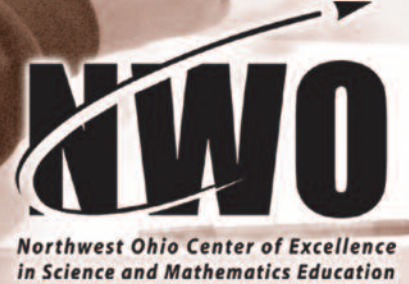
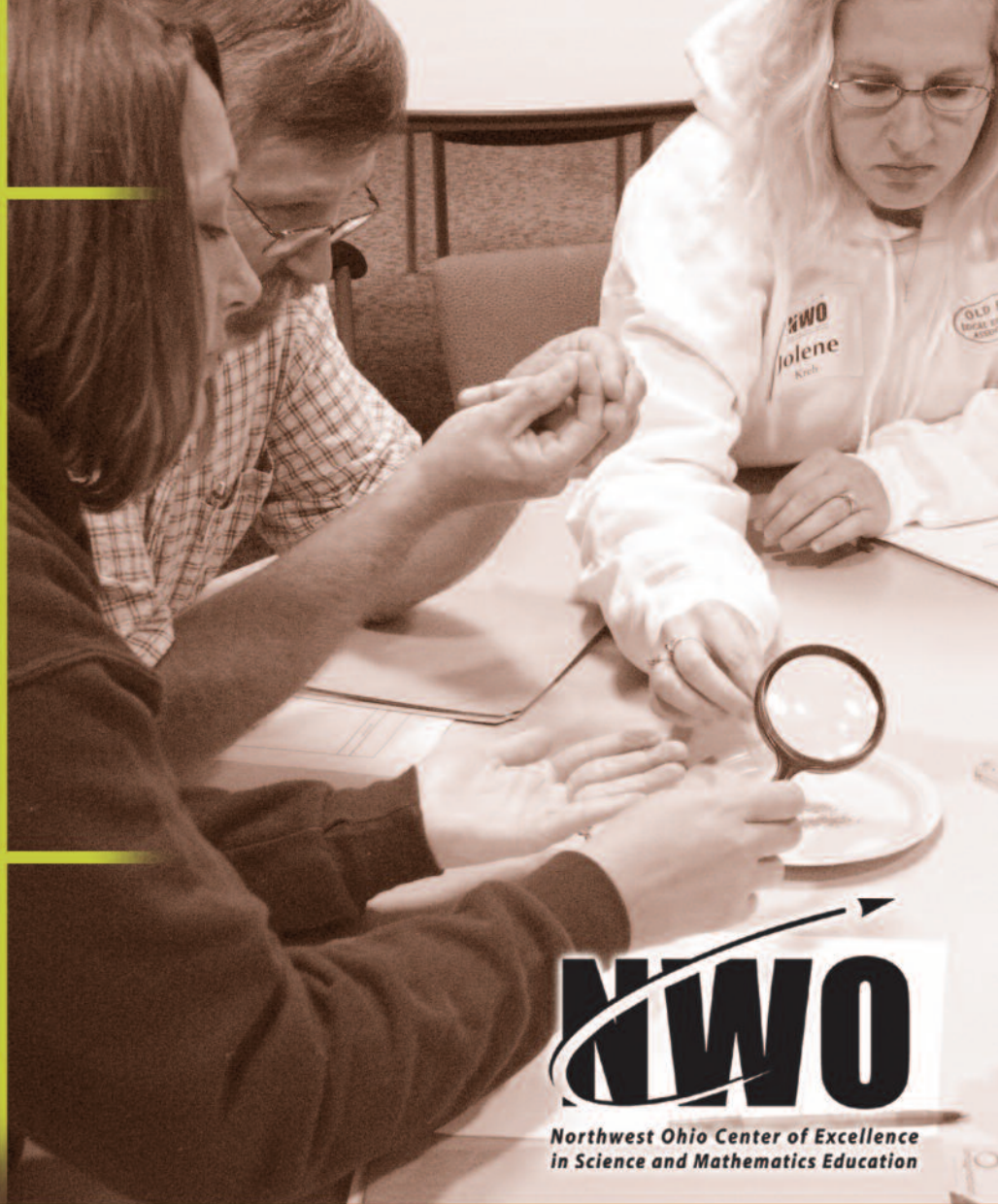


2009



NWO Annual Report

*Fiscal Year 2009
(July 1, 2008 to June 30, 2009)*

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Bowling Green State University
Bowling Green, OH

www.nwocenter.org

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NWO Mission

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

NWO Vision

The Northwest Ohio Center of Excellence 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) to stimulate the interest of young people, especially those in underrepresented groups, in these rewarding fields of study and career opportunities.

Acknowledgments

We would like to acknowledge the critical support we have received from the Ohio Board of Regents and grant programs funded by the Ohio Department of Education and our partnering business and community organizations, higher education institutions, and local school districts. We would especially like to acknowledge the contributions of the many active members of our NWO team. The dedication, passion, competence, and subsequent contribution of this team are far reaching.



Introduction

In this report, we provide both quantitative and qualitative measures documenting the effectiveness of our collective activities and accomplishments to unfold the evolving storyline of NWO during the 2009 fiscal year. This year, we built on the strong foundation that has been created over the last eight years of investing both time and financial resources to design, develop, and disseminate the NWO concept (rather than university/college-specific) through public relations efforts and professional-quality advertising materials to further demonstrate our commitment to a unified center approach. As a result of these efforts we have been able to extend our reach and our impact by increasing participation in our core activities including the NWO Inquiry Series, the NWO Symposium on Science, Mathematics, and Technology Teaching, and the NWO Future Teacher Conference.

The Center has continued to work hard to strengthen collaboration with our partner schools, including four high-needs districts (Fremont City, Fostoria Community, Lima City, and Toledo Public) as well as smaller districts and county educational service centers (ESCs) including, but not limited to, Bowling Green City, Maumee City, Perrysburg, Springfield Local, Hancock County ESC, and Wood County ESC, among others. We continued to utilize the NWO Collaborative Council (NWOCC, formerly COSMOS Collaborative Council or CCC), bringing together our school partners (teachers, principals, curriculum directors, and superintendents) once a month for regular planning and dissemination opportunities. The NWOCC has become an integral component of the Center and has helped us ensure true school-university-community partnerships. This group grew in both number and function during the 2009 fiscal year.

NWO has a clear and specific focus on providing K–16+ professional development in science, technology, engineering, and mathematics (STEM), both in content and pedagogy, and developing new knowledge in the teaching and learning of STEM. As a regional center, we aim to provide services appropriate and meaningful for all individuals and groups interested in joining our professional community. Often, non “high-needs” districts or individual teachers get left out of state-level professional development plans, yet our regional needs assessment indicated a strong desire and need for high-quality professional development in STEM across the 19 county area that we serve, especially in rural communities. As such, NWO hosts meetings and events that are open to all pre-service and in-service teachers, higher education faculty, and other business/community partners across the region. In total, 986 pre-service teachers, in-service teachers, higher education faculty, and business/community partners actively participated in at least one Center activity during the 2008-09 academic year.

We are equally committed to identifying high-needs partners (defined by low student pass rates on Ohio achievement tests, high poverty level, or lower percentages of employed highly qualified teachers within the district) that desire high-quality, rigorous, and sustained professional development. Our approach then is two-tiered: to provide high-quality professional development opportunities for interested individuals and smaller non-high-needs school groups and also to provide systemic professional development opportunities to a few targeted high-needs groups through both NWO activities and through our affiliated sponsored projects (DREAMS, NWO TEAMS, Improving Teacher Quality Grants, etc.) that will result in changes at the institutional level (school, district, college, university).

Our diverse efforts, described in detail in this report, fit best into these six categories:

- Educator professional development and outreach
- Undergraduate and graduate student educational enhancement
- Faculty professional development and collaborative education research
- K-12 school and community partner professional development and outreach
- Other professional development and outreach
- Affiliated programs



NWO Goals and Corresponding Activities for FY 2009

Goal 1: Develop the expertise of pre-service and in-service teachers and higher education faculty through research-based professional development framed by investigative science and mathematics teaching and learning.

- NWO Inquiry Series
- NWO Symposium on Science, Mathematics, and Technology Teaching
- Praxis II Preparation Workshops
- Undergraduate professional organizations
- Undergraduate and graduate teacher preparation courses or program modification
- Affiliated activities (DREAMS, NWO TEAMS, RIPE II, Project pi r²)

Goal 2: Recruit and retain students into STEM and STEM education disciplines.

- NWO Future Teacher Conference (FTC)
- Xtreme Degrees
- Ohio Junior Science and Humanities Symposium (OJSHS)
- Affiliated activities (Choose Ohio First: Science and Mathematics Education in ACTION, GRAMS, BOSEF)

Goal 3: Conduct and communicate collaborative research on how people best teach and learn science and mathematics and/or on the barriers and enablers related to current reform efforts.

- COSMOS Research Learning Community
- Affiliated activities (faculty/staff research and participation)

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

- NWO Collaborative Council (NWOCC)
- NWO Executive Board
- NWO website
- Business and community partnerships

Goal 5: Increase the leadership capacity for science and mathematics education in northwest Ohio.

- NWO Inquiry Series, Symposium, Summit, and FTC presentations (and others)
- Affiliated activities (DREAMS, NWO TEAMS)
- NWO K-12 Larabee-Stager Mini-Grants
- NWO Regional Partner Projects

FY 2009 Activity Reports

Each of the activities for the year are briefly described and a summary of all outcome data is provided. The NWO brochure can be found in Appendix A.



Educator Professional Development and Outreach

NWO Inquiry Series

Sustained professional development is offered by NWO throughout the academic year in the NWO Inquiry Series. The Inquiry Series continues to be a highly popular professional development resource in the region. The Inquiry Series is also a monthly platform for the affiliated NWO projects to bring together their respective project participants for project-specific professional development (action groups) or general professional development (feature presentations). 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 seven Inquiry Series events. Tuition scholarships for graduate credit opportunities are available through a cost share of the BGSU Graduate College. During the 2008-09 academic year, 19 teachers earned two hours of BGSU graduate credit.

The theme for the 2008-09 NWO Inquiry Series was “Sharing Common Experiences of Uncommon Quality” (see Inquiry Series brochure, Appendix B). Again this year, Inquiry Series participants rated sessions highly (4.29 on a 5-point scale). We will continue to expand this sustained professional development and adapt it to reflect emerging needs of our partners.

Detailed Participant Information

Participant Group	Total Attendance for 2008-09
Pre-Service Educators	79
K-12 Educators	249
K-12 Administrators	4
Graduate Students	1
Higher Ed Faculty	25
Community/Business Partners	6
Other	18
TOTAL	382

NWO Symposium on Science, Mathematics, and Technology Teaching (NWO Symposium)

For the last six 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 teachers to our long-term professional development opportunities and giving all participants resources and ideas they can use immediately in their classroom or setting. The one-day conference (Saturday) saw an increase in attendance of nearly 18% from the preceding year. Participants noted the impressive variety of the sessions and vendors, were pleased with more content, and had an overall positive experience. The individual sessions were rated over a range of 3.5 to 5.0 on a 5-point scale, and the overall rating for the Symposium was a 4.46 out of 5. The format for the symposium included five 100-minute sessions (“double session”) and sixty 50-minute sessions offered to participants. NWO will continue to expand this event and adapt it to reflect the emerging needs of our partners. The 2008 NWO Symposium postcard is included in Appendix C. The complete program is available online at: <http://cosmos.bgsu.edu/nwoSymposium/index.htm>

Detailed Participant Information

Participant Group	Total Attendance for 2008-09
Pre-Service Educators	153
K-12 Educators	287
Graduate Students	5
Higher Ed Faculty	28
Community/Business Partners	29
Other	7
TOTAL	509



Undergraduate and Graduate Student Educational Enhancement

Praxis II Preparation Workshops

BGSU Arts and Sciences faculty conducted three workshops on Saturday, March 21. The life science workshop was facilitated by Eileen Underwood from biological sciences. The middle childhood mathematics workshop was facilitated by Diane Mott and the AYA mathematics workshop was facilitated by Christy Miller, both from the mathematics and statistics department. Overall, the students were more pleased with the workshops than in previous years, giving the average rating of 5 out of 5 for each session. Students from colleges/universities in northwest Ohio paid \$30 to attend the workshop and BGSU students paid \$25 each; the remaining costs were subsidized by BGSU College of Arts & Sciences, College of Education & Human Development, School of Teaching & Learning, Department of Biological Sciences, Department of Mathematics & Statistics, and NWO.

Detailed Participant Information

Praxis II Preparation Session	Total Attendance for 2008-09
AYA Mathematics	5
Middle Childhood Mathematics	5
AYA Life Science	2
TOTAL	12

Undergraduate Professional Organizations

The BG-UT SECO (Science Education Council of Ohio) undergraduate professional organization hosted monthly activities to promote active involvement in the profession prior to graduation. This organization provided programming for 39 undergraduate students attending events this school year. Programs for the group included two events titled Planetarium Tour: The Sun and Season and Phases of the Moon and Toys in Space. We will continue to expand this collaboration and use it to recruit and retain students into the fields of science and mathematics education.

Undergraduate and Graduate Teacher Preparation Course or Program Modification

A critical component of pre-service and in-service teachers' professional development is their content and pedagogy coursework. Center funds are used to support faculty curriculum development, design, and modification. These awards are available to higher education faculty and instructors in the NWO region and provide a range of \$500 - \$2500 in support. The following two courses were developed at The University of Findlay using Center funds.

- EDSP 609: Advanced Methods in Teaching High School Science
- EDSP 610: Modern Concepts in Life Science

Similarly, the Developing Regional Excellence for Achievement in Mathematics and Science Education (DREAMS) program partnered with BGSU faculty in developing new university specializations and courses. We will continue to infuse research regarding best practices into these courses so that teachers do not face a mismatch between the teaching advocated in STEM education literature and the teaching methods employed in their teacher preparation programs and courses. The titles of the new courses are listed below. Developed syllabi and supporting documents for these new courses are available upon request.

- EDFI 680: Using Assessment & Research to Improve Practice
- BIOL 580: Reptiles in the Classroom
- EDFI 677: Contemporary Theory & Research in Classroom Learning
- EDTL 651: P-6 Academic Content Standards for Mathematics Teachers I
- EDTL 652: P-6 Academic Content Standards for Mathematics Teachers II
- GEOL 650: Fundamentals of Geology
- BIOL 682: Biology and Ecology of Carbon

NWO Future Teacher Conference (FTC)

This was a collaborative effort among the University of Findlay, BGSU, the University of Toledo, and NWO with the University of Findlay hosting the event. The goals of the conference were to provide an opportunity for pre-service teachers to gather with new and experienced in-service educators and administrators to prepare for careers in the classroom, to learn about relevant topics in education and local educational resources available to them, and to provide networking opportunities for students in the job market as well as an opportunity to connect with their peers and build a support network to increase retention (see flyer in Appendix D). Attendance at this one-day event (Saturday) nearly doubled from the previous year and received an overall of 4.06 out of 5 evaluation rating from participants.

Detailed Participant Information

Participant Group	Total Attendance for 2008-09
Pre-Service Educators	217
K-12 Educators	51
K-12 Students	3
Graduate Students	7
Higher Ed Faculty	16
Community/Business Partners	23
Other	7
TOTAL	324

Xtreme Degrees and STEM Recruiting

Xtreme Degrees Day is COSMOS' annual kickoff to STEM recruiting that we estimate more than a thousand Bowling Green State University students and faculty attended; specifically, 580 students signed and received a free Xtreme Degrees t-shirt by participating in at least three events. The eight events from 2008 were: Xtreme Antibodies, Xtreme Fluid, Xtreme Impact-Math, Xtreme Impact-Science, Xtreme Marine Life, Xtreme Physical Science (in collaboration with COSI-Toledo), Xtreme Reptiles, and Xtreme Sudoku. The video and explanation of the science of the events is available at: <http://cosmos.bgsu.edu/careers>. See Appendix E for the flyer advertising this event.

To address the goal of recruiting and retention of students into STEM and STEM education disciplines, NWO/COSMOS led and/or participated in many different activities. We also served as a liaison between universities and the Springfield Local Schools Science Olympiad team to help them recruit college students as event coaches to work with motivated high school students. NWO/COSMOS has also continued to develop a careers website that would be appealing to high school and college students (<http://www.nwocenter.org/careers>). COSMOS led the writing of the Science and Mathematics Education in ACTION grant sponsored

by the Choose Ohio First program from the Ohio Board of Regents (see description on page 26). COSMOS also served to promote STEM and STEM education by developing flyers and collaborations to span across colleges within Bowling Green State University, attempting to serve as a voice for promoting all STEM disciplines from the various colleges (see flyers in Appendix F and G). We actively promoted these ideas through booths at BGSU recruiting days, admissions trips, and assisting with the BGSU Women in Science, Math, Engineering, and Technology (Women in STEM) conferences (junior high conference in November and high school conference in March).

