \$2,000, \$1,500 and \$1,000 increments, will be given to three regional symposium finalists.



# Appendix H: Army Education Outreach Program (AEOP): Support for Ohio Junior Science & Humanities Symposium Recognition cont.

## AEOP Recognition

**aeop**  
ARMY EDUCATIONAL  
OUTREACH PROGRAM

ABOUT PROGRAMS GET INVOLVED

ARMY & OUTREACH  
IT ST

### NEWS

#### AEOP EXPANDS COMMUNITY OF PARTNERS TO PROMOTE STEM INITIATIVES

Three additional partners awarded grants to increase diverse student participation in STEM.

**Columbus, OH – August 15, 2016** – The Army Educational Outreach Program (AEOP), in collaboration with Babelia, has awarded grants to three organizations and institutions to expand student participation in enriching science, technology, engineering and math (STEM) exploration and learning, particularly for underserved students. AEOP offers students and teachers Army-sponsored programs that effectively engage, inspire and attract the next generation of STEM talent.

These second-round grant recipients will join a community of eight like-minded AEOP partner organizations awarded competitive grants in April 2016.

Through AEOP's suite of programs, students from elementary school to college, representing all proficiency levels and ethnic, economic and academic backgrounds, participate in real-world experiences involving STEM disciplines. Scientists, technology experts, engineers and mathematicians, who act as mentors and guides, introduce students to the various opportunities in STEM fields through hands-on experiences and provide advice for technical skill development and career planning.

"We've seen firsthand the power of partnering with strong local communities to provide even more students with high-quality STEM learning and mentorship," said Jeffrey Singleton, Director of Basic Research, Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology or ASA(ALT). "By further expanding AEOP's network, we are able to ensure students from all backgrounds, particularly those from underserved and underrepresented communities, have the opportunity to engage in programs proven to help students develop knowledge and skills that prepare them for real-world careers."

AEOP's new partners were selected specifically for their leadership in STEM learning and outreach to African-American, Hispanic, female and military-connected students. Together with these partners, the Army seeks to enhance existing programs to provide the highest quality experiences and contribute to an exceptionally prepared workforce.

"Hands-on learning and career exploration opportunities allow students to develop a sense of possibility for their own futures," said Aimee Kennedy, Vice President, Education, STEM Learning, & Philanthropy at Babelia. "For many students, these experiences are breaking down stereotypes of what STEM careers look like and how to pursue them."

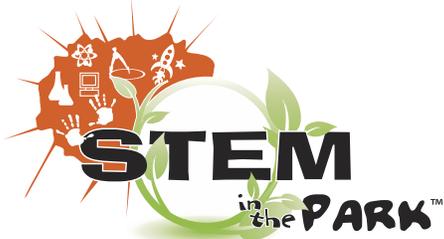
The grantees will each receive \$50,000 awards to facilitate meaningful collaboration that will ultimately integrate with or enhance the suite of opportunities already offered by AEOP. Second-round recipients include:

**Northwest Ohio (NWO) Center for Excellence in STEM Education (Bowling Green, Ohio):** The partnership will increase the number of underrepresented students participating in the Ohio Junior Science and Humanities Symposium (OJSHS) in March 2017, and beyond. NWO will recruit and train 30-50 underrepresented students and their teachers from Toledo Public, Lima City and Fosteria school districts with the purposes of engaging the students in scientific research and STEM studies.

**About AEOP:** The Army Educational Outreach Program (AEOP) is comprised of Army-sponsored research, education, competitions, internships, and practical experiences designed to engage and guide students and teachers in science, technology, engineering, and mathematics (STEM). From elementary school through graduate school, students at all levels, interests, ethnic, economic, and academic backgrounds are encouraged to participate in hands-on programs in STEM disciplines. More information is available at: [www.usaeop.com](http://www.usaeop.com)

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# Appendix I: STEM in the Park Advertising & Recognition



**STEM**  
in the **PARK**<sup>™</sup>  
Science, Technology, Engineering, and Mathematics

**FREE FAMILY EVENT**

**Saturday, September 24, 2016**  
10 a.m. to 2 p.m. | Perry Field House  
Bowling Green State University

5 x 7 Postcard



**SAVE TIME... Pre-register online! at [www.STEMint.com](http://www.STEMint.com)**

BOWLING GREEN STATE UNIVERSITY

## STEM in the Park is making a **SPLASH** with the all new



**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 two **NEW** activity zones for 2016... **H<sub>2</sub>O Zone** and **Food Science Zone**. Back by popular demand is the **STEM Stage** featuring Super-Sized Demos from the Toledo Zoo and Imagination Station. Also, come explore the expanded **Digital Media Zone**.

