

**Northwest Ohio Center of Excellence
in Science and Mathematics Education**

coordinating partners



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**NORTHWEST OHIO CENTER OF EXCELLENCE IN SCIENCE AND
MATHEMATICS EDUCATION (NWO) ANNUAL REPORT**

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W Robert Midden, PhD (ingoing)
Jodi Haney, PhD (outgoing)
Director, NWO Center
Director, COSMOS
Bowling Green State University
Bowling Green, OH

www.nwocenter.org

Jodi J. Haney, PhD

Director, NWO (term ended June 30, 2008)
Director, COSMOS
Bowling Green State University
Bowling Green, OH

Carla Johnson, EdD

Co-Director, NWO
Director, CATALyST
The University of Toledo
Toledo, OH

Michelle Shafer, MEd

Assistant Director, COSMOS
Bowling Green State University
Bowling Green, OH

Julie Nurnberger-Haag, MA in Education

Assistant Director, COSMOS
Bowling Green State University
Bowling Green, OH

The following COSMOS FY09 staff contributed to this report:

W. Robert Midden, PhD

Director, NWO (term began July 1, 2008)
Director, COSMOS

Michelle Leow Klinger

Assistant Director

Jessica Belcher

Program Manager

Lisa Addis

Graphic Designer/Marketing Director

Nancy Hoose

Secretary



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Mission

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

Vision

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

Acknowledgments

We would like to acknowledge the critical support we have received from the Ohio Board of Regents, 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.



An 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 2008 fiscal year. This year, we again organized and enacted an intense public relations campaign, investing both time and financial resources to design, develop, and disseminate the NWO concept through public relations efforts and professional-quality information materials to further demonstrate our commitment to a unified approach. The new identity is taking hold, as more and more individuals throughout the region and state now understand that NWO, COSMOS, CATALyST, Lourdes College (LC), Owens Community College (OCC), the University of Findlay (UF), and a number of community and business organizations such as BP, Toledo Zoo, and COSI-Toledo have become active and dedicated NWO collaborative partners.

NWO has a clear and specific focus on providing K–16+ professional development in science and mathematics, both in content and pedagogy, and developing new knowledge in the teaching and learning of science and mathematics. As a regional center, we aim to provide services appropriate and meaningful for all individuals and groups interested in joining our professional community. Sometimes, non “high-need” 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 science and mathematics across the 23-county area, 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 community partners across the region. In total, 619 pre-service teachers, in-service teachers, and higher education faculty actively participated in at least one Center activity during FY 2008.

We are equally committed to identifying high-need partners (defined by low student pass rates on Ohio achievement tests, high poverty level, or lower percentages of 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-need school groups and also to provide systemic professional development opportunities to a few targeted high-need 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).



The Center has continued to work closely our partner schools, including four high-need districts (Fremont City, Fostoria Community, Lima City, and Toledo Public) as well as smaller districts and county educational service centers (ESCs) including Bowling Green City, Maumee City, Perrysburg, Springfield Local, Hancock County ESC, and Wood County ESC, among others. During FY 2007, we established the COSMOS Collaborative Council (CCC) bringing together our school partners (teachers, principals, curriculum directors, and superintendents) once a month for regular planning and dissemination opportunities. The CCC 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 FY 2008.

Our diverse efforts, described in detail below, fit best into these four categories:

- In-service professional development
- Pre-service professional development
- Faculty development and collaborative research
- Affiliated project development, support, and implementation

These efforts help us attain the vision, mission, and goals of the Center. The goals for FY 2008 were slightly restructured, placing more emphasis on recruitment into STEM and STEM education disciplines and in conducting collaborative research in science and mathematics education than in years past to address these important needs in STEM education.



NWO Goals and Corresponding Activities for FY 2008

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/COSMOS Inquiry Series
- NWO Symposium on Science, Math, and Technology Teaching
- Praxis II Preparation Workshops
- Undergraduate professional organizations (BG-UT SECO and BGCTM)
- Early Childhood Mathematics Workshop Series
- Undergraduate and graduate teacher preparation course or program modification
- Affiliated activities (DREAMS, NWO TEAMS, RIPE, NWO TeachOhio)

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

- NWO Future Teacher Conference
- Xtreme Degrees
- Ohio Junior Science and the Humanities Symposium (OJSHS)
- Affiliated activities (Choose Ohio First: Science and Mathematics Education in Action, REAL, and TUMSA)

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
- BGSU Learning Sciences PhD program development
- 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.

- COSMOS Collaborative Council (CCC)
- NWO Executive Board
- NWO/COSMOS website
- Develop new business and community partnerships

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

- NWO Inquiry Series, Symposium, Summit, and FTC presentations
- Collaborate with the Ohio Resource Center to develop additional teacher- and faculty-developed resources
- Affiliated activities (DREAMS, NWO TEAMS)



FY 2008 Activity Reports

Each of the activities for the year is briefly described and a summary of all outcome data is provided below.

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/COSMOS Inquiry Series
- NWO Symposium on Science, Math, and Technology Teaching
- Praxis II Preparation Workshops
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- Affiliated activities (DREAMS, NWO TEAMS, RIPE, NWO TeachOhio)

NWO/COSMOS Inquiry Series

Sustained professional development is also offered by NWO through its academic year NWO/COSMOS Inquiry Series. The Inquiry Series continues to be a highly popular professional development opportunity 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). Monthly Inquiry Series meeting and action groups were attended by 350 participants (an average of 182 each month) and 10 higher education faculty during the 2007-08 academic year—an increase of almost 20% from the preceding year. The Inquiry Series is open to in-service and pre-service teachers, faculty members, and school 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 2007-08 academic year, 53 teachers earned two hours of BGSU graduate credit.

The theme for the 2007-08 NWO/COSMOS Inquiry Series was Renewing Science and Mathematics Education (see Inquiry Series brochure, Appendix A). The series started with a Blast-Off in September, during which we featured a nationally recognized speaker in mathematics education, Dr. Ed Berger. Participants then attended breakout sessions. The series continued with monthly events that included a menu of either high-quality



feature presentations (topics: student motivation, planning for inquiry, attacking the hands-on minds-on gap, questioning strategies, and assessment) or content-grade or project specific learning communities (action groups) facilitated by university faculty, community partners, and K–12 teacher leaders. The series concluded with the NWO/COSMOS Summit in April. At the Summit, Inquiry Series participants assumed leadership roles and shared lessons they developed during the year or action research they conducted on student learning in science and mathematics. Inquiry Series participants, including pre-service teachers, in-service teachers, MAT graduate students, NWO TEAMS participants, DREAMS participants, school administrators, and higher education faculty, rated sessions highly (4.1 on a 5-point scale). Participant feedback indicated the following: gained new ideas/activities/strategies/resources for more effective teaching in general as well as for teaching specific content and learning specific content; reflected on and challenged their own teaching; provided them the opportunity to interact with and share ideas with other teachers; learned more about teaching indicators and standards; and directly and immediately applied what they had learned in their classrooms. We will continue to expand this sustained professional development and adapt it to reflect emerging needs of our partners.

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

For the last five years, the NWO Symposium has brought together hundreds of participants to exchange effective strategies for teaching science and mathematics. 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 2007 Symposium moved from a two-day format to a one-day format (Saturday) since many teachers and higher education faculty reported difficulty in attending the Friday sessions. Despite the one-day format, the 2007 NWO Symposium was attended by 431 participants (pre-service and in-service teachers, faculty, and NWO staff), an increase of nearly 33% 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 3.6 to 5.0 on a 5-point scale, and the overall rating for the Symposium was a 4.0 out of 5.