Detailed Participant Information

Events: BGSU Recruiting Days, BGSU Admissions Trips, and Women in STEM Conferences
Attendance: 3,711 High School Students, 177 Middle School Students, and 139 Guidance Counselors
TOTAL Attendance for 2008-09 for All Events = 4,027

Ohio Junior Science and Humanities Symposium (OJSHS)

OJSHS brings the best and brightest talents from Ohio high schools together for a competition to highlight and judge the quality of their research projects in the sciences and humanities. We believe this event is an excellent opportunity for the recruitment of the next generation of teachers. We will continue to expand the organizations involved in this event and use it to recruit students into the fields of STEM and STEM education. This event is co-sponsored by NWO and a grant from the Academy of Applied Science (see Appendix H for recruitment postcard). Archives of past awardees, photos, and event programs can be found on the OJSHS website: <http://www.ojsHS.org/>

Detailed Participant Information

Participant Group	Total Attendance for 2008-09
K-12 Educators	12
High School and Middle School Students	102
Parents	12
Higher Ed Faculty	30
Other	24
TOTAL	180



Faculty Professional Development and Collaborative Education Research

COSMOS Research Learning Community and Research Journal Club

Faculty, graduate students, and others with a common interest in the science of STEM (Science, Technology, Engineering, and Mathematics) teaching and learning critiqued and discussed research articles, participated in action research, and designed, conducted, and presented collaborative research projects related to COSMOS goals and activities. The main goal of this research learning community was to provide a foundation and support for professionals interested in pursuing research in how people best teach and learn in the STEM disciplines in K-16+ environments. The format for this learning community was action research (with CTL scholarship areas potentially including: discover, integration, application, teaching, and engagement).

Each participant worked individually or in a small team to design, conduct, and present (via poster presentation at the BGSU Teaching and Learning Fair) a new action research project conducted in a K-12 or higher education classroom. One team was formed to focus on a research question related to COSMOS goals and activities.

The meetings consisted of both small team and whole community meetings (using a community-team-team meeting rotation). During the whole group community meetings, members discussed action research principles and potential journals for subsequent publications as well as engaged in critical, yet constructive feedback on the developing research projects. A couple weeks prior to the BGSU Fair, members presented draft poster presentations of their work to community peers in order to enrich the final presentation. Each community member (or team) delivered an approved HSRB application (by beginning of second semester) and poster presentation highlighting the project (by the community meeting preceding the BGSU Fair). Members were also encouraged to submit their work for external presentations and publications. The member listing for both of these communities is found in Appendix I.

Faculty and Staff Research Dissemination

A total of 14 refereed presentations and 13 refereed publications (with another 8 in review) focusing on STEM education were accomplished during FY 2009 by COSMOS-affiliated faculty and staff. Appendix J contains a full bibliography of FY 2009 publications, presentations, and grants.

NWO Faculty Participants

This chart demonstrates the number of arts and sciences and education faculty associated with NWO from our five partner higher education institutions. Many faculty from BGSU, UT, OCC, UF, and LC are involved in more than one capacity, including NWO Inquiry Series, Research Learning Community, Research Journal Club, NWO Symposium, Ohio Junior Science and Humanities Symposium, NWO Executive Board, NWO Collaborative Council, and NWO affiliated grant programs.

Partner	Number of Participants	Discipline
Bowling Green State University	38	Academic Fields • Biological Sciences • Chemistry • Education • Environmental Programs • Geography • Geology • Human Movement • Mathematics • Physics & Astronomy • Psychology • University Administration • Visual Comm. & Tech. Ed.
Lourdes College	5	
Owens Community College	3	
University of Findlay	6	
University of Toledo	7	

Faculty Growth and Recognition

Congratulations to Dr. Barbara Moses from the Mathematics and Statistics Department at Bowling Green State University who received the Bailey Family Endowed Professorship in Mathematics Education. Dr. Moses is a valued member of the COSMOS Team and a former director of COSMOS and NWO.



K-12 School and Community Partner Professional Development and Outreach

NWO Collaborative Council (NWOCC)

To increase the involvement of key stakeholders, NWO/COSMOS developed a forum for STEM regional support and collaboration. The NWOCC is composed of K–12 administrators, local teachers, community partners, higher education faculty, and NWO/COSMOS staff who meet monthly to communicate needs, share opportunities and research, and determine mutual goals, objectives, and strategies to advance STEM education for people of all ages. Minutes of the NWOCC meetings are available upon request to nwo@bgsu.edu.

Detailed Participant Information

Participant Group	Total Attendance for 2008-09
Educational Service Centers	8
State Support Teams	5
School Districts	7
Institutions of Higher Education	3
Community/Business Partners	13
NWO Center Staff	8
TOTAL	44

NWO Executive Board

The NWO Executive Board met in September 2008 and May 2009 as outlined in the NWO approved bylaws. Minutes for both meetings and the bylaws are available upon request to nwo@bgsu.edu. The composition of the board is as follows:

Anne Bullerjahn , Professor, Life and Natural Sciences	Owens Community College
Julie Campbell , Science Support Teacher	Toledo Public Schools
Emilio Duran , Asst. Professor, Biology Education; PI, NWO TEAMS	Bowling Green State University
Anjali D. Gray , Assoc. Professor & Chair, Biology and Health Science	Lourdes College
Lori Hauser , Director of Operations	Imagination Station (formerly COSI-Toledo)
Kathleen Herrmann , Executive Director	Lucas County Educational Service Center
Andy Jorgensen , Assoc. Professor, Chemistry	The University of Toledo
Linda Lower , Customer Service Manager	Perstorp Polyols, Inc.
Mitch Magdich , Curator of Education	Toledo Zoo
Jane McCleary , Curriculum Director	Hancock County Educational Service Center
Julie McIntosh , Asst. Dean & Assoc. Professor, College of Education	The University of Findlay
Bob Midden , Director, NWO and COSMOS	Bowling Green State University
Andrea Milner , Int. Director, CATALYST and Co-Director, NWO	The University of Toledo
Eileen Underwood , Assoc. Professor, Biological Sciences	Bowling Green State University

NWO Executive Board Composition by Partner Group

IHE Partners – 7 plus 1 NWO TEAMS PI

K-12 School Partners – 3

Community and Business Partners – 3



Other Professional Development and Outreach

NWO/COSMOS Website

The NWO website is currently housed with the COSMOS website at <http://www.nwocenter.org>. The website includes information about NWO (vision, mission, goals, and activities), partners, contacts, membership (and how to become a member and/or sponsor the Center's work), calendar (interactive, so that all members can add events to the calendar), resources (including links to the ORC, other professional organizations, lesson plans, and other related websites of interest), grants (all grants offered by NWO and others available to our NWO region), communities (pages dedicated for our working groups including the Executive Board, NWOCC, Research Community, etc.), and careers. The website undergoes regular revision to continue to meet the growing needs of our region.

Business and Community Partnerships

NWO impacts and works with collaborative partners all over northwest Ohio. Many institutions have become formal partners. The application to become an NWO partner is available at www.nwocenter.org/partners/. The NWO partnership listing, comprised of higher education institutions, K-12 schools, and business and community partners is summarized below.

Partner	Number of Participants	Profession
Universities	Number of Participants	Academic Fields
<ul style="list-style-type: none"> • Bowling Green State University • Lourdes College • Owens Community College • University of Findlay • University of Toledo 	38 5 3 6 7	<ul style="list-style-type: none"> • Biological Sciences • Chemistry • Education • Environmental Programs • Geography • Geology • Human Movement • Mathematics • Physics & Astronomy • Psychology • University Administration • Visual Comm. & Tech. Ed.
School Districts	Number of Participants	Professional Fields
<p><i>These are the main district collaborations, as cited in our current grant projects; however, we recruit/disseminate to 19 counties</i></p> <ul style="list-style-type: none"> • Toledo Public Schools • Lima City Schools • Bowling Green City Schools • Eastwood Local Schools • Fostoria Community Schools • Findlay City Schools • Perrysburg Exempted School District • Rossford Exempted Village School District • Springfield Local Schools • Sylvania Local Schools • Washington Local Schools 	N/A	pK-12 Educators and Administration
Executive Board	Number of Participants	Positions
<ul style="list-style-type: none"> • Bowling Green State University • Imagination Station (formerly COSI-Toledo) • Hancock County ESC • Lourdes College • Lucas County ESC • Owens Community College • Perstorp Polyols, Inc. • Toledo Public Schools • Toledo Zoo • University of Findlay • University of Toledo 	14	Curriculum Director Customer Service Manager Curator of Education Director IHE Faculty Teacher

Partner	Number of Participants	Profession
	Number of Participants	Positions
Business	11	Marketing Director Owner Regional Sales Representatives Vice President in Charge of Sales
<ul style="list-style-type: none"> • American Rent-All • Ball Corporation • British Petroleum • Carolina Biological Supply • Delta Education • Mother Hubbard's Reading Cupboard • Perstorp Polyols, Inc. • Reading Railroad • Sheridan Worldwide • Texas Instruments • Tractor Supply Company 		
Community	Number of Participants	Positions
<ul style="list-style-type: none"> • Armstrong Air and Space Museum • Toledo Museum of Art • Toledo Blade • Imagination Station (formerly COSI-Toledo) • Ohio Historical Society • Stranahan Arboretum • Toledo Zoo • WGTE • Lucas County Metroparks • Sauder Historical Village • Toledo Botanical Gardens • Challenger Learning Center 	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>2</p> <p>2</p> <p>2</p> <p>1</p> <p>1</p> <p>2</p> <p>1</p>	<p>Administrators</p> <p>Educational Consultants</p> <p>Educational Coordinators</p>
Others		
<p>Educational Service Centers Hancock County • Lucas County • Northwest Ohio • Putnam County • Wood County</p> <p>State Support Teams Region 1 • Region 6 • Region 7</p>		

NWO Regional Partner Grants

During FY 2009 NWO continued the successful Regional Partner Grants program. Our goal was to increase accountability and engagement among all NWO partners. The following two peer-reviewed (via subcommittee of the NWO Executive Board) proposals were awarded during FY 2009:

- Using Clickers to Identify Interventions through Technology (CLICK-IIT) – Lucas County Educational Service Center.

Project Summary: \$6,000 full funding. CLICK-IIT trained teachers to develop and administer high quality, formative assessments in mathematics and science. After training teachers in best practices in mathematics and science assessments, through the use of a personal response system, students anonymously answered questions aligned to Ohio Academic Content Standards while their teachers collected data on student knowledge in real time. This highly engaging system helped 13 high school teachers from four local districts to immediately identify struggling learners so they may provide interventions and facilitate students in gaining a better understanding of and taking ownership in their learning. Two Lucas County Educational Service Center (LCESC) professionals and eight partnering districts were involved in the project.

- Community Resources Workshop (CRW) – Toledo Zoo and Lourdes College.

Project Summary: \$2,100 full funding. The Community Resources Workshop was a week-long summer workshop that introduced educators to the standards-aligned, inquiry-based resources available from organizations across the region in order to strengthen student mathematics, science, technology, language arts, and social studies achievement in northwest Ohio. The Community Resources Workshop is an active consortium of area resource specialists and education directors of informal and formal educational institutions. This year's theme was "Going Green" and featured ways science and technologies are used at each regional partner institution to increase awareness of the importance of STEM education to the future of our region. The workshop was attended by 43 K-12 teachers, 1 undergraduate student, and 2 higher education faculty. Major partners in this endeavor were: The Toledo Blade; NWO; Challenger Learning Center of Lucas County; Franciscan Life Center of Lourdes College; Toledo Area Metroparks; Toledo-Lucas Co. Public Library; Toledo Mudhens; Toledo Museum of Art; Toledo Zoo; and Director of WGTE Public Media. The flyer for this event can be found in Appendix K.

NWO K–12 Larabee-Stager Mini-Grants

NWO sponsors mini-grants up to \$2,000 for K–12 education projects that aim to promote the NWO vision and goals. These grants are awarded bi-annually, with proposals due July 15 or January 15. The July 15 grant proposals are named after Deborah Stager, a master middle school science teacher from Sylvania School District, who lost a long-term battle with cancer in 2008. The January 15 proposals are named for David Larabee, a master high school mathematics and science teacher from Ottawa Hills School District, who tragically lost his life in 2005. The NWO Larabee-Stager grant application process information and documents are found at the NWO website (<http://www.nwocenter.org/grants>). All grant recipients disseminate their project information at an NWO event, such as the Blast-Off, Symposium, or Summit.

- Kids Kookin' (Springfield Local School District)

Project Summary: \$1,000 funded in July 2008. Students in 1st and 4th grades worked together to integrate STEM learning with other core subjects. Students had to prepare monthly recipes that incorporated learning of units of measurement, data analysis, food sources, and energy (among other topics). A cookbook made from a compilation of student recipes served as the culminating product from Kids Kookin'. This project impacted 60 students from 2 classrooms. An example from this project can be found in Appendix L.

- Math/Science Teacher Preparation Project (BGSU Child Development Center)

Project Summary: \$1,085 funded in July 2008. This project focused on pre-service teachers to try to engage them in pre-K inquiry methods of teaching math and science. Through the use of two different FOSS kits, the future teachers experienced hands-on science and pedagogy to incorporate exciting math and science teaching in their classes. Parents were also invited to attend sessions to learn more about this method of teaching and were given materials to extend their children's learning at home.

- Mathlab/Simulink (Seneca East Local Schools)

Project Summary: \$1,891 funded in January 2009. This project introduced students to the study of biology using quantitative data run through simulations of real life problems. Students then learned how to develop a model of a biological system. Cause and effect relationships were examined and students published their findings on a wiki. Visit <http://ohioportal.org/moodle/course/view.php?id=4>. This funding equipped 26 computers with simulation software to be used with current and future biology students and provided distance learning sessions with scientists to enhance the experience.

- Renewable & Non-Renewable Energy (Sylvania Schools)

Project Summary: \$1,135.50 funded in January 2009. This program worked to extend grants from 2007 (BP Energy & Martha Holden Jennings) to teach junior high students about energy and conservation. The project lessons included renewable and non-renewable energy sources and the impact of different appliances on energy usage. This project involved students working with their families to discover areas of wasted energy. Materials purchased through project funds included kits given to students to install at home and repairs for an exercise bike that demonstrated the conversion of food energy to electricity. This project impacted 100 students and their families in northwest Ohio.



Affiliated Programs

DREAMS (Developing Regional Excellence for Achievement in Mathematics and Science Education)

The DREAMS program represents a collaborative partnership BGSU and 5 school district partners including Lima City, Washington Local, and Fostoria Local. This Math and Science Partnership (MSP) grant aims to increase pK–12 teacher content knowledge and leadership skills in mathematics and science by providing teachers with the opportunity and skills to become leaders in mathematics and/or science for their school district. Participants have the option to complete a Master of Arts in Teaching (MAT) in one of four areas (biology, mathematics, physics, or a specialization in interdisciplinary sciences within the Biology MAT) or a Specialist Endorsement in mathematics or science. DREAMS served 66 teachers from northwest Ohio and

4 teachers from outside of northwest Ohio by funding tuition for 8 graduate credit hours per year. The recruiting brochure is available in Appendix M. Dr. Eileen Underwood, BGSU Biological Sciences, was the principal investigator for the DREAMS program in 2008-09. The program provides a total number of 135 contact hours/year. In 2008-09 DREAMS received \$482,792 from the Ohio Department of Education with \$217,490 matching funds from BGSU.

NWO TEAMS (Teachers Enhancing Achievement in Mathematics and Science Education)

NWO TEAMS is a collaborative partnership among three high-need school districts (Toledo Public Schools, Lima City Schools, and Fostoria Community Schools), suburban and rural school districts, the Colleges of Arts and Sciences and Education at BGSU, and UT. This Ohio Department of Education Math and Science Partnership (MSP) grant aims to increase the academic achievement of students in science and mathematics by enhancing the content knowledge and teaching skills of classroom teachers. In its third and final year of funding, NWO TEAMS served 3rd–6th grade in-service teachers from around northwest Ohio as well as a number of pre-service teachers. Thirty-three teachers in Cohort II of the program completed a four-day follow-up held at BGSU from June 18–21, 2008, and 75 teachers began the program as part of Cohort III by participating in an eight-day Summer Institute held June 25–July 3, 2008. Our Summer District Science Leaders Academy was held June 25 and 26, 2008, with 5 science leaders in attendance from our partnering districts. The quarterly evaluation reports are available upon request. The recruiting brochure is included in Appendix N. Dr. Emilio Duran, School of Teaching and Learning at BGSU, was the principal investigator for the NWO TEAMS program. NWO/COSMOS played a significant role in grant development, building collaborative partnerships, and all aspects of project implementation. The program provided a total number of 139 contact hours for the summer and academic year sessions for all three cohorts including the district science leaders. Total MSP funding for FY 2009 was \$733,487.