As part of our new **Food Science Zone**, we are once again teaming up with **Food for Thought** in an effort to help squash hunger. Please bring a food item or a basic household/personal care necessity with you to donate. All donations will once again stay in the BG Community and will be taken to the Cocoon Shelter. There will be a mobile pantry on site to accept your donations.



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

**#GetyourSTEMon**

Presenting Sponsors



Community Sponsors



General Sponsors



161067 2016 10.000



# Appendix I: STEM in the Park Advertising & Recognition cont.

## Recruitment Email - Exhibitor



### Let's Get Ready For STEM in the Park 2016!

**September 24, 2016  
10am-2pm  
Perry Field House  
BGSU**

We are excited to invite you/your organization to participate at NWO at our seventh annual STEM in the Park event! Last event drew over 4,300 people! This is due to amazing exhibits YOU! This family day of exciting hands-on STEM activities is thanks to your participation!



### 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 ST Stations arranged in an open, festival-like atmosphere. We invite you to activity or interactive display to bring to the event. In 2015, over 4,300 people including some 1,500+ children attended STEM in the Park with their parents, grandparents, teachers and neighbors. STEM in the Park is a highly visible unique opportunity for businesses, universities, colleges, and non-profit organizations to increase awareness and showcase regional STEM opportunities and innovation across northwest Ohio. We anticipate close to 4,500 people involved in the 2016 event.

#### NWO's STEM in the Park provides:

- An eight foot table
- Free printing of STEM in the Park Take Home Activity cards for your table
- Tablecloth
- Two chairs
- Free lunch for all of your station staff & volunteers
- Additional space or tables for large displays/activities is available
- Your company, college, department, or campus organization name will be featured on our website and in some larger marketing materials for this event

#### 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 examples, 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](mailto:jpolloc@bgsu.edu)) or Dr. Emilio Duran ([eduran@bgsu.edu](mailto:eduran@bgsu.edu)), School of Teaching and Learning.

Information regarding the previous years' STEM in the Park events can be found at [www.STEMinthePark.org](http://www.STEMinthePark.org)



NWO/COEMCE  
241 Math Science, BGSU  
Bowling Green OH 43403  
419-372-2718  
[ceo@bgsu.edu](mailto:ceo@bgsu.edu)

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](mailto:jpolloc@bgsu.edu). We will see that you receive future communications regarding STEM in the Park 2016.



# Appendix I: STEM in the Park Advertising & Recognition cont.

Recruitment Email - Attendee



Science, Technology, Engineering, and Mathematics

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## MEET US AT THE PARK

For the *7th Annual*  
**STEM in the Park**

**Saturday, September 24, 2016**  
**10:00 a.m. - 2:00 p.m.**

Held at the Perry Field House  
**Bowling Green State University**

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

**SAVE TIME... Pre-Register Online!**

[Click here](#) to Pre-Register and be entered into a drawing to win a \$25 gift card to Amazon!

[BGSU Campus Map](#)

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**STEM in the Park is making a SPLASH with the all new**



MAKE A SPLASH WITH STEM

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 two **NEW** activity zones for 2016... **H2O Zone** and **Food Science Zone**. Back by popular demand is the **STEM Stage** featuring Super-Sized Demos from the Toledo Zoo and Imagination Station. Also, come explore the expanded **Digital Media Zone**.



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As part of our new **Food Science Zone**, we are once again teaming up with Food for Thought in an effort to help squash hunger. Please bring a food item or a basic household/personal care necessity with you to donate. All donations will once again stay in the BG Community and will be taken to the Cocoon Shelter. There will be a mobile pantry on site to accept your donations.

[Click here](#) to download a (pdf) that list all the things needed.

Thank you! Your generous support allows Food for Thought to continue serving our community in a thoughtful manner!

Visit the website for more info: <http://www.foodforthought.org/>



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## Back by Popular Demand in 2016!

### The STEM Stages

The indoor STEM Stage features **Super-Sized Demos** from The Toledo Zoo and **Imagination Station** with a new show starting every 30 minutes.

The outdoor Musical Stage under the tent will feature several performances by popular vocal and drumming groups like the TSA Steel Drum Band and the BGSU a cappella group *AcrossChicks* (among several others).