This year's Symposium included nine 110-minute sessions and forty-six 50-minute sessions. NWO will continue to expand this event and adapt it to reflect the emerging needs of our partners. In addition, as the profile of this event continues to grow and we continue to attract more prospective presenters, we can be increasingly selective in the acceptance of Symposium presentations and offer a symposium that highlights the very best in science and mathematics professional development. The 2007 NWO Symposium "Program at a Glance" is included in Appendix B. The complete program is available online at: <http://cosmos.bgsu.edu/nwoSymposium/index.htm>



Praxis II Preparation Workshops

A total of 32 students attended three Praxis II Preparation Workshops hosted at BGSU: Adolescent/Young Adult (AYA) Mathematics (16), Middle Childhood (MC) Mathematics (10), and AYA Life Science (6). A teacher-consultant conducted the two mathematics workshops on Saturday, February 23. The life science workshop was facilitated by Dr. Eileen Underwood, associate professor of Biological Sciences at BGSU, on Sunday, February 24. Overall, the students were pleased with the workshops, giving each workshop the following average ratings out of 5: MC Mathematics (4.1), AYA Mathematics (4.5), and AYA Life Science (4.7). 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, BGSU School of Teaching and Learning, BGSU College of Education & Human Development, and NWO. Students continue to ask for workshops at other times of the year and for the other science areas. We continue to work with other IHE partner institutions to consider collaboration requests for this event.

Undergraduate Professional Organizations

BG-UT SECO (Science Education Council of Ohio) and BGCTM (Council for Teachers of Mathematics) undergraduate professional organizations hosted monthly activities to promote active involvement in the profession prior to graduation. These organizations provided programming for 175 undergraduate students attending events this school year (60 in the BG-UT SECO group and 115 in the BGCTM group). Programs for the SECO group included four events titled Education Materials (held at Toledo Zoo), Toys in Space, Population Connection, and Project Wet. Programming for the BGCTM group included seven events about various topics including Connected Math, panel discussions, Texas Instruments, and local teacher presentations. We will continue to expand this collaboration and use it to recruit and retain students into the fields of science and mathematics education.

Early Childhood Mathematics Workshop Series

COSMOS was honored to co-sponsor (in collaboration with BGSU's Department of Mathematics and Statistics) Dr. Rosemary Irons, visiting professor from Queensland University, Brisbane, Australia. Dr. Irons is an internationally recognized pK-3 mathematics scholar and author. While at BGSU, Rosemary presented the Early Childhood Mathematics Workshop Series during the spring 2008 semester. Approximately 60 undergraduate mathematics education majors and 10 higher education faculty members attended one or more of her sessions.



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. More information on this program is available at <http://cosmos.bgsu.edu/grants/>. No one applied for faculty development funds for this fiscal year.

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 and programs are listed below. Developed syllabi and supporting documents for these new courses are available upon request.

- BGSU Interdisciplinary Sciences specialization within the Biology MAT
- MATH 586: Problem Solving
- BIOL 580: Teaching & Learning Biology Fundamentals
- EDTL 680: STEM Leadership Academy I

Currently, BGSU offers tuition scholarships to study both content and pedagogy through BGSU's Master of Arts in Teaching (MAT) programs. It is worth noting that tight university budgets have forced a new funding structure for these programs. BGSU had to reduce its portion of the cost-share and require teachers to increase their costs for this scholarship program. The following six programs received development support from the DREAMS program in partnership with NWO/COSMOS: MAT in physics (geared towards high school physical science teachers), MAT in mathematics (geared towards high school mathematics teachers), MAT in biological sciences (geared towards high school life science teachers), Specialization in interdisciplinary sciences (geared towards middle grades science teachers), Specialist Endorsement in mathematics (geared towards K-6 mathematics teacher-leaders—in development), and Specialist Endorsement in science (geared towards K-9 science teacher-leaders—in development). The coursework for these programs has been developed in part by COSMOS faculty to blend content that is consistent with the Ohio Standards with research-based pedagogical techniques. In 2007-08, 14 students received full tuition MAT scholarships (three mathematics, eight physics, and three biology education) subsidized by DREAMS and the BGSU Graduate College. Due to the DREAMS grant program, many efforts are underway to expand and enhance the MAT offerings at BGSU including revised coursework in the sciences and mathematics and a new interdisciplinary science MAT program geared towards middle-grades teachers (approximately 35 teachers are projected to be enrolled in this program). Five teachers received their MAT degrees during FY 2008.



AFFILIATED ACTIVITIES:

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

As described above, DREAMS is a collaborative partnership between three high-need school districts (Toledo Public Schools, Lima City Schools, and Fostoria Community Schools), suburban and rural school districts, and the Colleges of Arts and Sciences and Education at BGSU. 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 in one of three areas (biology, mathematics, physics or a specialization in interdisciplinary sciences) or a Specialist Endorsement in mathematics or science. DREAMS serves over 75 teachers from across the state of Ohio by funding tuition for 9 graduate credit hours per year. Participants will remain with the program for the next three years as they take classes at BGSU to complete their graduate program. The recruiting brochure is available in Appendix C. Dr. Mandy Heddle, COSMOS Research Assistant Professor, was the principal investigator for the DREAMS program in 2007-08, and Dr. Eileen Underwood, BGSU Biological Sciences, will replace her in 2008-09. The program provides a total number of 135 contact hours/year, with a cost of approximately \$35/contact hour.

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

NWO TEAMS is a collaborative partnership between 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 second 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 D. Dr. Emilio Duran, School of Teaching and Learning at BGSU, is 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 2008 was \$634,618.

RIPE (Research-based Inquiry Physics Experiences)

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 pre- and in-service teachers in effective physics teaching. The recruiting brochure is included in Appendix E. Dr. Tracy Huziak-Clark, School of Teaching and Learning at BGSU, is the principal investigator and Dr. Steven Van Hook, Physics Department at the Pennsylvania State University, is 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 60 contact hours/year, with a cost of approximately \$59/contact hour. In total, 38 pK–3 teachers were served.



NWO TeachOhio

NWO TeachOhio was an initiative aimed at recruitment of teachers into mathematics and science involving grant funds from the Ohio Department of Education. The purpose of the TeachOhio grant was to increase the pool of highly qualified 7th–12th grade science and mathematics teachers in Ohio through alternative licensure. It was a collaborative partnership between BGSU, UT, OCC, and regional school districts. In particular for the 2006–07 school year, four high-need districts were key partners (Toledo Public Schools, Lima City Schools, Fostoria Community Schools, and Fremont City Schools). BGSU took the lead on this project with UT and OCC contributing to this project by leading monthly cohort meetings, serving on the advisory board, and assisting in planning recruitment of science and mathematics teachers. The NWO TeachOhio program sought to deepen this goal by having the cohort not only obtain licensure, but also earn a master’s degree in curriculum and teaching and receive on-going support and professional development via academic year participation in the NWO Inquiry Series and cohort meetings. The recruitment for this program began in 2006 with more than 1,000 people with science and/or mathematics backgrounds receiving brochures and many others reading about this opportunity through newspaper advertisements and an announcement in a teachers’ union newsletter. We received more than 150 inquiries through attendance at informational meetings as well as phone and e-mail messages, indicating an interest within the population to change careers to mathematics and/or science teaching.