RIPE II (Research-based Inquiry Physics Experiences II)

RIPE provided a second cohort of pK–3 teachers in northwest Ohio with training to transform early childhood education by (a) researching early childhood student conceptual understanding of physics concepts, (b) developing engaging and highly effective teaching models and instructional materials, (c) disseminating these models and materials, and (d) providing intense and sustained professional development to teams of in-service teachers in effective physics teaching. The recruiting postcard is included in Appendix O. Dr. Tracy Huziak-Clark, School of Teaching and Learning at BGSU, was the principal investigator and Dr. Steven Van Hook, Physics Department at the Pennsylvania State University, was the co-principal investigator for the RIPE program. COSMOS partnered with RIPE to provide release time for Dr. Tracy Huziak-Clark and helped establish collaborative partners for this project. The program provided a total of 100 contact hours/year, with a cost of approximately \$59/contact hour. In total, 38 pK–3 teachers were served. RIPE II received \$189,373 in funding from the Ohio Board of Regents for 2008-09.

GRAMS: Granting Access to Math and Science

Bowling Green State University is collaborating with two regional community colleges, Owens and Terra, with a \$600,000 5-year grant from the National Science Foundation to increase the number of highly qualified and capable students who are able to attend college by providing approximately 20 need-based 4-year scholarships to students selected by class rank, performance in college-prep math courses, successful participation in science and math activities, leadership experiences, and community service. Student persistence and success will be fostered with two major projects: 1) our NSF-funded STEP grant project, “Science, Engineering, and Technology Gateway Ohio” (SETGO) and 2) the BGSU Academic Investment in Mathematics and Science (AIMS). These programs include a 5-week summer bridge for entering students, to prepare them for the rigors of college science and math courses; a tiered system of mentoring by peers and faculty; learning communities with monthly events that draw students and faculty together by merging academics and social networking; and summer research opportunities. These strategies have been proven in BGSU’s AIMS program to increase student persistence and success, particularly of under-represented minority students majoring in science and math disciplines and are based on research that has identified the factors that most account for student attrition from these disciplines.

SMEA: Science and Mathematics Education in ACTION

BGSU received \$3,000,000 funding from the Ohio Board of Regents and is collaborating with three regional community colleges and the University of Findlay to use innovative strategies for preparing highly effective science and mathematics teachers for grades 5-12. These strategies include:

- 1) A 5-week summer bridge program preceding the first regular semester of college to launch students’ college careers under ideal circumstances and give them all of the skills they need to excel.
- 2) Participating in a collaborative science or mathematics research team that addresses a real community problem or concern. This gives students first hand experience in real research that enhances their understanding of science or math and their ability to practice it and teach it.
- 3) Participation in a co-op or internship work experience in a regional science or mathematics related business or industry. This “real world” experience gives future teachers insights into how science and mathematics are applied and provides examples that they can draw on to enrich their students’ learning.
- 4) Early teaching experiences in a regional school, assisting a teacher and working with students to get first hand experience in what teaching is really like and what they need to learn to be an effective teacher.
- 5) Creating a capstone project that involves applying research techniques to determining the best teaching practices that advance their students’ learning.

See Appendix P for the recruitment brochure.

BOSEF: Building Ohio’s Sustainable Energy Future

The BOSEF project 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, NW Ohio has major research and development strengths in environmental analysis and remediation technologies. For this Choose Ohio First Scholarship (COFSP) grant,

UT, BGSU, and the Community Colleges of Owens, Terra, and Northwest State will 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 will be enhanced through a cooperative 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 will prepare students for scientific and technical careers by providing internships with business, industry, agencies and non-profits in renewable energy and environmental sustainability fields. Recruiting and retaining minority and women scientists is a goal of this program and our students will benefit from the active collaboration of the existing AIMS (BGSU) and WISE (UT) programs. New undergraduate minor degree programs in renewable energy also will introduce students to the broader natural and social science connections of energy and sustainability. Although the primary program focus is on the undergraduate STEM pipeline, it will include PhD students and in-service high school teachers working toward MS degrees.

Through this grant, the participating institutions will have a comprehensive and vertically integrated approach to STEM education that will maximize student success and provide skilled professionals in these crucial STEM areas. The principal components of this program are:

- Scholarships for undergraduate students pursuing a relevant degree program.
- Stipends for summer research projects for undergraduate students pursuing a relevant degree program.
- Stipends for first year BOSEF students to attend the AIMS summer bridge program.
- Faculty Interest Group seminar series on a Sustainable Energy Future (FIG:SEF).
- Mentoring to enhance student success and retention.
- Graduate student and K-12 teacher participation.

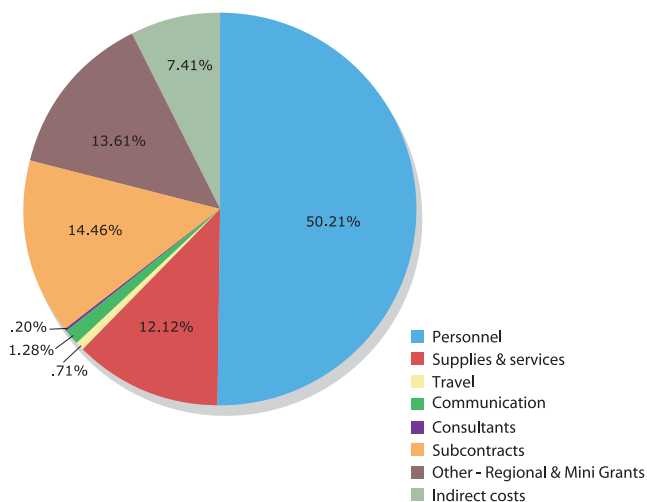
Project pi r²: Partners in Inquiry Resources and Research

Partners in Inquiry Resources and Research (Project pi r²), funded by a \$130,027 Ohio Board of Regents Improving Teacher Quality grant, unites the resources of the NWO and BGSU, in conjunction with principal partner Toledo Public Schools, a high-need local educational agency, and additional partners Challenger Center of Lucas County, Sauder Village, The Toledo Zoo, Lucas County Educational Service Center, and North Central Ohio Educational Service Center for a new model in professional development. This project will provide 30 K-8 teachers with 100 hours of thorough and sustained professional development and reach over 1,200 students in high need schools with state-of-the-art inquiry science education. The program's overall objectives are to (a) help retain and support teachers in science and technology; (b) expose teachers to effective models in science instruction; (c) integrate educational resources in the region's classrooms to model inquiry and increase class time spent on STEM subject areas; (d) improve student inquiry science process skills and science achievement; and (e) promote the use of research-based best practices in science teaching in Northwest Ohio classrooms consistent with local, state, and national standards. See Appendix Q for recruitment brochure.



FY 2009 NWO Budget

FY Expenditures for July 1, 2008 – June 30, 2009

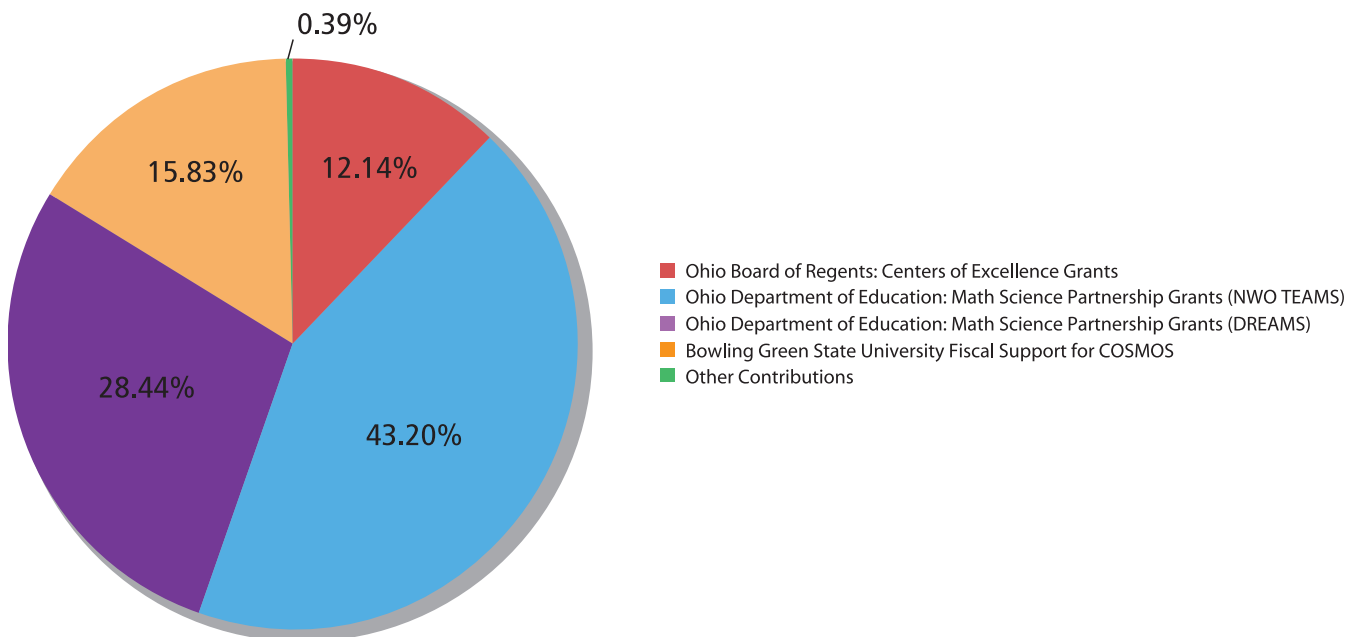


Personnel	124,999
Supplies and Services	30,182
Travel	1,761
Equipment	0
Communication	3,178
Consultants	500
Participant Support	0
Tuition	0
Subcontracts	36,000
Other – Regional & Mini Grants	33,887
Total direct costs	\$230,507
Indirect costs	\$18,441
TOTAL	\$248,948

*Includes \$31,810 encumbered funds.

The table below shows funding sources that supported FY 2009 NWO activities (total = \$1,697,737).

Agency - Program	Title	Award Amount
Ohio Board of Regents: Centers of Excellence Grants	NWO Center of Excellence	\$206,000
Ohio Department of Education: Math Science Partnership Grants	NWO TEAMS: Teachers Enhancing Achievement in Mathematics and Science education (BGSU)	\$733,487
Ohio Department of Education: Math Science Partnership Grants	DREAMS: Developing Regional Excellence for Achievement in Mathematics and Science Education (BGSU)	\$482,792
Bowling Green State University Fiscal Support for COSMOS <i>Note: All affiliated grant projects have additional matching funds</i>	<ul style="list-style-type: none"> • Director • Assistant Directors • Secretary • Faculty Associates • Fringes • Operating Budget • Tuition Waivers 	\$268,741
Other Contributions: Springfield Local Schools	Hosting monthly evening meetings of the NWO/COSMOS Inquiry Series at the high school	
Owens Community College	Host of the NWO Symposium at the Toledo Campus	
British Petroleum	NWO Symposium sponsor, OJSHS sponsor, Misc.	\$5,000
Carolina Biological	NWO Symposium sponsor	\$500
Delta Education	NWO Symposium sponsor	\$500
Tractor Supply Company	In-kind donations for Xtreme Degrees event	Valued at \$267
American Rent-All	In-kind donations for Xtreme Degrees event	Valued at \$450





NWO Projected Goals and Activities for FY 2010

Goal 1: Develop the expertise of pre-service and in-service teachers and higher education faculty through research-based professional development framed by investigative STEM teaching and learning.

- NWO Inquiry Series
- NWO Symposium on Science, Mathematics, and Technology Teaching
- Undergraduate professional organizations
- Affiliated activities (DREAMS, RIPE III, Project π r², USE-IT)

Goal 2: Recruit and retain students into STEM and STEM education disciplines.

- NWO Future Teacher Conference (included in the 2009 NWO Symposium)
- Ohio Junior Science and Humanities Symposium (OJSHS)
- Affiliated activities (Choose Ohio First: Science and Mathematics Education in ACTION, GRAMS, BOSEF)

Goal 3: Conduct and communicate collaborative research on how people best teach and learn STEM and/or on the barriers and enablers related to current reform efforts.

- COSMOS Research Learning Community
- Affiliated activities (faculty/staff research and participation)

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

- NWO Collaborative Council (NWOCC)
- NWO Executive Board
- NWO website
- Business and community partnerships

Goal 5: Increase the leadership capacity for STEM education in northwest Ohio.

- NWO Inquiry Series, Symposium, and Summit presentations (and others)
- Affiliated activities (DREAMS)
- NWO Regional Partner Projects



NWO Resource Development and Sustainability

The NWO Center Resource Development Plan includes four approaches for identifying and securing funding and additional non-fiscal resources needed to sustain the Center. These approaches include, but are not limited to, the following strategies: federal funding, business partnerships, university partnerships, and enhancing the IHE (institution of higher education) infrastructure within the region.

I. Federal Funding: We aim to develop one or more regional proposals to the National Science Foundation. We would invite each partner IHE in the region, along with targeted high needs schools and business and community partners to the table for project development. Currently, we have identified the Math and Science Partnership program as the most appropriate. We recently applied for the **Targeted Partnerships** award. We relied on our past experience and success with the NSF Local Systemic Change Project: TAPESTRIES, the National

Institute of Environmental Health Science Project: EXCITE, and our current Ohio MSP Projects: NWO TEAMS and DREAMS. We are also well poised to apply for the ***Institute Partnerships – Teacher Institutes for the 21st Century*** awards, as both the TAPESTRIES program and our current Ohio MSP Project: DREAMS aim to increase the number of science and mathematics teacher-leaders through high quality professional development and coursework focusing on content rich in pedagogy. Finally, the ***Innovation through Institutional Integration*** award might be an appropriate future proposal since The University of Toledo has secured a NOYCE award and if NWO secured either an MSP or ITEST award. More information about the MSP program can be found at http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5756.

II. Business Partnerships: COSMOS has developed a brochure and is working on developing a procedure for identifying new business partners to sponsor general NWO/COSMOS goals or specific NWO/COSMOS activities. We have obtained sponsorships from British Petroleum, Carolina Biological, and Delta Education. We will continue to discuss a more collaborative and regional approach for seeking business partnerships and sponsorships.

III. University Partnerships: Each IHE will continue to look for internal resources and partnerships that may exist and that would enhance both partnering organizations. For example, COSMOS partnered with the BGSU Center for Teaching and Learning (CTL). This partnership involved COSMOS leading a faculty learning community on research in STEM teaching and learning and in return, the BGSU CTL provided professional development stipends to learning community members for their active participation in the group (\$5,000 total sponsorship). We will continue to identify and develop these sorts of partnerships within and across partner IHEs in the region.

IV. IHE Infrastructure: We will continue to advocate that each partner IHE provide additional resources (space, fiscal, human) to support STEM education. CATLyST and COSMOS have secured a base level of needed resources for their Centers; however, The University of Findlay, Lourdes, and Owens Community College have no similar Center or organization. However, The University of Findlay has sponsored the Future Teacher Conference. We believe we need to initiate and organize regular dialogue with and among IHE leaders about the advantages and importance of gaining their support (fiscal and otherwise) for the work we do.

V. Foundations: \$300 million is distributed annually by foundations in Ohio. We will investigate these sources and determine which ones may provide support for our efforts. Recently NWO received funding from the Martha Holden Jennings Foundation in the amount of \$21,360 to fund technology sessions at the NWO Inquiry Series during the 2009-10 academic year.



Issues, Problems, and Anticipated Solutions

Although a sign of our success, the rapid growth of the NWO Center has resulted in a need to develop an investment strategy to build Center capacity to create, support, implement, and evaluate newly funded and future Center initiatives. We will work with the NWO Executive Board and within each higher education institution to further craft this investment plan.

There is a great deal of inequity of infrastructure among institutions. BGSU has a solid infrastructure in place. UT's CATALyST now has university-dedicated resources; however, the future of CATALyST has yet to be decided and currently a director for this center has yet to be named. Owens Community College, Lourdes College, and the University of Findlay do not have infrastructure similar to what is found at BGSU and UT for science and mathematics education reform. We will continue to discuss ideas to build the infrastructure needed to support the region.