# Appendix I: STEM in the Park Advertising & Recognition cont.

## The Science of Sports

Check out this expanded zone dedicated to the Science of Sports including a **NEW Golf Simulator!** Come participate in the **Long Drive Contest!**



## 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](http://www.STEMinthepark.org)

AF&T  
American Chemical Society - Toledo Local Section  
Anthony Wayne FFA  
RC Insurance Group  
BGSU Admissions  
BGSU Biology Graduate Student Association  
BGSU Curriculum Resource Center, University Library  
BGSU Department of Architecture and Environmental Design  
BGSU Department of Public & Allied Health  
BGSU Dept. of Physics & Astronomy  
BGSU Digital Arts  
BGSU Early Childhood Science  
BGSU Finlandia  
BGSU Hill Tech University  
BGSU Marine Biology Association  
BGSU School of the Earth Environment and Society  
BGSU Student Nutrition Association  
BGSU The Beta Sigma  
EGSU Department of Visual Communication Technology  
Bowling Green Early Childhood Learning Center (Montessori)  
Bowling Green Fire Division  
Bowling Green Science Education Council (BGSOC)  
Challenge Learning Center of Lake Erie West  
Costco Wholesale  
E.S. Wagner Company  
EPD Environmental Services  
Folios BCST  
Fire Solar  
Great Lakes Science Center  
Greater Cleveland Aquarium  
Grow Next Gen and the Ohio Soybean Council  
Horizon Science Academy of Toledo  
Imagination Station  
LIFEIT  
MISSION EARTH  
Maumee Valley Historical Society  
Nathan's Nursery  
New York Life  
Nutrients for Life Foundation  
Ohio Sea Grant and Stone Laboratory  
Ohio Virtual Academy  
Robinson Elementary School, TPS  
SGOC Group  
Saturn V Education  
Saxter Village  
Science & Math Education in ACTION  
Sparks Farmyorking  
St. Ursula Academy  
Sylvan Learning  
Sylvania Historical Village  
Team Family Coaching/the Spotted RN  
Technology First  
Trayer Family Bookshelves  
The University of Findlay-Biology  
Toledo Botanical Garden  
Toledo Football Academy  
Toledo Lucas County Rain Garden Initiative  
Toledo Metroparks  
Toledo Technology Academy  
Toledo Zoo  
University of Toledo - UT STACS  
University of Toledo-SCOPE Program  
Wood County District Public Library  
Wood County District Public Library  
Wood County Hospital  
Wood County Park District  
Wood Soil & Water Conservation District

Please visit our website for event details:

[www.STEMinthepark.org](http://www.STEMinthepark.org)



# Appendix I: STEM in the Park Advertising & Recognition cont.

## STEM in the Park Recognition



TOLEDO PARENT | SEPTEMBER 2015 | TAKE PART IN ENGAGING ACTIVITIES DURING STEM IN THE PARK.

BOOKMARK THIS PAGE | EMAIL | PRINT

### Take Part In Engaging Activities During STEM in the Park

Children Of All Ages Take Part In The 7th Annual STEM in the Park

BY KELSEY REVIUS



Children of all ages will take part in a variety of activities geared towards science, math, technology and engineering at the 7th Annual STEM in the Park. Featuring interactive displays and challenging activities to keep children of all ages engaged and active, STEM in the Park has everything from giant bubbles to edible DNA. The day of fun and experimentation with your favorite school subjects will also include Super-Sized Demos from the Toledo Zoo and the Imagination Station, a Science of Sports zone to test out your physical fitness, and Roots to STEM for ages Preschool to Grade 2. Get hands on with some science experiments or challenge your tech knowledge with over 100 activities to choose from.

10am-2pm | Saturday | September 24  
Perry Field House at Bowling Green State University  
801 N. Mercier Rd. | Bowling Green  
419-372-2531 | [bgsu.edu/news/programs/STEM-in-the-park.html](http://bgsu.edu/news/programs/STEM-in-the-park.html)  
Free

### Food For Thought returns to STEM in the Park.

Food For Thought will be participating in Bowling Green State University's yearly [STEM in the Park](#) event on Saturday, September 24th. Over 4300 participants came last year and packed our trailer full of food and hygiene items for the Cocoon Shelter and even more are expected to attend this year. As a part of their new Food Science, Food For Thought will be presenting stations on urban gardening, reducing food waste, and our new food box programs.

**We need you to help us staff this event!** We need 8-10 volunteers to help engage with participants and talk about the ways that Food For Thought helps reduce waste and get good food to people who need it. Even if you haven't volunteered with us, this is a fun way to get acquainted with our mission and we will be happy to show you the ropes.

We will begin set up at 8:30 at the Perry Field House on Mercier Road at BGSU and will be there until around 2:30. If you would like to volunteer for some or all of this event, please contact our volunteer coordinator at [Laura@foodtoledo.org](mailto:Laura@foodtoledo.org).

# Appendix I: STEM in the Park Advertising & Recognition cont.

## STEM in the Park Recognition

# Sentinel-Tribune

Home ▶ News



## Science study gets sudsy at STEM in the Park

Story Comments

Print Font Size

Posted: Thursday, September 29, 2016 9:15 am

Photo by Daniel Melograna/Sentinel-Tribune

Anthony Giesige, 5, of Leipsic, plays in the bubbles provided by Sparkl on Saturday during the STEM in the Park event at Perry Field House on the campus of Bowling Green State University. STEM stands for science, technology, engineering and mathematics, and was the focus of the daylong event for children.