The NWO TeachOhio program prepared 14 new people to be eligible for Alternative Educator Licenses (12 science and 2 mathematics) to teach 7th–12th grade science or mathematics. Thirteen of the cohort members maintained or acquired teaching jobs for the 2007-08 school year and are teaching in five Northwest Ohio school districts (Fostoria Community Schools, Lima City Schools, Scioto Valley Schools, Springfield Local Schools, and Toledo Public Schools). Twelve of these teachers are new to teaching as a result of our recruitment efforts, while two other 1st–8th grade licensed teachers used the program to obtain a 7th–12th license. Thirteen of the 14 TeachOhio teachers earned their master’s degrees by August 2008, with one on target to finish in December 2008. The final report is available upon request. Dr. Jodi Haney, NWO Director, was the principal investigator for the TeachOhio program and Julie Nurnberger-Haag was the program manager. NWO/COSMOS played a significant role in all aspects of this program. The program provided a total number of 575 contact hours/year, at a cost of approximately \$29/contact hour.



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

- NWO Future Teacher Conference
 - Xtreme Degrees
 - Ohio Junior Science and Humanities Symposium
 - Affiliated activities (Choose Ohio First: Science and Mathematics Education in Action, REAL, TUMSA, and other miscellaneous activities)
-

NWO Future Teacher Conference (FTC)

Funded through an NWO Regional Partnership Grant, this was a collaborative effort among the University of Findlay, BGSU, and the University of Toledo with the University of Findlay taking the lead. The goals of the conference address both the NWO goals of STEM education retention and developing the expertise of teachers. 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 F). Eighty-nine pre-service teachers attended the conference, and 64 of them completed the on-line survey (72% return rate). Almost all of the attendees indicated that they would recommend the FTC to other pre-service teachers (91%). A large majority ranked materials, activities, topics, and the overall conference quite useful. Participants also found the formats and presenters effective, gained useful information for the first year of teaching, developed support networks, and established relationships. Overall the conference received a mean of 4.3 out of 5 with a section for extended response documenting very positive comments on the structure, location, and presenters.

Xtreme Degrees

Xtreme Degrees Day is COSMOS' annual kickoff to STEM recruiting that thousands of BGSU students and faculty attend. Our first Xtreme Degrees Day was composed of the Xtreme Fountain, Xtreme Fluids, and Xtreme Life events. BGSU students had the chance to watch nucleation in action as 704 pop bottles erupted into a fountain that was choreographed to music (in collaboration with COSI-Toledo), run across a non-Newtonian fluid that behaves like a solid under force, and hold or watch the mating behavior of bearded dragons.



A specific count of all students impacted was not possible due to the nature of the event, but from the videos of the event we estimate at least 2,000 students and faculty attended the Xtreme Fountain and other events. Xtreme Fluids, the one event for which students had to register, had 139 students run across the fluid; each student received a flyer explaining the science they experienced. Many of those students as well as others enjoyed Xtreme Life by holding and learning about various reptiles. Many organizations made this recruiting event possible. COSMOS contributed most of the monetary and work hours to put on the event in collaboration with COSI-Toledo. The College of Arts & Sciences and the School of Teaching & Learning at BGSU each donated funds to help put on the event. In addition, American Rent-All and Tractor Supply Company donated the use of some equipment and supplies. Faculty from the College of Arts & Science, School of Teaching & Learning, and College of Technology as well as AIMS scholars (women and minority students in a unique scholarship program that requires undergraduate research in the sciences) and a graduate student in geology volunteered their time to make this event exciting for students. Each year we plan to expand the number of Xtreme Degrees events to include more STEM fields. We use these events to capture students' interest and enthusiasm, talk about the science behind the event, and then direct them to related careers. We distributed handbills describing the science of the events as well as flyers about interesting local STEM-related places to visit and BGSU STEM classes and majors. The video and explanation of the science of the events are available at our website: <http://cosmos.bgsu.edu/careers>. See Appendix G for the flyer advertising the event.

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. This year, 125 high school students presented their work, and 25 high school teachers and 25 higher education faculty were in attendance. We believe this event is an excellent opportunity for the recruitment of the next generation of teachers. The overall evaluation rating of the 2008 OJSHS by the participants was 4.8 on a 5-point scale. Participants remarked on the organization of the event, professional working atmosphere, and recreation/entertainment. Some of the comments were:

- Fostering respect and congeniality of participants was wonderful this year.
- The OJSHS was an interesting way to enjoy the study of science. Very fun!

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 United States Army, Navy, and Air Force (see Appendix H).



AFFILIATED ACTIVITIES:

Choose Ohio First: Science and Mathematics Education in Action

BGSU as the lead agency in affiliation with NWO was awarded a \$3,000,000 grant from the Ohio Board of Regents Choose Ohio First program. This grant will fund a project that will recruit 60 well-prepared and highly capable students who are planning to be science and mathematics teachers per year. A number of innovative practices will be used to enhance the success, achievement, and persistence of these students. Students will participate in collaborative undergraduate science or mathematics research projects in their first year, co-ops or internships in STEM-related businesses in their second year, and teaching field experiences throughout all four years of their college education. Their association and camaraderie with each other and with faculty and staff will be fostered through a residential learning community and they will enroll in science and mathematics courses that incorporate best practices in teaching and learning. A five-week summer bridge program immediately prior to their first semester of classes will prepare them for the rigors of college study in the sciences and mathematics and help ensure their success during the critical first year when attrition from these fields is the highest. This endeavor involves BGSU collaborating with three community colleges (Owens, Terra, and Northwest State) and with a regional private institution (University of Findlay). The project is based on and incorporates many of the features of BGSU's Academic Investment in Mathematics and Science, which has achieved a 65% four-year graduation rate of women and minority students in mathematics and science majors, dramatically higher than the 7% rate seen nationally for minority students at similar institutions.

BGSU's REAL (Regents Environment Academy for Learning) and UT's TUMSA (Toledo Urban Mathematics and Science Alliance)

Both of these programs completed their academic year activities during FY 2008. Despite the many indicators of success, neither program received a second year of funding from the Ohio Board of Regents. Dr. Carla Johnson was the principal investigator for TUMSA. Dr. Chris Keil, Environmental Health Program at BGSU, was the principal investigator for the REAL program. NWO/COSMOS played a significant role in the REAL grant development, building a collaborative partnership among BGSU, OCC, and participating Ohio high schools.

TUMSA was a collaborative effort of the University of Toledo (UT), Owens Community College (OCC), and the Toledo Public Schools (TPS), along with local community organizations and Frey Scientific, Delta Education, and Texas Instruments, to introduce students in TPS to potential careers in secondary science and mathematics teaching. The TUMSA program immersed students in exciting exploration of science and mathematics—taught through highly effective strategies to engage students in learning science and mathematics content that can



apply toward college credit, experiences teaching younger students, and opportunities observing effective teachers in action. TUMSA provided educational, intellectual, and social experiences for TPS students so that they will believe that going to college and obtaining a teaching license is an achievable goal.

REAL provided an opportunity for high school students entering 11th or 12th grade to earn college credit that also fulfilled high school requirements if approved by the student's home school district. Fifty-four students attended a three-week residential summer academy at BGSU. At the summer academy students experienced hands-on, minds-on science during two courses: Introduction to Chemistry and Environmental Health Science. Upon successful completion of the academy courses, students were eligible to take an additional distance-learning course in the fall of 2007. Fourteen students participated in the distance-learning course Global Commons, a social science general education course focusing on international perspectives of environmental issues.