NWO is a regional agency supporting and encouraging significant STEM activities for northwest Ohio K-16+ students, educators, and business/community members. The impact of NWO in northwest Ohio has been due in large part to our success in providing worthwhile, rigorous K-16+ professional development in science and mathematics, both in content and pedagogy, and in developing new knowledge in, and collaborations for, the teaching and learning of science and mathematics.

NWO provides great momentum to advancing STEM education and issues in northwest Ohio. As a maturing regional Center, we will continue to serve as an organizational framework, building capacity within local universities, schools, and community partner organizations and leveraging resources for STEM programs and opportunities for people of all ages.



Appendices

- A. NWO Brochure
- B. 2008-09 NWO Inquiry Series Brochure
- C. 2008 NWO Symposium Postcard
- D. 2009 NWO Future Teacher Conference Flyer
- E. 2008 Xtreme Degrees Flyer
- F. 2008 Catch a Class Flyer
- G. 2008 Xtreme Impact Flyer
- H. 2009 OJSHS Postcard

- I. COSMOS Learning Community/Journal Club Members List
- J. NWO Research/Scholarship
- K. 2008-09 Regional Partner Project Spotlight: Community Resources Workshop
- L. 2008-09 Larabee-Stager Mini Grant Spotlight: Kids Kookin'
- M. 2008 DREAMS Recruiting Postcard
- N. 2008 NWO TEAMS Recruiting Brochure
- O. 2008 RIPE II Recruiting Postcard
- P. 2009 ACTION Recruiting Brochure
- Q. 2009 Project π r^2 Recruiting Brochure
- R. NWO Publicity and Teacher and Faculty Recognition
- S. 2008-09 Evaluation Report

- I. COSMOS Learning Community/Journal Club Members List
- J. NWO Research/Scholarship
- K. 2008-09 Regional Partner Project Spotlight: Community Resources Workshop
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- O. 2008 RIPE II Recruiting Postcard
- P. 2009 ACTION Recruiting Brochure
- Q. 2009 Project π r^2 Recruiting Brochure
- R. NWO Publicity and Teacher and Faculty Recognition
- S. 2008-09 Evaluation Report

Appendix A: NWO Brochure



NWO
Northwest Ohio Center of Excellence
in Science and Mathematics Education

www.nwocenter.org

~ Advancing science, tec

Coordinating Partners



BGSU **COSMOS** **LOURDES** **OWENS**

To join **NWO** and receive updates on **NWO** activities

Visit:

www.nwocenter.org

NWO Initiatives

~ Advancing science, technology, engineering, and mathematics (STEM) education for people of all ages

Teacher/Pre-service and Higher Education Faculty Professional Development

NWO Inquiry Series in STEM Education

The NWO Inquiry Series is a highly popular professional development opportunity in the region, with K-12 pre-service and in-service teachers, graduate students, school administrators, and higher education faculty learning and collaborating on STEM education innovation in a variety of monthly forums. Graduate credit and contact hours available. <http://nwocenter.org/inquiryseries>

NWO Symposium on Science, Math, and Technology Teaching

The NWO Symposium is an annual conference that brings leaders in inquiry education together with hundreds of educators for professional development in science, mathematics, and technology. This event provides all participants with resources and skills they can put to immediate use in their classroom. <http://www.nwohiosymposium.org>

STEM and STEM Education Recruitment, Preparation, and Retention

PRAXIS II Mathematics and Science Preparation Workshops

PRAXIS II preparation workshops are hosted by STEM faculty to prepare pre-service teachers for the content tests required for teacher licensure. <http://cosmos.bgsu.edu/PraxisPrep.htm>

Future Teacher Conference

This professional development event helps prospective teachers explore teaching and assessment strategies, connect with future colleagues, and have the opportunity to discuss with in-service teachers, administrators, and higher education faculty issues related to education as a career. <http://nwocenter.org/nwoFutureTeacherConf>

Ohio Junior Science and Humanities Symposium

This symposium brings the best and brightest students from Ohio high schools together for a competition to evaluate and recognize their research projects in the sciences and humanities. This event is an excellent opportunity to recruit talented youth and encourage the continued study of STEM at the college level. <http://www.ojshs.org>

Xtreme Degrees

This fun and exciting annual event for college students provides high energy and interactive STEM activities aimed at increasing their content knowledge, spurring their interest in STEM, and getting them thinking about STEM careers, majors and minors. <http://nwocenter.org/careers>

Faculty Development and Collaborative Research

Research Community for University Faculty/Instructors

Faculty, graduate students, and others with a common interest in the science of STEM teaching and learning critique and discuss research articles, and design, conduct, and present collaborative research projects related to current NWO goals. http://nwocenter.org/communities/research_community

K-16 Administration Resources for STEM Education

NWO Collaborative Council

K-12 administrators and local school educators, higher education faculty, community partners, and NWO staff meet monthly to communicate needs, share opportunities and research, and determine mutual goals, objectives, and strategies to advance STEM education for people of all ages. <http://nwocenter.org/communities/ccc/index.htm>

K-16 Grant Opportunities (depending on funding)

K-12 Larabee & Stager Mini-Grants to Schools

NWO sponsors mini-grants for K-12 education projects that aim to promote the mission, vision, and goals of NWO. These grants are awarded twice per year. <http://nwocenter.org/grants>

K-16 Professional Development Mini-Grants

NWO mini-grant co-sponsorships are available for K-16 professional development programs that are well aligned with the mission, vision, and goals of NWO. The sponsorship region covers events held in northwest Ohio (or outside events organized by NWO members). It is expected that other organizations share the cost of the programs. <http://nwocenter.org/grants>

Faculty/Instructor Curriculum Development and Modification Mini-Grants

NWO faculty/instructor curriculum development and modification mini-grants provide support for the development of innovative college level courses in STEM or STEM education disciplines. <http://nwocenter.org/grants>

For more information, contact:

nwo@bgsu.edu

NWO
241 Math Science Building
Bowling Green State University
Bowling Green, OH 43403-0212
Office: 419-372-2718
Fax: 419-372-2738

www.nwocenter.org

Appendix B: 2008-09 NWO Inquiry Series Brochure

Join Our Community...Sharing Common Experiences of Uncommon Quality

NWO/COSMOS Mathematics & Science Inquiry Series 2008-09

Advancing Mathematics and Science Education for All Students



"These ideas ma



"[The Inquiry Series had] everything I wanted and more! It was excellent and I feel refreshed to continue to strive towards excellence in my profession"

-K-12 Teacher Participant in 2007-08 Inquiry Series

2008-09 Monthly Evening Session Mathematics Opportunities

Mathematics Teaching Is Fun! (Grades PreK-3)

Facilitators: Deb Gallagher, EdD, Education; Janet Emerine, MEd; Janer Ink, MEd; Barbara Moses, PhD, Mathematics

These sessions will be full of activities to make student learning fun and engaging. Each session will include ideas for resources and assessment for the area of mathematics discussed. These sessions go beyond what you have done in methods and are for pre-service and in-service teachers of mathematics.

Making Connections and Doing Mathematics (Grades 4-12)

Facilitator: Julie Nurnberger-Haag, MA

Wherever you are...kick it up a notch! We'll explore frameworks that will help you plan and implement higher levels of inquiry with students.

2008-09 Monthly Evening Session Science Opportunities

Exploring Science Inquiry for All (Grades K-12)

Facilitators: Amy Scheuermann, PhD, Special Education; Lena Ballone, PhD, Science Education

Get engaged and have fun exploring the fundamentals of inquiry-based instruction for all K-12 learners. Every class is made up of a diverse group of learners. The challenge is how to teach them all. Experienced educators share effective strategies for bringing elements of inquiry into every science classroom.

Science Success by Design (Grades 4-8)

Facilitator: Carin Helfer, PhD, Akron Global Polymer and Technology Institute

Participants will engage in active learning and discussion during the sessions and will receive:

- classroom ready, engaging units related to plastics and polymer design activities
- free materials to enrich teachers' supplies to assist in implementation of activities

These sessions will focus on the grades 4-8 Ohio Science Academic Content Standards in Physical Science, Science and Technology, and Scientific Inquiry.

Exploring Inquiry in High School Biology (Grades 9-12)

Facilitator: Eileen Underwood, PhD, Biology

Expand your professional network and join area biology teachers as they explore topics of interest and investigate current knowledge about the best ways to instruct students in the life sciences.

Physical Sciences Modeling (Grades 9-12)

Facilitators: Nate Ash, Perrysburg High School; Mary Kate Hafemann, Ottawa Hills High School

Physics, chemistry, and physical science teachers will learn how the modeling method gives students the opportunity to confront their misconceptions about physical science head on, analyze their data in an in-depth, consistent way in order to construct appropriate models, and develop the skills and confidence needed to interpret their results in a scientifically critical way.

-Teacher Participant

Save 50%

Scholarships available! Save 50% off BGSU tuition for up to ten participants who choose to take the Inquiry Series for 2 Graduate Credit Hours (EDTL 680). Participants interested will register at the October 23 meeting.

2008-09 Inquiry Series Dates

DATE		TIME	PLACE
Sept. 20 [Sat]	Blast-Off - Dr. Debra Gallagher, NASA MESSENGER Educator Fellow	8:30-12:30	BGSU Student Union: Lenhart Grand Ballroom
Oct. 23 [Thurs]	Monthly Evening Session	5:00-8:00	Springfield High School (1470 S McCord Road, Holland, OH)
Nov. 8 [Sat]	NWO Symposium	8:00-4:00	Owens Community College (Toledo Campus)
Dec. 11 [Thurs]	Monthly Evening Session	5:00-8:00	Springfield High School (1470 S McCord Road, Holland, OH)
Jan. 22 [Thurs]	Monthly Evening Session	5:00-8:00	Springfield High School (1470 S McCord Road, Holland, OH)
Feb. 19 [Thurs]	Monthly Evening Session	5:00-8:00	Springfield High School (1470 S McCord Road, Holland, OH)
Mar. 19 [Thurs]	Monthly Evening Session	5:00-8:00	Springfield High School (1470 S McCord Road, Holland, OH)
Apr. 23 [Thurs]	Summit	4:30-8:30	Challenger Learning Center of Lucas County (4955 Seaman Road, Oregon, OH)

The Inquiry Series is free to all northwest Ohio educators. Meals are provided free of charge.

Register online at: <http://cosmos.bgsu.edu/inquiryseries>

For more information contact Michelle Klinger at mklinge@bgsu.edu, 419-372-2718



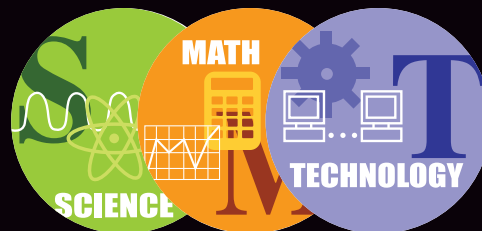
Appendix C: 2008 NWO Symposium Postcard

NORTHWEST OHIO SYMPOSIUM ON SCIENCE, MATH, AND TECHNOLOGY



TEACHING

Saturday, November 8, 2008
Owens Community College
(Toledo Campus)



www.nwohiosymposium.org

Owens Community College (AV Center)
Saturday, November 8, 2008 (8:00am-4:00pm)

Engage in innovative activities, share teaching ideas and tools, and grow as an educator!

Northwest Ohio's premier professional development symposium on Science, Math, and Technology Teaching.

Keynote Speaker:

Deborah Wickerham, 2008 Ohio Teacher of the Year

The Science of Teaching: *Teaching is a science. We are scientists everyday that we walk into our classrooms. What do we do as teachers to help ensure success for our students?*

Certificate of Contact Hours Available for Teachers

- No Charge for Registration (*but you must pre-register online by Nov. 1*)
- Breakfast Buffet & Lunch Provided Free of Charge
- Free Bag with Classroom Resources

The 2008 NW Ohio Symposium on Science, Math, and Technology Teaching is sponsored by the Northwest Ohio Center of Excellence and its partners BGSU-COSMOS, Lourdes College, Owens Community College, The University of Findlay, The University of Toledo-CATALyST, and BP.

Coordinating Partners



Northwest Ohio Center of Excellence
in Science and Mathematics Education

241 Math Science Bldg., BGSU
Bowling Green, OH 43403-0212

US POSTAGE PAID
PERMIT #1
BOWLING GREEN OH

Register today at (*you must pre-register online by Nov. 1*)
www.nwohiosymposium.org

Funding provided by the Ohio Board of Regents.

Appendix D: 2009 NWO Future Teacher Conference Flyer



NWO Future Teacher Conference

Saturday, February 7, 2009
8:30 am - 3:00 pm
The University of Findlay Campus

Online Registration Is Now Open!

Cost: \$10.00 (includes certificate of completion, lunch, classroom resources, and entrance into door prize drawings)

This year's conference will feature sessions and resources especially for pre-service teachers to jump start your transition from college student to classroom teacher.

- Connect with future colleagues
- Explore classroom teaching and assessment strategies
- Discover exciting lesson plans, standards-aligned activities, and resources



Keynote Speaker
Salome Thomas-EL, Inspirational Teacher

Don't miss this exciting opportunity to get a head start on your future!

<http://cosmos.bgsu.edu/nwoFutureTeacherConf>



Appendix E: 2008 Xtreme Degrees Flyer



Friday, September 5th
11:00 am-2:00 pm

(Next to Campus Fest on the lawn by Overman Hall and the Math Science Building)
Participate in at least 3 Xtreme Degrees events to get a **FREE T-SHIRT!**

Run across a fluid! If you missed **Xtreme Fluid** last year, don't make the same mistake twice! • Hold a dragon at **Xtreme Reptiles!** • Enter the **Xtreme Sudoku** tournament! • **Xtreme Aviation** lets you sit in the cockpit of a plane!

Don't miss the other events: **Xtreme Antibodies**, **Xtreme Discoveries**, **Xtreme Impact-Math**, **Xtreme Impact-Science**, **Xtreme Marine Life** and...

Find out if COSI's Sloan Eberly will survive the bed of nails. The sledgehammer falls at **11:25 am!** Then **Xtreme Physical Science** continues!

Take another look at Science, Technology, Engineering, or Mathematics (STEM)!
*Check out **Xtreme Degrees** for a great career in STEM!*
(<http://cosmos.bgsu.edu/careers>)

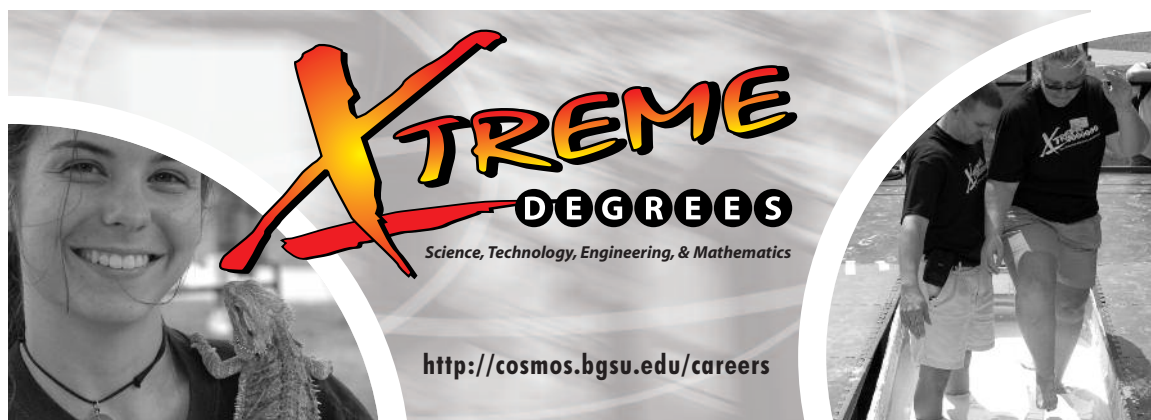
BGSU

COSMOS office: Nancy Hoose (372-2718)



In collaboration with: College of Arts & Sciences • College of Education & Human Development • College of Technology • School of Teaching & Learning • Departments of Biological Sciences, Chemistry, Computer Science, Geology, Mathematics & Statistics, Physics & Astronomy, Psychology, Public & Allied Health • BGSU Facilities Services

Appendix F: 2008 Catch a Class Flyer



STEM is more than lab coats and calculators!

Volunteer!

The **BGSU Herpetarium** is run exclusively by student volunteers.

Stop by to talk about volunteering!
111 Life Sciences Building
(9:30a.m. - 5:00p.m. school days) or
contact Andrew Sternisha, student
coordinator at apstern@bgsu.edu

Work with middle school or high school students who are excited about science and math!

Become a mentor for middle school or high school students involved in **Science Olympiad**. No experience or science expertise necessary. Meet with students from 1 to 4 hours a month. The amount of time is up to you! To find out more contact Jim Schall, Springfield High School at sphs_js@nwoca.org



Catch a Class!