### Related Galleries



STEM in the Park, Saturday, Sept. 24, 2016

Photos by Dan Melograna/Sentinel-Tribune

# Appendix J: Women in STEM Advertising

## Recruitment Email - Attendee



**Women  
in STEM**  
Science, Technology, Engineering, & Mathematics

Empowering young women in science, technology, engineering, and mathematics. Fostering confidence and capabilities.

**Friday, October 21, 2016**



**For 6th through 8th Grade Girls**

NWO is excited to announce the 33rd 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!**

**Each school is limited to 20 students, please register by September 30, 2016.**

The goal of the **Women in STEM** program is to provide a rewarding experience for 6th - 8th grade girls that connects STEM education to the real world and sparks an interest in pursuing STEM majors in college and ultimately STEM careers.

**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 successful STEM role models. Break out sessions held during the program will 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.

### Schedule:

8:30 - 9:00 AM	Schools Check-In
9:00 - 9:05 AM	Welcome
9:05 - 9:45 AM	Keynote Presentation
9:55 - 10:40 AM	Session 1
10:50 - 11:35 AM	Session 2/Lunch A
11:45 - 12:30 PM	Session 3/Lunch B
12:40 - 1:25 PM	Session 4
1:35 - 2:10 PM	Closing Activities
2:10 - 2:15 PM	Adjournment and Departure

### Fee: (includes lunch)

- Students - \$20
- Adults - \$15

### Notes:

- Groups need to arrive by 8:30 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 replies, including snafus 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.
- 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/1uTrRn7nBvKk1bshDQzEEm2TC\\_an\\_55V5trOnKLU/viewform](https://docs.google.com/forms/d/1uTrRn7nBvKk1bshDQzEEm2TC_an_55V5trOnKLU/viewform)

**Registration deadline is September 30, 2016**

For additional details visit the **Women in STEM** webpage at:  
<http://www.bgsu.edu/nwo/programs/women-in-stem.html>

Sponsored in part by:

**BGSU.**



## Appendix J: Women in STEM Advertising cont.

### Recruitment Email - Presenter



**Women  
in  
STEM**  
*Science, Technology, Engineering, & Mathematics*

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

**Friday, October 21, 2016**



**For 6th through 8th Grade Girls**

**Presentation Proposals are now being accepted for the 33rd Annual Women in STEM program!**

The goal of the **Women in STEM** program at BGSU is to provide a rewarding experience for 6th - 8th grade girls that connects STEM education to the real world and sparks an interest in pursuing STEM majors in college and ultimately STEM careers.

**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 day will begin with a keynote presentation followed by break-out sessions that provide hands-on, fun-filled, critical thinking/learning activities. **Women in STEM** will help young women recognize the wide array of options available in STEM fields, inspiring them to take classes in the STEM fields throughout their educational careers.

There will be groups of approximately 15-20 girls with adult supervision in each break-out session. Sessions should include innovative and creative hands-on activities that are fun-filled and engaging. We would like to foster a collaborative growth-minded atmosphere in the breakout sessions that gives students opportunities to interact with one another and YOU as a STEM academic/career role model.

We rely on the support of our presenters and volunteers like you in order to continue to provide this unique experience for this age group of girls. We are thrilled to host the 33rd annual Women in STEM program at BGSU and look forward to your participation!

We invite submission of proposals for presentations at the 2016 Women in STEM on Friday, October 21st at Bowling Green State University.

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/1V6d89JHRnw-kNvP30ADnZGSJWDkDPg\\_YEHJUF90s8/viewform](https://docs.google.com/forms/d/1V6d89JHRnw-kNvP30ADnZGSJWDkDPg_YEHJUF90s8/viewform)

**Registration Deadline: October 1, 2016**

You will be notified of your presentation acceptance to present by October 2, 2016.

#### Schedule:

8:30 - 9:00 AM	Schools Check-in
9:00 - 9:05 AM	Welcome
9:05 - 9:45 AM	Keynote Presentation
9:55 - 10:40 AM	First Session
10:50 - 11:35 AM	Second Session/First Lunch
11:45 - 12:30 PM	Third Session/Second Lunch
12:40 - 1:25 PM	Fourth Session
1:35 - 2:00 PM	Whole Group Session/Closing Keynote
2:00 - 2:30 PM	Adjourn and Bus/Parent Pick-Up

All presenters are welcome to attend the keynote presentation and are invited to enjoy lunch on campus.

**BGSU**