Miscellaneous Activities

Through NWO communication structures, we are able to develop win-win situations for many stakeholders. For example, Jim Schall asked NWO to recruit college students to serve as mentors for his large Science Olympiad team (37 students). In doing so, NWO saw this as an opportunity to stimulate high school students' interest in STEM, but also as a way to promote and recruit college students to explore careers teaching science or mathematics. In just the first year, due to the NWO's communication efforts, Springfield High School's Science Olympiad had 12 more event coaches than the previous year. Of the 250 teams competing in the regional competition, only the top 40 qualify for state competition. Jim credits the support of the mentors recruited by NWO with having two teams qualify for the state competition for the first time, although only one team per school is allowed to advance to the state competition. Moreover, one of the coaches who was planning to teach high school social studies has now switched to teaching high school science. Through this service as a communication hub, connecting students, teachers, and other collaborators, the Center has been able to advance science and mathematics education not only for the students at Springfield High School but also for thousands of future students who can now benefit from a recruited science teacher.

During FY 2008, NWO also began to collaborate more fully with existing general recruiting structures within BGSU to encourage students to join STEM disciplines. Rather than simply have students visit a residence hall or sit in on a class, NWO recruited faculty and organized with the office of admissions to host STEM focused tours. Three different middle school tours that the office of admissions planned to host for approximately 190 students provided hands-on experiences in environmental science, chemistry, life science, marine biology, and/or technology.



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
 - BGSU Learning Sciences PhD program development
 - Affiliated activities (faculty/staff research and participation)
-

COSMOS Research Learning Community

In the COSMOS Research Learning Community, faculty members read and discuss top-tier research on science and mathematics education and present their own research (design and develop new collaborative projects, discuss work in progress, or share the findings from a completed study). Importantly, presenters receive feedback from their peers and discuss new potential collaborative research project ideas. Twenty-eight higher education faculty and center staff representing 13 departments/units and 4 colleges participated in the COSMOS Research Learning Community during the 2007-08 academic year. As a result, five new collaborative research projects were launched during this time (biology student motivation, visualization, relationship between vector comprehension and misconceptions in physics, elementary teacher and student misconceptions in science, and defining scientific literacy for undergraduate science and mathematics education). This Research Learning Community was highly rated by faculty participants for establishing a sense of community among other researchers and teachers across the university, developing new research methodologies and refining research designs, gaining a background in science education, and enriching interdisciplinary awareness. In fact, on the mid-year evaluation, 87% of the learning community participants rated the community as useful to their professional development as a researcher and teacher. The member listing for this community is found in Appendix I.

BGSU Learning Sciences PhD Program

A full proposal for a new interdisciplinary PhD program focusing on how people learn in the mathematics and science disciplines has been successfully routed through the College of Arts and Sciences and the College of Education and Human Development at BGSU. The goal of this program is to prepare future faculty in the Colleges of Arts and Sciences with a research and teaching focus in the learning sciences. A financial impact statement is now being prepared before it is sent to the graduate council for approval and then to the BGSU Board of Trustees. When approved, the proposal will be sent the OBR Chancellor for consideration. We believe this program is the first of its kind in Ohio and only few similar programs exist nationally. Recent trends in the hiring practices at IHEs suggest that faculty possessing this background are desperately needed. We foresee high levels of collaboration between this doctoral program and COSMOS, and among the NWO partners in the region.

AFFILIATED ACTIVITIES:

Faculty and Staff Research and Dissemination

A total of 13 refereed presentations and 10 refereed publications (with another 9 in review) focusing on STEM education were accomplished during FY 2008 by COSMOS-affiliated faculty and staff. Appendix J contains a full bibliography of FY 2008 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/COSMOS Inquiry Series, Action Groups, Research Learning Community, NWO Symposium, Ohio Junior Science and Humanities Symposium, NWO Executive Board, COSMOS Collaborative Council, and Learning Sciences PhD program committee.

Partner	Number of Participants	Discipline
Bowling Green State University	44 (59%)	Arts and Sciences - 43% (of university partners) • Biological Sciences • Chemistry • Computer Science • Environmental Programs • Geology • Mathematics • Pharmacy • Physics & Astronomy Education - 32% (of university partners) University Administration & Support Staff - 25% (of university partners)
Lourdes College	7 (10%)	
Owens Community College	6 (8%)	
University of Findlay	8 (11%)	
University of Toledo	9 (12%)	
Total IHE Participants	74	

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.

- COSMOS Collaborative Council (CCC)
- NWO Executive Board
- NWO/COSMOS website
- Develop new business and community partnerships

COSMOS Collaborative Council (CCC)

To increase the involvement of key stakeholders, COSMOS developed a forum for STEM regional support and collaboration. The CCC is composed of K–12 administrators, local teachers, BGSU faculty, and 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 CCC meetings are available at www.nwocenter.org/communities/ccc/. A breakdown of CCC 2007-08 attendees follows:

- 18 ESC & State Support Team members from 6 ESC and 3 State Support Team regions
- 13 School District partners from 8 school districts
- 13 IHE partners from one university
- 4 Community partners from 4 different locations
- 5 Center staff members

NWO Executive Board)

The NWO Executive Board met in September 2007 and May 2008 as outlined in the NWO approved bylaws. Minutes for both meetings and the bylaws guiding our operation are found on the website at www.nwocenter.org/nwo_exec-board/index.htm. The composition of the board is as follows.

Jodi Haney , NWO Director, COSMOS Director	BGSU
Eileen Underwood , Associate Professor in Biological Sciences	BGSU
Emilio Duran , NWO TEAMS PI, Asst. Professor in Science Education	BGSU
Lori Hauser , Director of Operations	COSI Toledo
Jane McCleary , Director of Curriculum	Hancock County ESC
Anjali Gray , Chair, Biological Sciences Dept.	Lourdes College
Kathleen Herrmann , Executive Director	Lucas County ESC
Anne Bullerjahn , Professor, Math/Science Department	Owens Community College
Linda Lower , Customer Services Manager	Perstorp Polyols
Julie Campbell , Science and Math Support Teacher	Toledo Public Schools
Mitch Magdich , Curator of Education	The Toledo Zoo
Julie McIntosh , Associate Dean, College of Education	The University of Findlay
Carla Johnson , NWO Co-Director, CATALyST Director	The University of Toledo
Andy Jorgensen , Associate Professor of Chemistry	The University of Toledo

<i>NWO Executive Board Composition</i>	
BGSU (2 + 1 NWO-TEAMS PI)	Positions
COSI Toledo (1)	Curriculum Director (1)
Hancock County ESC (1)	Executive Director (1)
Lourdes College (1)	Customer Service Manager (1)
Lucas County ESC (1)	Curator of Education (2)
Owens Community College (1)	Director (3)
Perstorp Polyols (1)	IHE Faculty (5)
Toledo Public Schools (1)	Teacher (1)
Toledo Zoo (1)	
University of Findlay (1)	
University of Toledo (2)	

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, contact us, 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, CCC, Research Community, etc.), and careers (information for STEM teachers and potential STEM students K–16). The website undergoes regular revision to continue to meet the growing needs of our region.

Develop New Business and Community Partnerships

NWO Partners. 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.