(For official course descriptions go to <http://webapps.bgsu.edu/courses/search.php>)

Air Traffic Control and the National Airspace System (AERT 224) Find out about the latest developments in aviation radio communication, safety, and navigation.

Architectural Materials and Systems (ARCH 336) Build a "green" outdoor space with concrete blocks and any other materials you can think of.

Display and Exhibit Technology (VCT 304) Build your own display, using high-tech media to stop audiences and deliver a clear message.

Electrical-Electronic Systems (ECT 196) Build a robot, and find out how robotics is revolutionizing fabrication and assembly in today's manufacturing facilities.

Environmental Physics (PHYS 360) Physics is more than pendulums and planetary orbits. Explore the physics of energy and its role in the environment.

Introduction to Education (EDHD 201) Explore teaching as a career through seminars and service learning while taking your first class towards accomplishing that goal!

Introduction to Forensic Science (CHEM 177) Better than watching a TV show! Jump into this class to find out how science is used to solve crimes.

Life in Extreme Environments (BIOL 109) Learn about living things found deep underground, deep in the sea, in the extreme cold of the Antarctic...not to mention organisms that can deal with radioactivity and toxic chemicals!

Life in the Sea (BIOL 108) Learn about physical oceanography and the marine animals that live in the sea.

Life in the Universe (ASTR 305) Consider the possibilities of life in other planetary environments in a scientific way!

Materials in the Service of Society (MATS 100) Find out about materials science and how materials have been used historically and in our daily lives.

Go to XTREME DEGREES for a great career in STEM!

Appendix G: 2008 Xtreme Impact Flyer

Teaching is a great way to combine achievement in math or science with a desire to improve people's lives!

<http://cosmos.bgsu.edu/careers>

Do you want to...

- Work with math or science?
- Inspire others to enjoy math or science?
- Work with people?
- Be creative and innovative?
- Make a difference in teenagers' lives?
- Motivate students to use math or science to change the world?
- Work hard and love it?

Changing the world by degrees

Make an
Xtreme Impact
with math or science...

Become a teacher!

In a 30-year career you'll have millions of interactions with about 4,000 teens—now that's IMPACT!

Discover how to make your impact positive for those students by learning how to teach math and/or science at BGSU!

Contact mathematics education advisor Dr. Daniel Brahier (brahier@bgsu.edu) or science education advisor Dr. Tracy Huziak-Clark (thuziak@bgsu.edu) in the School of Teaching and Learning to prepare for your career as a teacher!

BGSU

COSMOS is a partner of the Northeast Ohio Center of Excellence in Science and Mathematics Education (NWO). Funding provided by the Ohio Board of Regents.



- This major prepares you to teach all subjects in preschool or in kindergarten to 3rd grade.
- It is very difficult to get a job in Ohio with an early childhood license, but if you really want to do so, then become very knowledgeable about mathematics and science teaching in order to set yourself apart from the other job applicants.
- Math at this age is more than counting and naming shapes. Science is more than growing plants. Little ones need good math and science teachers too!

Big Kids and/or Early Teens (4th grade to 9th grade) —> Middle Childhood Majors

- Choose two subjects (mathematics, science, language arts, or social studies) to teach in one of the following:
 - Elementary school 4th grade to 6th grade
 - Middle school/junior high school 6th grade to 8th grade
 - High school 9th grade
- We need more good mathematics and science teachers at these grades too!

Early Teens and Teens (7th grade to 12th grade) —> Adolescent to Young Adult Major

- Adolescent to Young Adult major will prepare you to teach 7th grade to 12th grade in your chosen subject area(s).
- School administrators tell us they need more strong mathematics and science teachers in middle schools, so they often prefer the Adolescent to Young Adult License. Will it be you?

By taking math and science classes in high school and college YOU get to decide what you want to do!

Even if you don't think you want to teach, keep taking math to keep your options open! Careers in business and other non-science fields often require that you take precalculus or calculus in college, so don't cut off your options!

are available
to an advisor today!

In collaboration with...

College of Arts & Sciences,
College of Education &
Human Development, and
School of Teaching &
Learning

Departments of Biological
Sciences, Chemistry,
Computer Science, Geology,
Mathematics & Statistics,
and Physics & Astronomy

Appendix H: 2009 OJSHS Postcard



Call for High School Research Papers & Posters

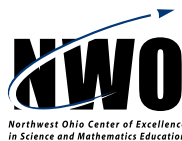


Sponsored by the Northwest Ohio Center of Excellence in Science and Mathematics Education (NWO) and The School of Teaching and Learning at Bowling Green State University.

In cooperation with The Academy of Applied Science and with the support of the Departments of the Army, Navy, and Air Force.

Important Deadline ~ February 16, 2009

- Online registration is required for all participants including Paper Presenters, Poster Presenters, Teachers, Student Delegates, Parents, and Guests.
- **Poster Presenters** must submit an **Abstract**.
- **Paper Presenters** must submit an **Abstract** and a copy of the **Research Paper**.



Dr. Emilio Duran
Bowling Green State University
School of Teaching and Learning
126 Life Science Building
Bowling Green, OH 43403

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The National Association of Secondary School Principals has placed this program on the NASSP National Advisory List of Student Contests and Activities for 2008-2009

Visit our web site for more information
www.ojshs.org

Appendix I: COSMOS Learning Community/ Journal Club Members List

Learning Community Members 2008-09

Name	Department	College
Jake Burgoon	NWO/TEAMS	Education
Mohammed Darabie	School of Teaching and Learning	Education
Emilio Duran	School of Teaching and Learning	Education
Jodi Haney	School of Teaching and Learning/ Environmental Programs	Education/ A&S
Dale Klopfer	Psychology	A&S
John Laird	Physics & Astronomy	A&S
Lan Li	School of Teaching and Learning	Education
Bob Midden	COSMOS/ Chemistry	Graduate College/ A&S
Barbara Moses	Mathematics & Statistics	A&S
Julie Nurnberger-Haag	COSMOS	Graduate College
Richard Oldrieve	School of Teaching and Learning	Education
Matt Partin	Biological Sciences	A&S
Amy Scheuermann	School of Teaching and Learning	Education
Karen Sirum	Biological Sciences	A&S
Eileen Underwood	Biological Sciences	A&S
Rick Worch	School of Teaching and Learning	Education

Journal Club Members 2008-09

Name	Department	College
Kit Chan	Mathematics & Statistics	A&S
Jodi Haney, Co-Facilitator	School of Teaching and Learning/ Environmental Programs	Education/ A&S
Dale Klopfer	Psychology	A&S
John Laird	Physics & Astronomy	A&S
Lan Li	School of Teaching and Learning	Education
David Meel	Mathematics & Statistics	A&S
Stephania Messersmith	Chemistry	A&S
Bob Midden, Co-Facilitator	COSMOS/ Chemistry	Graduate College/ A&S
Julie Nurnberger-Haag	COSMOS	Graduate College
Richard Oldrieve	School of Teaching and Learning	Education
Matthew Partin	Biological Sciences	A&S
Karen Sirum	Biological Sciences	A&S

Appendix J: NWO Research/Scholarship

Faculty Refereed Publications

Articles by NWO core faculty and staff published in FY 2009 that are directly related to NWO/COSMOS activities

Duran, E., & Burgoon, J. (2009). Assessment of the science content knowledge of elementary and middle school teachers during a professional development program entitled NWO-TEAMS (Teachers Enhancing Achievement in Mathematics and Science). *National Social Science Journal*, 32(2), 84-99.

Meel, D. E. (n.d.). Glimpses into the shadows of understanding: Using concept mapping as an assessment tool. *PRIMUS*. Manuscript submitted for publication.

Meel, D. E. (n.d.). On the edge: A case study of a mathematics teaching assistant under extreme stress. *Journal of Mathematics Teacher Education*. Manuscript submitted for publication.

Meel, D. E. (in press). On the edge: Explorations of mathematics teaching assistants under stress. *PRIMUS*.

Meel, D. E. (n.d.). Thinking outside the box: Or maybe just about the box. *Journal of Online Mathematical Applications*. Manuscript submitted for publication.

Meel, D. E. (in press). Visions of acculturation: Using case stories to educate international teaching assistants in mathematics. *Studies in Graduate and Professional Student Development*, 12.

Meel, D. E., Albert, J., & Nguyen, D. (n.d.). Lessons from BGSU's web-based mathematics placement exam system. *Ohio Council of Teachers of Mathematics Journal*. Manuscript submitted for publication.

Meel, D. E., & Nguyen, D. (n.d.). Issues in the development of a web-based mathematics placement exam system. *School Science and Mathematics*. Manuscript submitted for publication.

Nurnberger-Haag, J., Huziak-Clark, T. L., Van Hook, S. J., & Ballone-Duran, L. (2008). Mind the gap! A model for collaboration between K-12 teachers and graduate student scientists/mathematicians. *The Journal of Natural Inquiry and Reflective Practice*, 23(1), 20-39.

Articles by NWO core faculty and staff published in FY 2009 that are related to NWO goals but NOT directly related to NWO/COSMOS activities

Duran, E., Ballone-Duran, L., & Haney, J. J. (n.d.). Project ASTER III: A model for professional development integrating science museum exhibits with state and national science education content standards. *Curator*. Manuscript submitted for publication.

Duran, E., Ballone, L., Haney, J., & Beltyukova, S. (in press). The impact of a professional development program integrating informal science education on early childhood teachers' self-efficacy and beliefs about inquiry-based science teaching. *Journal of Elementary Science*.

Duran, E., Ballone-Duran, L., Haney, J. J., & Beltyukova, S. (n.d.). Project ASTER III: The impact of a professional development program integrating informal science education on early childhood teachers' self-efficacy and beliefs about inquiry-based science teaching. *The Journal of Elementary Science Teacher Education*. Manuscript submitted for publication.

Duran, E., Ballone-Duran, L., & Worch, E. A. (2009). Papier- mâché animals: An integrating theme for elementary classroom. *Science Education Review*, 8(1), 6-16.

Murray, M., Novak, J., & Scheuermann, A. M. (n.d.). Improving the preparation of special educators through service learning: Evidence from two preservice courses. *International Journal of Special Education*. Manuscript submitted for publication.

Appendix J: NWO Research/Scholarship cont.

- Scheuermann, A. M., Deshler, D. D., & Schumaker, J. B. (in press). The effects of the explicit inquiry routine on the performance of students with learning disabilities on one-variable equations. *Learning Disability Quarterly*.
- Scheuermann, A. M., Harris, M. L., Faggella-Luby, M. N., Fritschmann, N. S., Graner, P. G., & Deshler, D. D. (in press). Closing the performance gap: Learning strategies instruction for adolescents with learning disabilities. In G. Sideridis & T. Citro (Eds.), *Educating students with learning disabilities: Validated instructional practices*. Boston: Learning Disabilities Worldwide.
- Scheuermann, A. M., & van Garderen, D. (2008). Analyzing students' use of graphic representations: Determining misconceptions and error patterns for instruction. *Mathematics Teaching in the Middle School*, 13(8), 471-477.
- Sozzetti, A., Torres, G., Charbonneau, D., Winn, J. N., Korzennik, S. G., Holman, M. J., Latham, D. W., Laird, J. B., Fernandez, J., O'Donovan, F. T., Mandushev, G., Dunham, E., Everett, M. E., Esquerdo, G. A., Rabus, M., Belmonte, J. A., Deeg, H. J., Brown, T. N., Hidas, M. G., Baliber, N. (2009). A new spectroscopic and photometric analysis of the transiting planet systems TrES-3 and TrES-4. *Astrophysical Journal*, 691, 1145-1158.
- Sozzetti, A., Torres, G., Latham, D. W., Stefanik, R. P., Korzennik, S. G., Boss, A. P., Carney, B. W., & Laird, J. B. (in press). A keck HIRES doppler search for planets orbiting metal-poor dwarfs. II. On the frequency of giant planets in the metal-poor regime. *Astrophysical Journal*.
- van Garderen, D., Scheuermann, A. M., Jackson, C., & Hampton, D. (2009). Supporting the collaboration of special educators and general educators to teach students who struggle with mathematics: An overview of the research. *Psychology in the School*, 46(1), 56-77.
- Worch, E., Haney, J. J., & Scheuermann, A. (in press). Catch me if you can!: Understanding basic needs of animals through role-playing. *Science and Children*.

Presentations by NWO core faculty and staff in FY 2009 that are directly related to NWO/COSMOS activities

- Belyukova, S., Fox, C., & Duran, E. (2009). *Using magnitude estimation scaling in measuring test efficacy and predicting test performance: A replication study*. Paper presented at the 7th annual Hawaii International Conference on Education, Honolulu, HI.
- Bucher, A., Burgoon, J., & Duran, E. (2009). *Exploring elementary and middle school in-service teachers' knowledge of animal classification: A comparison of student and teacher misconceptions*. Paper presented at the National Technology and Social Science Association Conference, Las Vegas, NV.
- Burgoon, J., & Duran, E. (2009). *Identifying science misconceptions held by elementary and middle school teachers from northwest Ohio*. Paper presented at the National Technology and Social Science Association Conference, Las Vegas, NV.
- Burgoon, J., Klinger, M., Duran, E., & Ballone Duran, L. (2008). *Identifying teachers' science misconceptions for the improvement of professional development programs*. Paper presented at the International Conference on Assessment for Learning in Science, San Francisco, CA.
- Duran, E., & Burgoon, J. (2009). *Development of instruments to effectively measure teachers' science content knowledge*. Paper presented at the US DOE Mathematics and Science Partnership Program Regional Conference, Chicago, IL.
- Hansen, M. J., Huerta, J. C., Chism, L., Williams, G., & Midden, W. R. (2008). *Comprehensive assessment strategies for understanding the impacts of learning communities: New issues and directions*. Paper presented at the 13th annual Learning Communities Conference, Kansas City, MO.

Appendix J: NWO Research/Scholarship cont.

- Klinger, M., Eberly, S., & Duran, E. (2009). *Partners in inquiry resources and research: Linking institutions of higher learning, high needs school districts and community resource partners to improve science achievement*. Paper presented at the National Technology and Social Science Association Conference, Las Vegas, NV.
- Midden, W. R. (2008). *Rubric-based assessment of student academic achievement in service-learning courses in learning communities*. Paper presented at the 13th Annual Learning Communities Conference, Kansas City, MO.
- Midden, W. R., & Spishak, D. (2009). *Undergraduates evaluate the impact of CAFOs on water quality in the Portage River watershed*. Paper presented at the Challenges of Great Lakes Stewardship: SENCER Approaches meeting, Cleveland, OH.
- Worch, E. A., Duran, E., Ballone-Duran, L., Pollock, J. L., & Burgoon, J. N. (2009). *The impact of sustained professional development on preservice teachers*. Paper presented at the Association for Science Teacher Education International Conference, Hartford, CT.
- Worch, E. A., Pollock, J. L., Duran, E., & Burgoon, J. N. (2009). *The impact of sustained professional development on preservice teachers' concept of an effective learning environment*. Paper presented at the National Technology and Social Science Association Conference, Las Vegas, NV.

Presentations by NWO core faculty and staff in FY 2009 that are related to NWO goals but NOT directly related to NWO/COSMOS activities

- Meel, D. E. (2009, January). *Collaborative concept mapping in calculus*. Paper presented at the AMS-MAA special session on the Scholarship of Teaching and Learning in Mathematics, Washington, DC.
- van Garderen, D., & Scheuermann, A. M. (2008, October). *Drawing diagrams to solve word problems—What do student's diagrams tell us?* Paper presented at the Council for Learning Disabilities National Conference, Kansas City, KS.
- Worch, E. A., Pollock, J. L., Duran, E., & Burgoon, J. N. (in press). *The impact of sustained professional development on preservice teachers' concept of an effective learning environment*. *Proceedings of the 25th Annual National Technology and Social Science Conference*, Las Vegas, NV.

Grant Submissions and Awards

- EDHD Research Development Council. *Foundation Building: Preparing Literacy Environments for Preschool Age Children's K-3 School Readiness*. PI: M. Murray; Co-I: L. Dimling, S. Peet, R. Oldrieve, E. Worch, & R. Viramontez Anguiano. \$12,489. Funded.
- National Science Foundation. *Granting Access to Mathematics and Science*. PI: W. R. Midden; Co-I: M. van Staaden & T. C. Gilmer. \$600,000. Funded.
- National Science Foundation Course, Curriculum, and Laboratory Improvement Grant. *Project COLA—Conceptual Online Linear Algebra Project*. PI: D. E. Meel. \$164,000 requested. Submitted 2008.
- Ohio Department of Education: Mathematics and Science Partnership (MSP) Grant. Project: *DREAMS: Developing Regional Excellence for Achievement in Mathematics and Science Education* (Reapplication). PI: E. Underwood; Co-I: Savilla Banister & Matt Partin. \$428,750. Funded.
- Ohio Board of Regents Improving Teacher Quality Program. *Partners in Inquiry Resources and Research (pi r²)*. PI: E. Duran; Co-I: L. Duran. \$130,027. Funded.

Appendix J: NWO Research/Scholarship cont.

Ohio Board of Regents Improving Teacher Quality State Grant. *Research-Based Inquiry Physics Experiences III (RIPE III)*. PI: T. Huziak-Clark; Co-I: S. Van Hook. \$139,487. Funded.

Ohio Board of Regents Improving Teacher Quality State Grant. *Writing-Reading Initiative to Enhance Students' Test Performance in Science*. PI: E. Worch; Co-I: A. Scheuermann & E. Duran. \$208,415. Submitted November 1, 2008.

Ohio Department of Education: Mathematics and Science Partnership (MSP) Grant. *Northwest Ohio Teachers Enhancing Achievement in Mathematics and Science: Science Instruction for All*. PI: E. Duran; Co-I: L. Duran, J. Haney, E. Worch, & A. Scheuermann. \$733,487. Funded.

University System of Ohio. *Science and Mathematics Education in Action*. PI: W. R. Midden \$3,000,000. Funded.

U.S Army, Navy, and Air Force (subgrant issued by The Academy of Applied Science). *Ohio Junior Science and Humanities Symposium*. PI: E. Duran. \$20,000. Funded.

Appendix K: 2008-09 Regional Partner Project Spotlight: Community Resources Workshop

An A+ Resource for Teachers

2009 COMMUNITY RESOURCES WORKSHOP *for* EDUCATORS

JUNE 15-19, 2009

A TOP GRADE PROGRAM THAT INCLUDES:

- Five fast-paced days*
- Tips for energizing your lesson plans
- Loads of learning and fun
- A wealth of materials, services and resources available through your community's resources
- Connections for your curriculum
- Ideas for "going green" in your school and classroom
- 35 contact hours or 2 semester graduate credits through Lourdes College or Bowling Green State University

DAY-LONG SESSIONS WITH AREA EDUCATIONAL SPECIALISTS FROM:

The Blade, Challenger Learning Center of Lucas County, Franciscan Center and Life Lab of Lourdes College, Metroparks of the Toledo Area, Toledo-Lucas County Public Library, Toledo Mud Hens, Toledo Museum of Art, Toledo Zoo, and WGTE Public Media.

With additional presentations by BP A+ Program, Downtown Toledo, Inc., Johnson's Island, Nature's Nursery, the Oregon Career & Tech Center Solar House, Sauder Village, Toledo Botanical Garden, Toledo Science Center, Toledo Symphony Orchestra, and the Wolcott House.

For more information, contact:

The Toledo Museum of Art at 419.255.8000 ext. 7432 or visit <http://crw.byow.org>

*Workshop requires daily walking tours and outdoor activities.



THE BLADE
toledoblade.com

NIE
Newspaper
in Education

MUD HENS

**LOURDES
COLLEGE**

**MUSEUM
OF ART**

**TOLEDO
PUBLIC
LIBRARY**

**TOLEDO
ZOO**

METROPARKS
of the Toledo Area

BGSU.

NWO

**community resources
workshop**

**OHIO BOARD
OF REGENTS**

Support for the development/production of this material was provided by a grant under the federally funded Improving Teacher Quality State Grants Program, administered by the Ohio Board of Regents.

Appendix L: 2008-09 Larabee-Stager Mini Grant Spotlight: Kids Kookin'



From the Kitchen of: Austin Brewer

Recipe Home made pancakes Serves 4 to 6 people

Ingredients

<u>1 1/4 cup Flour</u>	<u>1 1/4 cups milk</u>
<u>2 1/2 tsp. double acting powder</u>	
<u>2 TBSP. Sugar</u>	<u>3 TBSP. melted butter</u>
<u>3/4 tsp. salt (optional)</u>	<u>4 TBSP. Vanilla Extract (optional)</u>
<u>1 egg</u>	

Directions

mix ingredients in order, cook to golden brown on each side, serve with Syrup or Jam. Then enjoy!! you can double or more to make bigger batches for a bigger crowd.

Appendix M: 2008 DREAMS Recruiting Postcard



Turning your DREAMS into reality!

DREAMS:

A scholarship program for mathematics and science with a leadership focus

Tuition scholarships for coursework towards a Master of Arts in Teaching (MAT) in Mathematics, Physics, Biology, or Interdisciplinary Science OR a Specialist Endorsement in Science and/or Mathematics.

Features:

- Tuition for 8 graduate credit hours paid by the program (Participant pays 1 credit hour up front and is responsible for all general and registration fees. Average cost of \$119 per credit hour for 9 hours of instruction.)
- Rigorous content coursework
- Leadership development
- Career enhancement

Requirements:

- STEM Leadership Academy I (June 17-20, 2008) and II (June 2009)
- NWO/COSMOS Inquiry Series (once a month from September through April)
- Acceptance to BGSU Graduate College and desired department graduate program

Open to K-12 teachers wishing to pursue a:

- Specialist Endorsement in Science (K-9) and/or Mathematics (K-6)
- MAT in Interdisciplinary Science (targets grades 4-9 teachers)
- MAT in Biology, Mathematics, or Physics (targets grades 9-12 teachers)

For more information visit us at:
http://cosmos.bgsu.edu/affiliated_projects/dreams
Or contact: Jessica Belcher, Program Manager
E-mail: jbelche@bgsu.edu or Ph: 419.372.5571



241 Math Science Bldg.
Bowling Green State University
Bowling Green, OH 43403-0212

**Limited Scholarships Available...
Apply online by May 1, 2008**

http://cosmos.bgsu.edu/affiliated_projects/dreams

Funding provided by the Ohio Department of Education, MSP grant.

DREAMS is a project affiliated with COSMOS.
COSMOS is a partner of the Northwest Ohio Center
of Excellence in Science and Mathematics Education (NWO).

BGSU.

Appendix N: 2008 NWO TEAMS Recruiting Brochure

Register today!

Three options for registration:

1

Online at www.nwocenter.org

2

Fill out the application on the other side of this page and send to the following address:

Michelle Klinger
241 Math Science Bldg.
Bowling Green State University
Bowling Green, OH 43403-0212

3

Email, phone, or fax
Michelle Klinger: mklinge@bgsu.edu
419.372.2745, fax: 419.372.2738



Who can participate?

- Teachers grades 3-6 who teach science and/or special education.
- We are looking for teaching teams to attend together! Science inclusion teams, grade level teams, school based teams, and even multi-school teams of teachers will get preferential registration.



Science Instruction For All



www.nwocenter.org

Funding provided by the Ohio Board of Regents and the Ohio Resource Center



Funding provided by Ohio Department of Education

BGSU.

School of Teaching and Learning

What is NWO TEAMS?

- Teachers who participate will experience over 100 hours of high-quality, sustained professional development focused on the integration of differentiated instruction with grade specific science topics. Participants will participate in and plan grade appropriate engaging differentiated science modules during two summer institutes and throughout the academic year.
- Science and intervention specialist university faculty and K-12 master teachers will co-teach the NWO TEAMS summer institutes as well as the academic year content study groups.
- While participating in NWO TEAMS, teachers will incorporate the principles of differentiated instruction with the utilization of FOSS and STC science kits, which are best-practices, research-based curriculum materials.



www.nwocenter.org

Professional Development Format



Summer Institute I - 2008

Dates: Monday, June 23 - Friday, June 27 and Monday, June 30 - Wednesday, July 2
Time: 8:00 a.m. - 3:00 p.m.

- Eight days of intensive hands-on science experiences using differentiated instruction.
- Co-taught by an experienced educator and science/intervention specialist teaching team.
- Content learned will directly apply to the Ohio content standards grade level indicators and benchmarks as well as the curriculum materials of the district.

Academic Year Content Study Groups

- Eight monthly science content study group meetings (5 Thursday evenings, 3 Saturdays).
- Time will be spent forming collaborative professional relationships with peers while learning content and discussing implementation challenges and successes.

Summer Institute II - 2009

- Four days of hands-on science experiences, with field trips to local centers of informal science education such as the Toledo Zoo and Hanson Quarry.
- Content learned will directly apply to the Ohio content standards grade level indicators and benchmarks as well as the curriculum materials of the district.

Incentives:

- \$1,000 stipend (\$400 after summer institute I, \$400 after the academic year, and \$200 after summer institute II).

- A wealth of standards-aligned high-quality curricular materials and kits available for classroom use by any NWO TEAMS participant.

Questions? Please contact Michelle Klinger at mklinge@bgsu.edu or 419.372.2745.

NWO TEAMS: Science Instruction For All

NWO TEAMS application

Deadline for application is April 25, 2008
(all team members fill out individual applications and mail applications together)

First Name _____

Last Name _____

Team Members _____

School _____

School Address _____

City _____ State _____ Zip _____

District _____

Home Address _____

City _____ State _____ Zip _____

Primary Email _____

Phone Number _____

Grade level 3 4 5 6

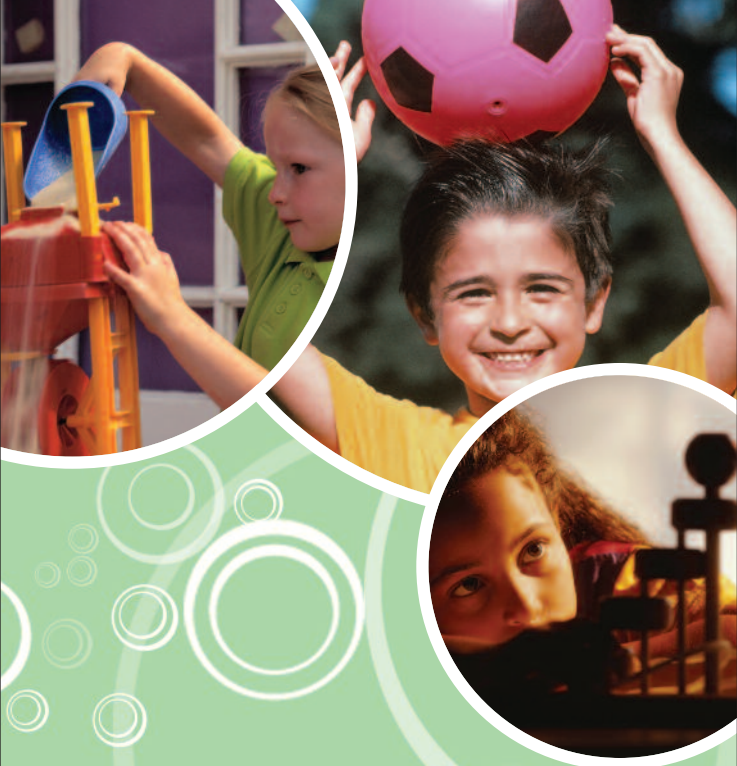
I teach special ed. science both

I am interested in receiving credit Yes No

I prefer vegetarian meals Yes No

Please mail refundable deposit check for \$30 to address on back to hold your spot in the program. Check will be returned on the first day of the summer institute.

Appendix O: 2008 RIPE II Recruiting Postcard



RIPE II Research-based Inquiry Physics Experiences

For early childhood teachers

<http://cosmos.bgsu.edu/ripe>

Are you an early childhood teacher who wants your students to better understand physical science? Do you want to have a deeper understanding of the concepts and how to teach them? If so, the 2008 RIPE summer workshop is the place to be!

Incentives:

- Physical science curriculum materials for early childhood students aligned to state standards
- Teacher content preparation with other K-3 professionals
- Participants will receive 4 FREE graduate credit hours from Bowling Green State University
- Participants will receive a material resource kit of approximately \$600 value

Teacher Requirements:

- Apply online at <http://cosmos.bgsu.edu/ripe> for the program
- Modify, implement, and evaluate one physical science unit
- Participate actively in all meetings and program evaluation
- Preference will be given to schools with more than one participant, so talk a friend into joining with you

Schedule:

- 2-week (8 day) Summer Institute, July 28 - August 7 (80 contact hours)
- 4 meetings in the Fall Semester 2008 (15 contact hours)

Equivalent to 4 Semester hours (3 after Summer Institute, 1 after Fall '08)

For more information, please contact Tracy Huziak-Clark, thuziak@bgsu.edu, (419) 372-7363.

<http://cosmos.bgsu.edu/ripe>

Funded by the Ohio Board of Regents Improving Teacher Quality 2008 grant program

Additional support for the RIPE summer workshop is provided by the BGSU College of Education & Human Development, the School of Teaching & Learning, the Center of Excellence in Science and Mathematics Education: Opportunities of Science (COSMOS), and the Northwest Ohio Center of Excellence in Science and Mathematics Education (NWO).

Appendix P: 2009 ACTION Recruiting Brochure



Teach him
how to calculate the circumference of the earth.

Alternative pathways are available at these partner institutions:

Northwest State Community College
Lana Evans
levans@northweststate.edu

Owens Community College
Dr. Renay Scot
renay_scott@owens.edu

Terra Community College
Dr. Nancy J. Sattler
nsattler@terra.edu

University of Findlay
Amy Depuy
adeputy@findlay.edu



research.teach.inspire.

Check out BGSU's innovative scholarship program for students interested in teaching mathematics or science.

- Summer Bridge Program
- Collaborative Research Projects
- On-Campus Learning Community
- Real-World Experiences
- Early Teaching Opportunities
- Capstone Project
- Innovative Education

Teach her
how to see a new world in a drop of water.





Expand your world with BGSU Scholarships

Teach them
how to save the planet.



Bowling Green State University
<http://www.bgsu.edu/action>
Email: action@bgsu.edu

ACTION Scholarships

Students selected to be ACTION Scholars will receive a scholarship, the value of which will increase annually based on the student's successful completion of program benchmarks. For the 2009-10 cohort, the scholarships will increase according to the following schedule:

Year 1	Year 2	Year 3	Year 4
\$2,000	\$2,750	\$3,500	\$4,250

Academic merit-based scholarships up to the full cost of tuition and fees may be available for some students to supplement the ACTION scholarship.

Imagine yourself changing the world – inspiring one student at a time.

Science and Math Education in Action (ACTION) is Bowling Green State University's new program for students interested in becoming middle childhood and high school mathematics or science teachers. Open only to Ohio residents, this program will prepare students to excel in the teaching profession, providing exceptional opportunities for research, real-world connections, and classroom experiences.

Choose Ohio First

www.bgsu.edu/action

BGSU
Funding provided by Choose Ohio First

In addition to these scholarships, ACTION Scholars will take part in:



Summer Bridge Program

This five-week program is designed to give ACTION Scholars a head start in their education before beginning their freshman year, featuring specially designed mathematics and science courses as well as a number of exciting activities.



On-Campus Learning Community

During their first two years, students will live in one of BGSU's nationally recognized learning communities, Natural and Health Science Residential Community, focused on the interests and needs of students in scientific and mathematics disciplines.



Innovative Education

Throughout the program, students will be introduced to innovative courses in the College of Arts & Sciences and the College of Education & Human Development, helping them learn teaching techniques that will enhance their skill and competency in the classroom.



Collaborative Research Projects

During their first year, ACTION Scholars will be part of a research team, gaining valuable experience as they work with their peers and expert faculty to examine a variety of pressing scientific issues.



Real-World Experiences

In their second year, students will experience firsthand how science and mathematics are used in the real world through experiences with industries and organizations.



Early Teaching Opportunities

ACTION Scholars will participate in teaching related activities with real students during their first semester and continue to use real classroom experiences to develop an understanding of the craft of teaching throughout the program.



Year 1

- Summer Bridge Program
- Collaborative Research Projects
- Teaching Experiences



Year 2

- On-Campus Learning Community
- Real-World Experiences
- Teaching Experiences



Years 3 & 4

- Capstone Project
- Methods & Student Teaching Experiences

Live in Natural and Health Science Residential Community (NHSRC)

To apply for an ACTION scholarship or to find more information about the program, visit the web site: www.bgsu.edu/action

Increased pool of exceptional science and mathematics teachers teaching in grades 4-12.

Appendix Q: 2009 Project pi r² Recruiting Brochure

Register Today!

There is no cost to teachers for this program.

Online at:

www.nwocenter.org

Email, Phone, or Fax:

Michelle Klinger: mklinge@bgsu.edu
Phone: 419.372.2745
Fax: 419.372.2738

Project pi r² is open to grades K-8 teachers of all subject areas who would like additional professional development in inquiry and STEM subject areas.



What is pi r²?