Type of Organization	Name of Organization
Executive Board Member Institutions	<ul style="list-style-type: none"> • Bowling Green State University • Toledo Public Schools • COSI Toledo • Lourdes College • Owens Community College • Hancock County ESC • University of Toledo • Toledo Zoo • Lucas County ESC • University of Findlay • Perstorp Polyols
Institutes of Higher Education	<ul style="list-style-type: none"> • Bowling Green State University • Owens Community College • University of Toledo • University of Findlay • Lourdes College
School Districts	<ul style="list-style-type: none"> • Toledo Public Schools • Washington Local Schools • Fostoria Community Schools • Findlay City Schools • Perrysburg Exempted School District • Lima City Schools • Springfield Local Schools • Rossford Exempted Village School District • Toledo Diocesan Schools • Bowling Green City Schools
Educational Service Centers	<ul style="list-style-type: none"> • Hancock County • Lucas County • Putnam County • Wood County • Northwest Ohio
State Support Teams	<ul style="list-style-type: none"> • Region 1 • Region 6 • Region 7
Business Partners	<ul style="list-style-type: none"> • American Rent-All • British Petroleum • Carolina Biological Supply • Tractor Supply Company • Mother Hubbard’s Reading Cupboard • Delta Education • Perstorp Polyols, Inc. • Reading Railroad • Toledo Blade • Sheridan Worldwide • Texas Instruments
Community Partners	<ul style="list-style-type: none"> • Armstrong Air and Space Museum • COSI-Toledo • WGTE • Ohio Historical Society • Stranahan Arboretum • Toledo Zoo • Lucas County Metroparks • Sauder Historical Village • Toledo Botanical Gardens • Challenger Learning Center
Affiliated Professional Org.	<ul style="list-style-type: none"> • OCTM/NCTM • SECO

Regional Partner Grants. Due to changes at the University of Toledo at a time when the FY 2008 budget was in negotiation, and due to previous year shortcomings in deliverables, we followed the approach used by the Southwest Center of Excellence and began an NWO Regional Partner Grant program in FY 2008. Our goal was to increase accountability and engagement among all NWO partners. The Ohio Board of Regents, UT, and BGSU administrators and center directors communicated extensively on this new approach. As such, the UT subcontract award was not offered in 2008; instead, the money was used to support the following three peer-reviewed (via subcommittee of the NWO Executive Board) proposals:

- Smart Tech Program – Toledo Public Schools/WGTE Public Broadcasting
Summary of Proposed Project: \$12,100 full funding, average score 91.8. Toledo Public Schools, in partnership with WGTE Public Media, proposes to initiate SmartTech (Science, Math and Technology), a teacher professional development program for 3rd–6th grade science and mathematics educators on effective technology integration techniques to enhance instruction.
- SATELLITES: Students and Teachers Exploring Local Landscapes to Interpret the Earth from Space – University of Toledo/Bowling Green State University
Summary of Proposed Project: \$20,000 full funding, average score 88.3. This program will work with teachers and students from Toledo and Penta County Career Center to bring geospatial technology, the third fastest growing career path in the United States according to the Labor Department, into K–12 classrooms.
- Bowling Green State University/Medical College of Ohio at University of Toledo/Owens Community College
Summary of Proposed Project: \$2,900 partial funding, average score 82.5. The goal of this research project is to improve the mathematics, science, technology, and overall training of future educators by highlighting the relationship between visualization skills to the achievement in certain courses and fields.



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

- NWO Inquiry Series, Symposium, Summit, and FTC presentations
 - Collaborate with the Ohio Resource Center to develop additional teacher- and faculty-developed resources
 - NWO Teacher and Faculty Recognition (not in original list of activities)
 - NWO Larabee Mini-Grants to K–12 Schools (not in original list of activities)
 - Affiliated activities (DREAMS, NWO TEAMS) (added)
-

NWO Inquiry Series, Symposium, Summit, and FTC Presentations

Fifty teachers made professional presentations at NWO-sponsored events such as the Inquiry Series, Symposium, Summit, and other professional conferences.

Collaboration with the Ohio Resource Center

Our efforts for sustained collaboration with the Ohio Resource Center fall into the following two categories:

1) Assistance to schools to instill “best practices”

We consistently point to the instructional resources at ORC during our pre-service courses and the NWO Future Teacher Conference, as well as events we sponsor for in-service teachers such as the NWO/COSMOS Inquiry Series, DREAMS courses, and NWO TEAMS workshops. During FY 2008, we have also begun referring teacher-leaders to the content resources, professional resources, and assessment resources. All of our professional development is grounded in research on effective professional development. Our vision is to create PD opportunities for novice through expert teachers by developing experiences to generate awareness about school science and mathematics through providing leadership training for teachers and district leaders.

2) Efforts to incorporate ORC web-based resources into pre-service and in-service products created and submitted for ORC consideration

At this time, we are not actively advocating for creation and submission of resources and products to ORC for evaluation. However, we remain open to continuing the dialogue with ORC regarding future mutually beneficial collaborative efforts.



NWO Teacher and Faculty Recognition

Barbara Moses (BGSU Mathematics) hosted Rosemary Irons, visiting professor from Queensland University, Brisbane, Australia. Rosemary Irons is an internationally recognized pK–3 mathematics scholar and author, and COSMOS and the Mathematics Department at BGSU funded her travel. During her stay, Rosemary attended the COSMOS Research Learning Community and Team meetings and presented at the NWO Inquiry Series and an Early Childhood Mathematics Seminar for pre-service and in-service teachers. Drs. Moses and Irons also collaborated on publications during her two-month visit.

Several BGSU faculty members and NWO participants received awards during FY 2008 (see Appendix K):

- BGSU Research Conference – Jackie Kane (MAT physics student), Applications of Remote Sensing for Ohio Secondary Schools
- Elliot L. Blinn Award for Faculty (Undergraduate Student Innovative Basic Research/Collaborative Work) – Dr. John Laird, BGSU
- Christofferson-Fawcett Award from Ohio Council of Teachers of Mathematics – Dr. Dan Brahier, BGSU
- Outstanding Researcher Award (Council for Learning Disabilities) – Dr. Amy Scheuermann, BGSU
- Wood County Health Department Public Health Award – Dr. Bob Midden, BGSU
- Ohio Teacher of the Year – Deb Wickerham, Findlay City Schools teacher and NWO TEAMS consultant

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.



In spring 2008, a \$2,000 K–12 mini-grant was awarded to Matthew Partin, BGSU biology instructor, for his Virtual Bio Tour project. This grant is a partnership among Bowling Green State University, WBGU Public Broadcasting, and several area school districts. Video tours called “Extreme Adaptations” were filmed in labs at BGSU. “Extreme Adaptations” was broadcast live on WBGU-PBS. Featuring BGSU faculty and students, this interactive tour took students inside the BGSU greenhouse, herpetology lab, and marine biology lab to learn about some amazing plants and animals. The video, placed online at <http://wbgu.org/biotour> for teachers to access at their convenience, includes a companion study guide. The final project report is available upon request and the flyer is available in Appendix L.

Anne Bullerjahn, Owens Community College, was awarded a \$978 K–12 mini-grant for a Plant Lending Library. Due to time and personnel constraints at Owens, the grant award was declined.

A \$2,000 K–12 mini-grant awarded during FY 2007 to David Bowers, Bellevue City Schools, for a Marine Club project received an extension. The project was completed and funds awarded in FY 2008.

AFFILIATED ACTIVITIES:

DREAMS

See description of DREAMS program in the Goal 1: Affiliated Activities section.

NWO TEAMS

See description of NWO TEAMS program in the Goal 1: Affiliated Activities section.