Project pi r², Partners in Inquiry Resources and Research, is an exciting program offering 120 hours of high-quality, research-based teacher professional development for teachers in grades K-8 with a special focus on 3-5 inquiry science and STEM-related curricula.

Project pi r² is a grant-funded program offering no-cost, State Standards-based sessions, school outreach, science materials, and a \$1,000 stipend to grades K-8 teachers who participate.



Project pi r²
241 Math Science Bldg.
Bowling Green State University
Bowling Green, OH 43403-0212

www.nwocenter.org

Funding provided by the Ohio Board of Regents

NWO BGSU
School of Teaching and Learning

Project pi r²

Partners in Inquiry Resources and Research

Project pi r²
Partners in Inquiry Resources & Research

Funding provided by the Ohio Department of Education

Why Project pi r²?

Academic Year Inquiry Sessions

In-depth, inquiry-based, science content sessions beginning in the Fall of 2008 and continuing throughout the school year. Scientists will team with our educational facilitators to help teachers dispel common science misconceptions and provide new insight on how to tackle the standards that students struggle with most often.

Educational Outreach

The region's best educational outreach comes right to your classroom. Educators from the Toledo Zoo, Challenger Learning Center, Toledo Area Metroparks, and others bring a variety of hands-on, inquiry-based programs to explore science with you and your students.

Community Resources

Summer Session 2009 takes you to some of the best community resources in the area to explore real-world science and introduce students to STEM careers in action.

Technology Integration

Hands-on distance learning sessions open new doors blending technology and science. WGETE shows teachers how to integrate science with today's technology from podcasts to SMART Boards.

Professional Development

Academic Year 2008-2009

Content Sessions

- Three Saturdays (8:30 am-4 pm) and five Thursday evenings (5-8 pm) between September and April.

Technology Integration Workshops

- Four workshops after school between November and May.

School Day Outreach Sessions (20)

- Outreach providers visit your school to present one-hour classroom workshops to students on a variety of exciting science topics. Scheduled with teachers between November and May.

Summer 2009

- A five-day (June 22-26, 2009) Community Resources Workshop

Incentives:

- \$1,000 stipend for participants (\$600 during the academic year and \$400 for the summer workshop).
- A wealth of standards-aligned, high-quality curricular and classroom science materials.
- 20+ hours of free outreach programming for your students from the Toledo Zoo, Toledo Area Metroparks, Sauder Village, and others!
- Optional BGSU graduate credit available (at an additional cost).

Questions

Please contact:

Michelle Klinger
Project Manager
241 Math Science, BGSU
Bowling Green, OH 43403
419.372.2745
mklinge@bgsu.edu



Project pi r² Application

Deadline for application is Sept. 1, 2008

First Name _____

Last Name _____

Team Members _____

School _____

School Address _____

City _____ State _____ Zip _____

District _____

Home Address _____

City _____ State _____ Zip _____

Primary Email _____

Phone Number _____

Grade level _____

I am interested in receiving credit Yes No

I prefer vegetarian meals Yes No

Appendix R: NWO Publicity and Teacher and Faculty Recognition

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A WEEKLY PUBLICATION FOR THE BGSU COMMUNITY



Dr. Barbara Gellman-Danley (second from right) meets with (left to right) Dr. Bruce Edwards, Connie Molnar and Albert Colom at the Center for Online and Blended Learning.

Vice chancellor visits to discuss BGSU's online, blended learning initiatives

When Dr. Barbara Gellman-Danley, Ohio Board of Regents (OBOR) vice chancellor for academic affairs and systems integration, held a distance-learning summit in Columbus in early May, she heard a buzz from other state participants that made her want to visit BGSU.

"Innovation, collaboration, sustainability" kept emerging as themes when other campuses spoke of BGSU, Gellman-Danley said. Dr. Bruce Edwards, associate vice provost for academic technology, who represented BGSU at the summit, recalled that "our reputation had preceded us. It was nice to have unsolicited praise for our work from other institutions."

As a result of the summit and ensuing conversations, Gellman-Danley and two of her staff, Stephanie Davidson, associate vice chancellor for program development and approval, and Thomas Bordenkircher, associate vice chancellor for academic quality and assurance, visited BGSU July 22.

Hosted by the Office of Academic Technology and the Center for Online and Blended Learning (COBL), Gellman-Danley spoke to various campus leaders about how distance learning can contribute to the University System of Ohio's strategic plan by providing access to a quality education for students who cannot easily travel to a campus to attend classes due to job or life circumstances.

"BGSU gets it when it comes to serving nontraditional students and meeting their needs, which is evidenced by the programs and student support services available, such as the Adult Learner Services office and the Center for Online and Blended Learning," said Gellman-Danley.

During their daylong visit, the OBOR contingent met with President Carol Cartwright, Vice Provost for Enrollment Management Albert Colom, Deans Council, International Programs and Adult Learner Services staff, and the BGSU Northwest Ohio COSMOS-STEM Committee, among others, to discuss the expansion of distance education initiatives and the innovative use of technologies in teaching and learning.

Gellman-Danley stressed the new opportunities available through the growth of online courses and programs. She also emphasized Chancellor Eric Fingerhut's expectation that campuses will utilize technologies to respond to the needs of students and meet state goals for higher graduation rates and affordability.

Connie Molnar, COBL director, said, "We were honored by Dr. Gellman-Danley's visit and her interest in BGSU's distance education initiatives. It confirms that we are on the right track in providing more opportunities for students to achieve their educational goals through the growth of online courses and programs."

Gellman-Danley has appointed Edwards and Molnar to the Ohio Strategic Planning Committee, which the vice chancellor refers to as "the BIG Idea Group." She formed the committee to develop a sustainable plan for Ohio to become a national leader in the use of technology to support and improve education.

"Our appointment to the statewide planning committee is a clear message that BGSU has built its online and blended platform wisely and well," Edwards added, "and that Columbus believes BGSU has something important to share with other public and private institutions in the state."

Edwards said the planning committee is charged with issuing a report and a set of recommendations to the chancellor by the end of this year.

July 27, 2009

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A WEEKLY PUBLICATION FOR THE BGSU COMMUNITY

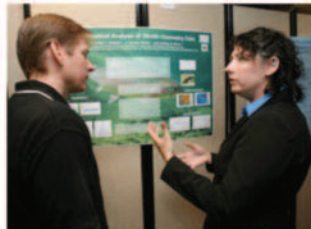


SETGO student Brian Greer explains his neurological research to President Carol Cartwright.

SETGO students advance skills, knowledge

It wasn't a typical summer vacation for students in the SETGO program. They spent 10 weeks in campus labs and at research sites conducting independent study on all manner of topics. Each received a \$3,500 scholarship.

The 38 hard-working students, from BGSU and Owens Community College, shared the results of their studies Aug. 14 at the SETGO (Science, Engineering and Technology Gateway Ohio) poster presentation. In addition to faculty mentors, peers, families and friends, the session was attended by BGSU President Carol Cartwright and, from Owens, President Christa Adams and project co-director Dr. Anne Bullerjahn.



Jennifer Noland (right) discusses her analysis of data from a study of the movements of sport fish.

"You should congratulate yourselves for having the will to take this kind of time this summer and not to be on the beach but to work on something with long-term results," Cartwright told the students, adding that their effort spoke of their commitment. "Not everyone gets the opportunity to do something like this. We congratulate you, and we need you," she said.

Martez Mott, a senior computer science major from Detroit, said, "The research experience will help in grad school. I was able to get a feel for it before I go on." Ultimately, he would like to do both teaching and research. Teaching, because "I like to help people, and research is really exciting. You're always pushing the state of the art."

Ashley Hannah, a BGSU senior from Macedonia, Ohio, majoring in pre-med biology, worked with SETGO co-director Dr. Molra van Staaden, biological sciences. They were engaged in a study of the sensory system of cichlids, looking at the fishes' lateral line systems. "I did learn a lot. SETGO gave me the full opportunity to conduct research and learn more about science," Hannah said.

For some, the research also revealed something about the bigger picture of evolution. Senior Brian Greer, from Akron, also a biology pre-med student, worked with Dr. Robert Huber, biology. Greer's poster detailed the results of his teaching crayfish to self-administer amphetamine in a test of how strongly addictive the drug is in the crustaceans.

"No paradigms exist for this in drug research," Greer said. That was the exciting part: the slow and painstaking process the work required was difficult, he recalled. "It teaches you to have patience," he said. "But it's worth it to prove that after 600 million years of evolution, we're still connected to them in how our reward system functions."

"When they run into trouble, that's the best thing, that's how they learn," said Dr. Vipapom Phuntumart, biology, who mentored three students this summer. "When you have a problem, you have to think harder, analyze it and learn how to solve it."

In some cases, the students' work also helped advance ongoing research by faculty, as in the contribution of senior Jennifer Noland to a project of Drs. Jeffrey Miner, biology, and John Farver, geology. Noland's mathematical analysis of data (working with Dr. J. Gordon Wade, mathematics) on mineral deposits in fish skulls, which serve as chemical fingerprints, helped confirm that they reflect fishes' place of origin, enabling the researchers to track their movements.

For more on SETGO, visit
<http://www.bgsu.edu/offices/imc/monitor/07-13-09/page47647.html>.

August 24, 2009

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BGSU Monitor

A WEEKLY PUBLICATION FOR THE BGSU COMMUNITY



SETGO student Michael Simecek works underneath the College of Technology's hybrid vehicle testing the efficiency of its motor drive train to obtain baseline performance data. Later, a new electric propulsion unit will be installed and a comparison made of the two systems.

SETGO students immersing themselves in research

It's a bit of a leap from studying theatre arts to looking for the genetic marker of a plant species, but for Amanda Ramirez of Toledo, funding and mentoring through the Science, Engineering and Technology Gateway Ohio (SETGO) program made it a possibility.

Ramirez, a second-year biotechnology student at Owens Community College, is one of 38 students on the BGSU campus this summer engaged in independent research through SETGO. The students are spending 10 weeks in hands-on projects, mentored by BGSU faculty in their labs, while receiving a \$3,500 scholarship. Their projects range from directional ability in pigeons to alternative energy to computer science, wetlands restoration and astronomy.

The schedule is demanding. "They're working on their projects at least five days a week for 10 weeks," said Dr. Moira van Staaden, biology, who is co-director of SETGO along with Dr. Anne Bullerjahn of Owens. "It's research, and you do what you have to do. But it's giving you the chance to actually work in what will be your eventual environment."

"With graduate school as competitive as it is, it's so important for undergraduates to get themselves out there and get experience," said senior Jennifer Noland, a nontraditional BGSU student with three children.

"My SETGO project is in quantitative ecology," said the Portage resident, who is majoring in mathematics and minoring in biology. "I'm using my math skills to answer certain biological problems." The project has the potential to trace the movements of sport fish by measuring mineral deposits accumulated in their skull bones before their release from Great Lakes hatcheries.

For Stacey Burris of Maumee, a second-year biology major from Owens, the summer project has been the first opportunity to actually apply what she has been learning in the classroom. She is cloning transcription factors from a major pathogen of soybeans. And even though the work initially did go smoothly, "It's reaffirmed that this is what I want to do," said Burris. "When things don't work out as you planned, you have to adapt and change, and then when you finally get results, it's so much more rewarding because of the effort you've put into it."

The students seem to agree the experience has been productive. "Science always interested me, but I never felt I could apply myself as well as I could in theatre arts," Ramirez said. "But our faculty mentors have welcomed inexperienced students with open arms, and I have never felt intimidated here. I've learned so much in the program."

Developing student skills is a primary goal for Dr. Scott Rogers, chair of biology. His two SETGO students are involved in his ice core research, which looks for bacteria and fungi from a subglacial lake in Antarctica. He hopes the students will continue in his lab this fall. "They're making culture plates for growing fungi and bacteria, and they have more than a dozen colonies growing already," Rogers said. "When they extract the DNA and see something on a gel, they're genuinely excited. I want to expose them to as many methods as possible this summer so they're trained and ready to go."

Funded by the National Science Foundation, SETGO is designed to increase the number of science, math, engineering and technology graduates in the region. In addition to the summer research program, it comprises a bridge program at Owens between high school and college, and student participation in an Art of Science Community, which meets periodically throughout the year.

The summer program also includes a weekly meeting of all the students to share information and hear from a faculty member about an area of science.

The students will show the results of their work in a poster session Aug. 14 in the Bowen-Thompson Student Union.

July 13, 2009

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BGSU Monitor

A WEEKLY PUBLICATION FOR THE BGSU COMMUNITY



Dr. Emilio Duran (left) with student Andrew Heath in Duran's Introduction to the Teaching of Science class

Grading teacher training part of TEAMS work at BGSU

Persistent calls for improved math and science education have been met in recent years with efforts to better train teachers in the subject matter. For all the time and money spent on training programs, however, has it made a difference in the classroom?

There's no simple way of accurately measuring if teachers are benefiting from professional development, says Dr. Emilio Duran, adding that "very little empirical evidence" suggests such programs are effective—and even less that students are doing better on standardized achievement tests as a result of their teachers' training.

But Duran, School of Teaching and Learning, is heading an attempt to measure the impact of a professional development project that he also helps lead. More specifically, he and BGSU colleagues are looking to measure acquisition of content knowledge by participants in Northwest Ohio Teachers Enhancing Achievement in Mathematics and Science (NWO TEAMS).

Last year, Duran and Jake Burgoon, a TEAMS internal evaluator, presented a paper on science content knowledge in participating elementary and middle school teachers at the National Social Science Association conference. The paper was published recently in the association's official publication, the *National Social Science Journal*, which accepts only about 15 percent of all submitted articles, screened by national referees and consulting editors, Duran says.

For teachers of grades 3-6, NWO TEAMS started three years ago as a Northwest Ohio Center of Excellence in Science and Mathematics Education effort, with \$1.9 million in grant funding from the Ohio Department of Education. Last year, the focus was narrowed to science at the same time the composition was expanded to special education teachers, of both gifted and special-needs students.

"We're providing training for teachers to address the needs of every student," says Duran, a former University of Toledo biologist whose career has shifted from molecular biology research to applied study of science education. The change began about 10 years ago, when he was asked to be part of a BG-UT grant pairing on professional development of teachers.

A spinoff of that elementary science-related project, NWO TEAMS has allowed his group to conduct research while being part of a professional development effort. Also among the subjects of study are factors that influence teachers' beliefs and perceptions in science teaching and learning, he says, noting that the way teachers feel about their ability will affect their classroom performance. "Teachers are lifelong learners, and we need to come up with ways of helping them."

To keep grant money coming for training programs, proof of their worth will be necessary as well, adds Duran, who came to BGSU in 2007. "If we don't do something about it, we're not going to get funding anymore," he says, so TEAMS leaders are trying to develop accurate, effective ways of measuring the project's impact in the classroom.

They hope to devise a model that is based on teachers' needs and also applicable to other programs at BGSU and beyond—even with the knowledge that teachers, and students, all differ in ability and training. In science, Duran says, referring to his own background, thousands of researchers can look in a laboratory at cells with the same genetic information. But in education, "we can't do that with our students," he points out. "We need to do a better job, and everyone needs to do their share."

He sees that happening at BGSU, which he calls "unique" for hiring people like him, with content knowledge in the sciences, to work with current and future teachers through its College of Education and Human Development. Citing the joint work of the education college and the College of Arts and Sciences, he says "the positive climate of collaboration that exists at BGSU right now is very rare."

"We have an incredibly passionate group of people at BGSU who care about our teachers," Duran adds. "We are one of the top colleges of education for a reason."

June 15, 2009

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BGSU MONITOR



Rolling the dice are (left to right) Diane Mott, James Albert and Barbara Moses, faculty members in the outreach project for public school math teachers.

Outreach project puts odds in math teachers' favor

"Life is uncertain," says Dr. James Albert, mathematics and statistics, but having a grasp of the laws of probability can help people make better decisions, as can the ability to understand data.

With the help of a two-year, \$192,710 award from the Ohio Department of Education and support from BGSU, Albert and colleagues Dr. Barbara Moses, the Bailey Family Endowed Professor of Mathematics, and instructor Diane Mott are working with area teachers to better prepare them to teach these skills to their students. Participants also gain three hours of graduate credit at no cost.

"Ohio standards require that we teach probability topics in grades K-12, but the schools are having a hard time working that into the curriculum," Albert said. "We want to give them curriculum and activities that address real-life situations the kids are dealing with. At the end of the course, we want the teachers to make lesson plans to show what they've learned."

Much of the course content is based on a textbook Albert wrote, *Data Analysis and Probability for Teachers*, that will be published by Wiley.