NWO Evaluation

The impact NWO has made in achieving the mission and goals is evidenced by the FY 2008 evaluation conducted by MetriKs Amérique (Appendix M). In order to determine progress towards these goals, the Center worked with MetriKs to align the Center's activities with each goal, formulate specific evaluation questions for each goal, and identify multiple instruments and data sources that could be triangulated to enhance the validity of the findings. Further details on the evaluation methods, analysis, and findings can be found in the full evaluation report.

Example

Goal 2: Effective Professional Development

Evaluation of the effectiveness of the NWO professional development was accomplished by thematically analyzing and summarizing data gathered from several different sources:

- Survey data (Teacher Beliefs Inventory [TBI], Survey of Teacher Science Leadership Efficacy Beliefs [SLEBI])
- Open-ended session evaluations by the participants (Inquiry Series, Praxis Workshop, NWO Symposium, OJSHS, Research Community mid-year evaluations)
- Research Community interview data
- Attendance data
- Other documentation (e.g., courses/programs development and modification, Research Community minutes, number of students in MAT programs, number of hours successfully completed each year, names of courses completed, number of SECO/OCTM meetings, attendance at SECO/OCTM meetings, number of members in SECO/OCTM, minutes from the monthly CCC meetings, and minutes from the two NWO Executive Board meetings)
- Academic achievement of REAL participants
- Results from the pilot of the new classroom observation protocol



The following evaluation questions were examined using the data described above:

- Evaluation Question 1:** What are the beliefs and practices of NWO participants? How do these beliefs compare for TEAMS, DREAMS and Other NWO participants? Do beliefs of in-service teacher change differently than beliefs of pre-service teachers?
- Evaluation Question 2:** What are the participants' perceptions regarding the effectiveness of the NWO professional development?
- Evaluation Question 3:** How do participants perceive that NWO activities have impacted their beliefs and practices?
- Evaluation Question 4:** How have the universities responded by developing/revising courses/programs to better prepare teachers?
- Evaluation Question 5:** In what ways are participants deepening their content knowledge in their subject areas?
- Evaluation Question 6:** How do participants transfer skills and knowledge received through NWO professional development into the classroom?
- Evaluation Question 7:** What types and how many students have been served as a result of the NWO recruiting and retention activities?
- Evaluation Question 8:** How did these participants rate the effectiveness of NWO Center?
- Evaluation Question 9:** How have BGSU faculty contributed to the body of knowledge on how people best learn science and mathematics and/or on the barriers and enablers related to current reform efforts?
- Evaluation Question 10:** What do faculty believe about the utility of the Research Community as a faculty development opportunity that serves to enhance the research efforts of the university in mathematics and science education?
- Evaluation Question 11:** How do faculty perceive the role of NWO in impacting problems associated with K–16 mathematics and science teaching and learning?
- Evaluation Question 12:** How has NWO developed and sustained a regional collaborative alliance including university, school, and community partners through a shared vision and collaborative spirit for tackling current STEM education issues?
- Evaluation Question 13:** In what ways have NWO teachers taken on leadership roles in the region?



The following main findings summarize the largest impacts NWO has made during this fiscal year. The MetriKs report includes a discussion of all findings in great detail.

STEM Recruiting and Retention

- New recruiting programs such as TUMSA, REAL, and Xtreme Degrees significantly increased the number of potential STEM students served by NWO.
- Data from the REAL program revealed that high school students' awareness about STEM as a potential major/career increased significantly over the course of the program.
- The Xtreme Degrees program directly served approximately 2,000 BGSU students who observed a demonstration and at least 200 BGSU students who interacted at higher levels by participating in events in order to encourage STEM major/career awareness.
- Participated in BGSU Preview Days, President's Day, Major Mania, and Cleveland Admissions Trip, providing information to encourage students interested in STEM or STEM education to pursue those majors and trying to generate consideration of those majors for students who once had an interest but the spark was extinguished for whatever reason.
- Assisted in recruiting presenters and volunteers as well as providing the lunch activity for the Women in Science, Math, Technology, and Engineering conference for 7th and 8th grade girls (November) as well as high school girls (February) that is sponsored and organized by BGSU's Office of Continuing and Extended Education.

Teacher Beliefs and Practices

- Teachers reported greater self-efficacy in their ability to be effective STEM teachers.
- Teachers held more positive constructivist beliefs about the learning environment.
- Teachers reported more frequent use of, and more preparedness and importance in using, reform based best practices.
- Teachers reported less frequent use of more traditional and didactic instructional practices.



Perceptions of the Value of NWO Professional Development

- All professional development provided by NWO was rated very highly, including the Inquiry Series sessions, NWO Symposium, and Summer Institutes (NWO TEAMS, DREAMS).
- Teachers reported that the best aspects of the professional development included the support and encouragement they felt from other professionals, including higher education faculty; gaining confidence in their ability to be effective teachers through learning both new content and best-practice strategies; and gaining a renewed sense of passion and motivation for the work we do as educators.
- IHE faculty rated the COSMOS research community highly with specific praise for its ability to establish collaborative networks to conduct research on how people best teach and learn in the STEM disciplines.
- IHE faculty launched five new collaborative research projects focusing on STEM education.

NWO Collaborative Networks

- The NWO Executive Board continues to function as outlined in the developed and approved bylaws. Subcommittees have been formed to take on arising needs such as grant review.
- The CCC continues to be an effective school-community-IHE collaborative group with strong and growing participation from the NWO region.
- The NWO website has been re-crafted so it is now a collaborative tool with an interactive calendar and with registration and evaluation capabilities.

NWO Leadership

- Over 60 NWO teachers participated in the first Cohort of the DREAMS program, providing leadership training and graduate content coursework to all participants.
- The DREAMS participants reported significant increases in teacher leadership efficacy (their abilities to be effective leaders of science and mathematics teachers).
- 50 NWO teachers made professional presentations at NWO sponsored events such as the Inquiry Series, Symposium, or Summit or at other professional conferences.

The COSMOS name was derived from the term defined as “an organized harmonious whole.” We believe the evaluation of NWO/COSMOS provides evidence of our success in attempting to establish a regional united force ready and able to tackle current issues in education through our goals: recruiting and retaining students into STEM, providing effective professional development for teachers and faculty, conducting and communicating timely research on science and mathematics education, establishing and growing the alliance, and enhancing the leadership capabilities to sustain our efforts.

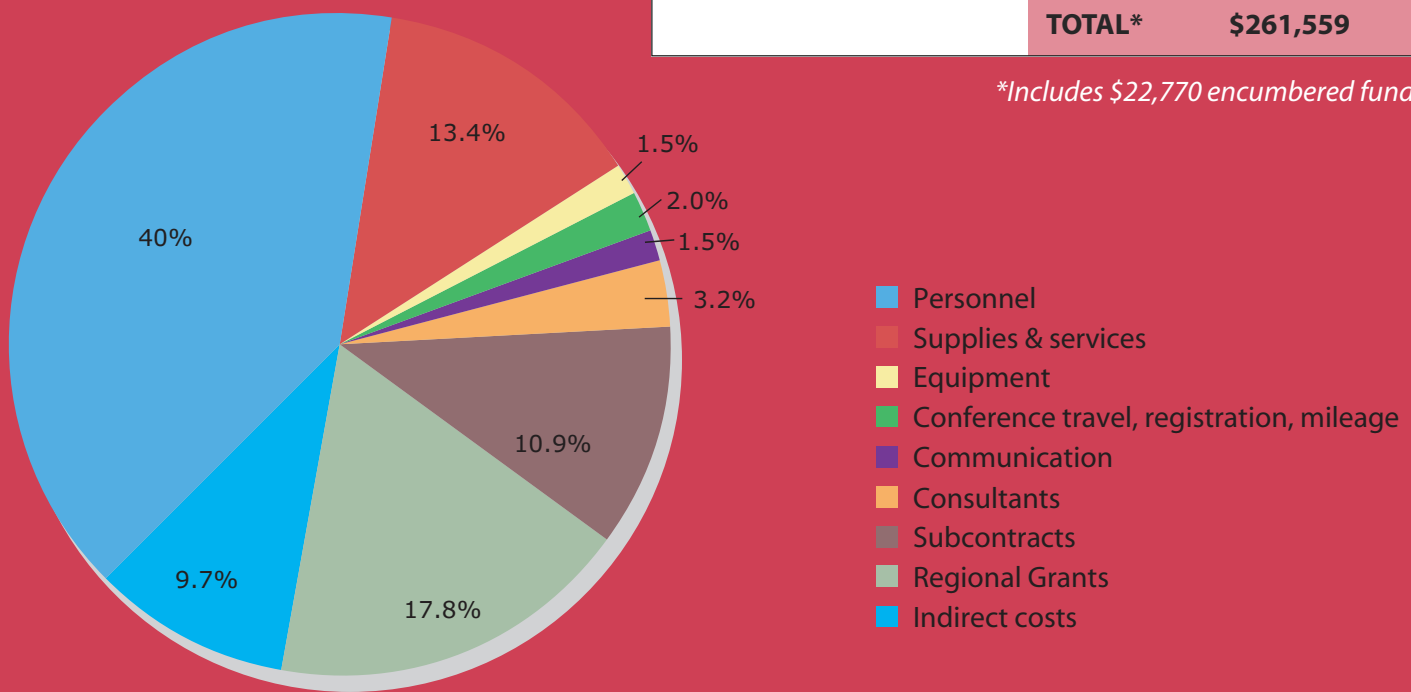
During FY 2009, we will continue these efforts with specific focus on recruiting and retaining students in STEM and STEM education disciplines. We will also step up our collaborative research efforts using the COSMOS research community forum.

FY 2008 NWO Budget

FY Expenditures for July 1, 2007 - June 30, 2008

Personnel	\$104,666
Supplies & services	\$35,057
Equipment	\$3,975
Conference travel, registration, mileage	\$5,144
Communication	\$3,938
Other	\$3,000
Consultants	\$8,461
Subcontracts	\$28,500
Regional Grants	\$46,525
Total direct costs	\$236,266
Indirect costs	\$25,293
TOTAL*	\$261,559

*Includes \$22,770 encumbered funds.

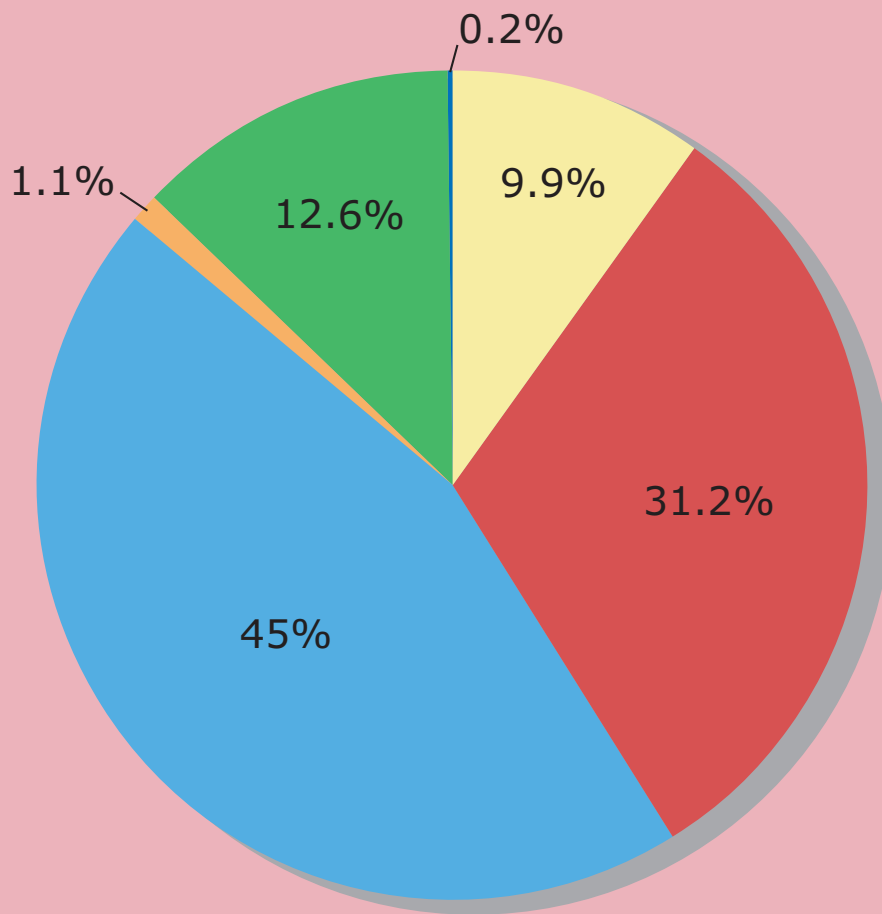


The table below shows funding sources that supported FY 2008 NWO activities (total = \$2,185,651).

Agency - Program	Title	Award Amount
Ohio Board of Regents: Centers of Excellence Grants	NWO Center of Excellence (BGSU)	\$216,000
Ohio Board of Regents: STEM Academies	TUMSA: Toledo Urban Mathematics and Science Alliance (UT)	\$340,000
Ohio Board of Regents: STEM Academies	NWO REAL: Regents Environment Academy for Learning (BGSU and Owens Community College)	\$340,000
Ohio Department of Education: Math Science Partnership Grants	NWO TEAMS: Teachers Enhancing Achievement in Mathematics and Science education (BGSU)	\$634,618 Renewal Grant
Ohio Department of Education: Math Science Partnership Grants	DREAMS: Developing Regional Excellence for Achievement in Mathematics and Science Education (BGSU)	\$350,000
Ohio Department of Education: Seed Grants	NWO Partners in Resources and Research (BGSU)	\$25,000
Bowling Green State University Fiscal Support for COSMOS <i>Note: All affiliated grant projects (TEAMS, DREAMS, REAL, SEED Grant) have additional matching funds</i>	<ul style="list-style-type: none"> • Director • Assistant Directors • Secretary • Faculty Associates • Fringes • Operating Budget • Tuition Waivers 	\$276,060
Other Contributions: Owens Community College	Hosting monthly evening meetings of the Inquiry Series and the all-day NWO Symposium	
British Petroleum	NWO Symposium sponsor	\$2,500
Carolina Biological	NWO Symposium sponsor	\$500
Texas Instruments	NWO Symposium sponsor	\$350
Tractor Supply Company	Xtreme Degrees/in-kind donation	\$273 (estimated)
American Rent-All	Xtreme Degrees/in-kind donaton	\$350 (estimated)



- Ohio Board of Regents: Centers of Excellence Grants
- Ohio Board of Regents: STEM Academies
- Ohio Department of Education: Math Science Partnership Grants
- Ohio Department of Education: Seed Grants
- Bowling Green State University Fiscal Support for COSMOS
- Other Contributions



NWO Projected Goals and Activities ~ FY 2009

NWO Vision:

NWO aims to advance science, technology, engineering, and mathematics (STEM) education for people of all ages by working with partners to (a) generate new knowledge about the science of teaching and learning, (b) develop the expertise of K–12 educators and higher education faculty, (c) increase public support for, and understanding of, the STEM subject areas, and (d) stimulate the interest of young people, especially those in underrepresented groups, in these rewarding fields of study and career opportunities.