Fifty teachers of grades 7-12 are participating in the grant project. "Developing Reasoning about Data and Chance." They began in July 2007 with an online class on data analysis, with special emphasis on graphing and relationships. They will be taking a second online course in summer 2009 on concepts of probability. The group also meets in person occasionally to work on specific skills. At the next meetings, in November, the teachers will give presentations on the lesson plans they have written. The spring meetings will focus on developing graphing calculator skills.

"In each year, the course is directed toward understanding and addressing students' misconceptions on learning these topics," Albert said.

"Probability is not a natural skill," he observed. "It's not hard to make mistakes. People have certain beliefs about chance that aren't true. Also, many people have difficulties adjusting their probabilities in the presence of new information."

He cited the example of gamblers feeling that when they're on a "hot streak," they're either bound to cool off or, conversely, should keep going, when in reality the odds revert to the baseline only in the long run.

Dana Edmonds, math department chair for grades 7-12 in the Washington Local Schools, said her interest in taking the course was particularly piqued by the probability aspect. "I think there's a lot more we could be doing with probability and that kids would want to take that as an elective. I'd like to offer a class in it at some point."

"We want to better equip teachers and give them the tools to teach these concepts," Albert said.

October 27, 2008

Appendix R: NWO Publicity and Teacher and Faculty Recognition cont.

NEWS

NEWS RELEASE

Barbara Moses named BGSU's first Bailey endowed professor in math

BOWLING GREEN, O.—As a Bowling Green State University student in the 1960s, James Bailey was inspired by his mathematics professors. Years later, when he had achieved considerable success as a banking executive, Bailey was again inspired by a BGSU math professor—Dr. Barbara Moses of Bowling Green.

A talk by Moses on the importance to society of math education and teacher preparation—and of countering the disturbing decline in interest in math and science—helped shape the direction of a \$1 million gift that Bailey, his wife, Judy, and their daughters made to BGSU in 2004. Of the \$500,000 cash portion of the donation, \$250,000 is designated for an endowed professorship in mathematics.

When determining who should be the first recipient of the Bailey Family Endowed Professorship in Mathematics, Bailey said, "There was no one more deserving of the honor than Dr. Barbara Moses." Bailey was on campus Sept. 4 at the naming ceremony.

A highly regarded teacher and specialist in math education and teacher preparation for middle and high school, Moses was the founding director, in 2002, of COSMOS (Center of Excellence in Science and Mathematics: Opportunities for Success) at BGSU. The collaborative center is designed to help produce more and better-prepared math and science teachers. Bailey noted that "northwest Ohio now boasts one of the strongest math and science centers in the state of Ohio."

An appreciative Moses responded, "Not only are you rewarding me, but you are rewarding BGSU. This serves as a catalyst to make more of this happen. BGSU is becoming known for its math and science education. With BGSU having this position dedicated to math education, our program has become that much more respectable."

Moses received a bachelor's degree in mathematics education from Carnegie-Mellon University and master's and Ph.D. degrees from Indiana University. After two years on the faculty at Indiana State University at Evansville, she came to BGSU in 1978 and was promoted to full professor in 2003.

During many years of working with colleagues in K-12 math and science education, Moses and her teams have received more than \$1.7 million in external funding. Moses' research focuses on visualization in algebraic thinking, and she is co-author, with retired faculty member Dr. Alice Calderonello, of the soon-to-be-published book *Algebra for Teachers*.

"Because of our family's good fortune, we have been able to support causes in which we believe," Bailey said. "When we were deciding what to support, one of my daughters said, 'Don't just start a scholarship, because it affects just one person.'"

"The result was that the family established the endowed professorship in mathematics education (at BGSU) and an elementary program in Bridgeport, Conn., inner-city schools that teaches teachers. We think we can have a wider spread of influence across the country by impacting the teachers of math. We wanted to raise the level of math education, not just at BG but to reach out to the rest of the world by teaching the teachers."

At their 2004 gift announcement, Bailey explained that he and his family targeted math education specifically because "teachers have an underappreciated skill. Teachers have the opportunity to turn people off or turn people on." He recalled that he had gotten a C in his first math class at BGSU but then had a great professor "who made all the difference in the world."

At the Sept. 4 event, he said his BGSU experiences were "the foundation of whatever successes I have had."

Those successes have been many. The former executive vice president of Citibank's North American consumer bank responsible for the branches, mortgage and credit card businesses, he retired as executive vice president in 2000. Until 2003, he was a consultant in such areas as consumer marketing and financial modeling, and led a team that recommended a restructuring of the Bank of China as China prepared to enter the World Trade Organization.

From 2003-07, Bailey was chief operating officer of U.S. Trust and a member of the executive committee at Schwab.

He has maintained a strong relationship with BGSU, returning in 2007 to co-teach a history class with Dr. Donald Nieman, former dean of the College of Arts and Sciences. A member of the BGSU Foundation Board, he is also on the search committee for the University's next president.

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(Posted September 15, 2008)

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Picnic, visit, be amazed by science at all-campus get-together

A picnic, fun with friends and colleagues, entertainment—what better way to begin the new academic year than at the All-Campus Picnic and Campus Fest this Friday (Sept. 5). Also that day, see some exciting demonstrations of science phenomena at Xtreme Degrees.

The annual free picnic and fest, from 11 a.m. to 3 p.m. on the Union Oval and University Hall Lawn, is open to faculty, staff and students.

This year's Xtreme Degrees event promises to be even bigger and better than last year's premiere. Hosted by the Center of Excellence in Science and Mathematics Education: Opportunities for Success (COSMOS), it includes Xtreme Fluids, Xtreme Antibodies, Xtreme Aviation, Xtreme Discoveries, Xtreme Impact, Xtreme Sudoku, Xtreme Reptiles, Xtreme Marine Life and, in collaboration with COSI-Toledo, Xtreme Physical Science.

The interactive events are designed to spark interest in STEM (science, technology, engineering and mathematics) majors/minors and careers. But there is something for everyone, even for those students who would not be likely to choose a STEM major, according to Julie Nummerger-Haag, associate director of COSMOS. Every event is designed to teach students a big concept within science or mathematics. Information about the science or math behind the event will be available on a poster and a card that students can take with them. These posters and cards also spotlight related majors and careers.

Additional flyers are available to inform students about introductory classes that might get them hooked on STEM as well as minors and majors. For those already interested in STEM, the flyers provide more information about minors/majors, careers and ways to get more involved through volunteer opportunities or undergraduate research.

Xtreme Degrees 2008 is a collaboration among COSMOS and the colleges of Arts and Sciences, Education and Human Development, and Technology, along with the School of Teaching and Learning, the departments of biological sciences, chemistry, computer science, geology, mathematics and statistics, physics and astronomy, psychology, and public and allied health, with help from facilities services.

Last year at Xtreme Degrees, faculty had fun serving as announcers, running events and walking around with the non-Newtonian fluid as they talked with students. If you are an advisor or STEM faculty and would like the chance to interact with students at this year's event, contact Nummerger-Haag at jnumbe@bgsu.edu.

September 2, 2008

Appendix R: NWO Publicity and Teacher and Faculty Recognition cont.

BOWLING GREEN STATE UNIVERSITY

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BGSU MONITOR



Drs. Moira van Staaden (left) and Anne Bullerjahn

BGSU, Owens get grant to produce more scientists

BGSU is teaming with Owens Community College to address a goal that's easy to state and offering a challenge to meet.

It's "fairly ambitious," says Dr. Moira van Staaden, biology, of a national business-backed goal of doubling the number of college graduates in the sciences by 2015. "But we need to do it."

She and a colleague from Owens, Dr. Anne Bullerjahn, hope to do their part as directors of a project funded by the National Science Foundation for up to \$2.2 million over five years. Science, Engineering and Technology Gateway Ohio (SETGO) is expected to encompass several hundred Bowling Green and Owens students and faculty in a three-pronged approach to generating more scientists.

The national need stems from an aging work force in the so-called STEM (science, technology, engineering and mathematics) fields, says van Staaden, whose project co-director at BGSU, Dr. Tracy Huziak-Clark in the Division of Teaching and Learning, will assess its effectiveness.

While the number of jobs requiring at least a two-year degree in the STEM disciplines is expected to increase by 2020, the number of American college graduates in those fields is declining, van Staaden explains. "It's not just an Ohio problem, but it's particularly acute here because education is problematic in Ohio," she adds, noting that Ohio is in the bottom half of states in its percentages of both STEM graduates and residents with at least a two-year degree.

Research has shown that many students who enter college in math or the sciences but then leave those disciplines do so because they weren't prepared for the college-level content they encountered, van Staaden says. So SETGO will begin with a five-week "bridge" course at Owens, taught by Owens faculty, to bolster incoming students in math and science, including chemistry and biology.

Owens students sometimes start there thinking they're not interested in science, says Bullerjahn, a professor of math and life/natural sciences, but "with this grant, we can say, 'Do we have a program for you!'" The bridge course will provide an opportunity to learn about different branches of science—also including ecology, for example—in a lab-based, hands-on setting.

"I think if we can tap into that interest and show the aspects of science they've never seen before, it will take off for them," she predicts.

Students in the bridge program will be in cohorts of 24, which are further divided into study groups of six people working closely with a peer teaching assistant. Three other Owens faculty members are also involved with the bridge program, which, van Staaden points out, is modeled after BGSU's successful Academic Investment in Math and Science (AIMS) program for young women and students of color.

"What we're trying to do is recreate the social and academic support connections that AIMS is so good at providing and put it in a framework that will work for a broader demographic," she says, noting that Owens students are often older than the traditional college-age students served by AIMS.

Following the summer bridge program, SETGO students—who must be American citizens—will be part of a BGSU-based, academic-year learning community called the Art of Science Community. It's so named because evidence elsewhere suggests that students with other creative interests and outlets tend to be more successful in the sciences, and institutions attracting such students can increase their graduation rates, van Staaden says.

The learning community will host monthly meetings of faculty and students, to be held alternately at BGSU and Owens, with the theme "Building a Better Environment." The two-hour meetings will cut across the sciences, with one hour devoted to a scientific presentation with broad appeal followed by an hour of social programming, according to the Bowling Green biologist. Video podcasts will be part of the meetings as well, allowing more students to participate at some level, she says.

Faculty—along with BGSU undergraduate and graduate students—can serve as mentors to the Owens students, many of whom the directors hope will transfer to Bowling Green to complete four-year degrees after two years at the community college. "This provides a mechanism for them to transition to BG if they have the desire to do that," she says.

Bullerjahn points out that BGSU will afford the students more opportunities for research experiences—the third element of SETGO. The idea is for students to work in faculty members' labs during the summer following the academic year in the learning community. The project's success will depend largely on how many faculty get the students involved with research that piques their interest, says van Staaden, adding that many of her science colleagues already do a "splendid" job of it. The grant offers funds to faculty for materials, as well as student stipends.

July 21, 2008

Appendix R: NWO Publicity and Teacher and Faculty Recognition cont.

BGSU Monitor

BGSU MONITOR



BGSU to recruit, aid future math and science teachers

An ambitious plan by BGSU to recruit and educate science and math teachers has been chosen for state funding. The \$3 million Science and Math Education in Action grant will encourage and enable promising students to "Choose Ohio First" when selecting a college and, later, to find in-state teaching jobs.

Students in the program will receive from \$2,000 to \$4,250 per year in Choose Ohio First scholarships, along with intensive academic assistance, career counseling and the opportunity to conduct research and gain related work experience as undergraduates. Combined with other scholarships from BGSU, the future teachers could receive up to \$9,250 as seniors. "We want to give them the support, the community and the encouragement to meet high standards and be successful," said Dr. Bob Midden, leader of the grant-writing team.

"In essence, the primary goal of Science and Math Education in Action (SMEA) is to assist in the development and preparation of STEM (science, technology, engineering and mathematics) teachers who have the experiences, tools and skills necessary to have a positive impact on the learning of Pre-K-12 students in Ohio schools," said Dr. Julia Matuga, associate dean of the College of Education and Human Development.

The state initiative is aimed at two of Gov. Ted Strickland and Ohio Board of Regents Chancellor Eric Fingerhut's objectives in addressing Ohio's needs: graduating more students and keeping graduates in Ohio. By helping to better prepare the citizens of tomorrow, it also will play a role in work-force development, seen as another key to the state's economic development. "Inspiring and effectively educating Pre-K-12 students in the STEM areas is a critical contribution to the future development of the state," Matuga noted.

Part of the Ohio Innovation Partnership, the \$100 million Choose Ohio First scholarship program seeks to improve the state's competitiveness in science and math education. BGSU's grant is one of 17 proposals funded. Bowling Green will partner with the University of Findlay and Owens, Terra and Northwest State community colleges to immediately begin recruiting Ohio students who have an interest in science or math and in becoming teachers, and whose high school grades, classes and activities indicate an interest in those fields. Those who come in through the community colleges will be able to finish their four-year degrees at BGSU.

To be eligible for the scholarships, STEM students do not have to initially declare teacher education as a major but in their first and second years must participate in experiences with Pre-K-12 students, exposing them to teaching as a profession. This is a strategy to recruit those STEM students who may not have considered teaching as a profession by providing them with teaching experiences early in their college education, said Dr. Rosalind Hammond, interim education dean.

The grant team anticipates enrolling about 50 students on main campus and 10 at BGSU Firelands, with another 15 each at Findlay and Terra, 12 at Northwest State and 10 at Owens. BGSU Admissions Director Gary Swegan and Student Financial Aid Director Greg Guzman will collaborate to set them up with the scholarships, which are renewable for four years as long as they maintain the required grade point average and take the approved schedule of courses.

Bowling Green is equally matching the state funding, said Dr. Deanne Shavey, acting dean of the Graduate College. "Choose Ohio First puts money directly into students' pockets," Shavey said. The University's portion, coming largely from the colleges of education and arts and sciences, in addition to Student Financial Aid, pays for hiring a director and administrative support and for the programming on campus, she explained.

BGSU's program builds on its longstanding strength in teacher education, Midden said, and combines that with the content areas in science and math. The University has also been a leader in the study of teaching and learning, and will incorporate proven, research-based teaching strategies into the content-area courses, said Midden, a chemistry faculty member. He is also the director of COSMOS, which aims to strengthen the skills of public school science and math teachers as well as education majors. According to the board of regents, Bowling Green's plan "builds on BGSU's excellent track record on graduating highly prepared teaching professionals in Ohio."

"A fair amount has been learned in the last 20 years about what has limited student interest in math and science," Midden observed. "We're making some important changes in the 'gateway' courses and will use what has nationally been found to be most effective. We will use active learning, present the material so it is meaningful and engage students in service-learning."

The junior and senior years of the SMEA program will focus on preparing STEM education professionals through a newly designed curriculum thread, Teachers as Researchers, that will be infused in required education-preparation coursework, Matuga explained. SMEA students will utilize classroom research methods learned in these courses to design and conduct action research while student teaching, thereby documenting the impact their teaching has on Pre-K-12 student learning in a STEM area.

SMEA will draw upon some of the University's already established and proven avenues for providing students high-quality preparation and support, in addition to the scholarship assistance. Like the AMS program, which works with women and minorities to enroll and mentor them through to graduate degrees in math and science, the new program begins with a five-week summer bridge experience that brings students to campus early.

"The goal is to introduce them to the rigors of college study and give them time to get to know one another and their faculty mentors," Midden said.

Most SMEA students will spend their first year living in the Natural and Health Sciences Residential Community, located in Offenhauser West, where they will have access to exam review sessions, walk-in tutoring, small-group study sessions and other resources directly related to their coursework. "We have everything they need to get their work done," said Robert Harr, director of the community. "We're giving them the opportunities and the assistance along with the synergy of working and living with other students."

The community will also facilitate the research projects required of each freshman and host science seminars.

The required internships and work experiences, in the sophomore year, will also help students boost their learning and ultimately be better teachers, by demonstrating the application of knowledge in the real world. The work experience gives teachers a good opportunity to enrich their experience and expand their teaching," Midden said.

Dr. James Michael Smith, vice president for economic development and regional growth, has been in discussion with hospitals and businesses from Norwalk and Sandusky to Fremont and Toledo to explore potential sites for student placements. "There's going to be a large number of opportunities," he predicted. "This will be a great way to tie industry more closely to the educational experience."

Building such a comprehensive program required teamwork from numerous areas on campus, Shavey said. The working group includes members from the education college and its School of Family and Consumer Sciences, the College of Arts and Sciences, Continuing and Extended Education, AMS, the College of Health and Human Services, the Office of Service-Learning and COSMOS, among others.

"They all played important roles, as have faculty and administrators from each of the partnering institutions," Midden said.

"It's been a great collaborative effort and will continue to be," Shavey said.

To read the SMEA proposal, visit <http://www.ceris.org/programs/education/graduate/education>

July 14, 2008