NWO Goals and Activities

The following goals and goal-aligned activities will guide the NWO vision:

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.

Center Activities:

- a. Conduct monthly regional professional development meetings (NWO Inquiry Series for K–12 science and mathematics pre-service and in-service teachers).
- b. Host the annual one-day regional conference for pre-service and in-service teachers and higher education faculty (NWO Symposium).
- c. Host and co-sponsor Praxis II Preparation Workshops for AYA science and mathematics pre-service teachers.
- d. Co-sponsor undergraduate professional organizations (BG-UT SECO and BGCTM).
- e. Co-sponsor learning communities and/or seminars for higher education faculty focused on improving science and mathematics teaching.

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

Center Activities:

- a. Host the annual NWO Future Teacher Conference.
- b. Launch a collaborative STEM recruitment campaign aiming at increasing student interest and participation in STEM disciplines. Additional state and/or federal funds will be sought to further develop these recruitment activities.



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.

Center Activities:

- a. Host and co-sponsor the COSMOS research community for higher education faculty, graduate students, and support staff.
- b. Research action teams (consisting of 3–5 members) will conduct research studies focused on how people best teach and learn science and mathematics or on the barriers and enablers related to current reform efforts. A minimum of three new collaborative research projects will be launched in fiscal year. (Nearly half of the funding needed for this activity comes from the BGSU Center for Teaching and Learning.)

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.

Center Activities:

- a. Host monthly COSMOS Collaborative Council (CCC) meetings with regional school partners to plan new collaborative projects and sustain on-going projects.
- b. Maintain semi-annual meetings of the Center's Executive Board of Directors to focus on building a collaborative alliance and shared decision-making body to guide and coordinate regional activities aimed at improving science and mathematics teaching and learning across the region using equitable and shared-responsibility approaches.
- c. Reconstruct the current NWO/COSMOS websites to be more user-friendly and inclusive of the NWO/COSMOS activities.
- d. Develop new business and community partnerships through formed CATALYST Action Groups and other forums.

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

Center Activities:

- a. Increase the number of teacher and faculty professional presentations of classroom best practices at the NWO Inquiry Series meetings, the NWO Symposium, and the NWO Future Teacher Conference and at other local, regional, state, and national forums. Provide more explicit mentorship to these emerging leaders.
- b. Continue to collaborate with the Ohio Resource Center in all of our professional development programs by showing regional teachers and faculty the useful materials found at the ORC.



NWO Resource Development and Sustainability

At BGSU, the administration extended strong financial support to COSMOS again during FY 2008. The University committed to pay 100% of the COSMOS director salary, but only 90% was needed because the DREAMS and TEAMS grants paid 10% of the salary. In addition, the University paid for a half-time secretary and approximately 75% of the assistant director salary and benefits. BGSU also funds a three-hour course release for two associate faculty each semester to conduct research and contribute to grant-writing efforts (\$16,000). Moreover, COSMOS had an internal budget of \$6,000 in FY 2008 (\$10,000 in FY 2009) to serve as a university hybrid (research and teaching) center. COSMOS is officially “housed” in the Office of the Vice Provost for Research to promote high quality research and grant writing activities. This support will ensure the life of the Center beyond Ohio Board of Regents funding.

During FY 2008, CATALyST at the University of Toledo had \$8,000 in internal support from the Judith Herb College of Education and \$12,000 in secretarial support from Curriculum & Instruction.

No other partner institutions of higher education currently have internal funds to support the activities of NWO.

Resource Development Plan for FY 2009

The NWO Center Resource Development Plan includes five 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, enhancing the IHE (institution of higher education) infrastructure within the region, and contracting services with local school districts.



I. Federal Funding:

We aim to submit one or more regional proposals to the National Science Foundation. We would invite each partner IHE in the region along with targeted high-need schools and business and community partners to the table for project development. Currently, we have identified the Math and Science Partnership (MSP) program as the most appropriate. We believe we are in a good position to apply for either the ***Targeted Partnerships*** award, based 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 Project: NWO TEAMS. 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 were to secure either an MSP or ITEST award. More information about these MSP program follows

The MSP program is a major research and development effort that supports innovative partnerships to improve K–12 student achievement in mathematics and science. MSP projects are expected to raise the achievement levels of all students and significantly reduce achievement gaps in the mathematics and science performance of diverse student populations. In order to improve the mathematics and science achievement of the nation's students, MSP projects contribute to the knowledge base for mathematics and science education and serve as models that have a sufficiently strong evidence base to be replicated in educational practice.

In this solicitation, NSF seeks to support six types of awards:

Targeted Partnerships focus on studying and addressing issues within a specific grade range or at a critical juncture in education, and/or within a specific disciplinary focus in mathematics or the sciences;

Institute Partnerships–Teacher Institutes for the 21st Century are designed to meet national needs for teacher leaders/master teachers who have deep knowledge of disciplinary content and are school- or district-based intellectual leaders in mathematics and science;



MSP-Start Partnerships are for awardees new to the MSP program, especially from minority-serving institutions, community colleges, and primarily undergraduate institutions, to support the necessary data analysis, project design, evaluation, and team-building activities needed to develop a full MSP Targeted or Institute Partnership;

Phase II Partnerships for prior MSP Partnership awardees focus on specific innovative areas of their work where evidence of significant positive impact is clearly documented and where an investment of additional resources and time would produce more robust findings and results;

Research, Evaluation and Technical Assistance (RETA) projects directly support the work of the Partnerships, especially by developing tools to assess teachers' growth in the knowledge of mathematics or the sciences needed for teaching, conducting longitudinal studies of teachers and their students who participate in the MSP projects, or engaging the national disciplinary and professional societies in MSP work; and

Innovation through Institutional Integration (I³) projects enable institutions to think and act strategically about the creative integration of NSF-funded awards, with particular emphasis on awards managed through programs in the Directorate for Education and Human Resources (EHR), but not limited to those awards. For FY 2008, proposals are being solicited in six EHR programs that advance I³ goals: CREST, ITEST, MSP, Noyce, RDE, and TCUP.

II. Business Partnerships:

CATALyST has initiated an effort to develop new business and community partnerships through formed CATALyST Action Groups and other forums. 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 successfully earned significant 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). The partnerships required the COSMOS Director to lead a 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. CATALyST and COSMOS have secured a base level of needed resources for their Centers; however, University of Findlay, Lourdes College, and Owens Community College have no similar center or organization. However the University of Findlay now sponsors the NWO Future Teacher Conference (at least for the next fiscal year) and they have offered matching resources and administrative support to make this event successful. 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. Contracting Services with Local School Districts:

Resources are tight everywhere in Ohio, but sometimes school districts have access to professional development funds targeted specifically for the STEM disciplines, such as with the recent Ohio Core dollars. NWO Center IHE partners will continue to seek out opportunities to contract with school districts to provide high quality professional development.

Grant dollars from several key initiatives significantly contributed toward our sustainability, and we anticipate the renewal of these grant projects and securing funding from additional grant submissions (federal, private foundation, and/or state).



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, and UT's CATALYST now has university-dedicated resources. However, Owens Community College, Lourdes College, and the University of Findlay do not have similar infrastructure 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 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.

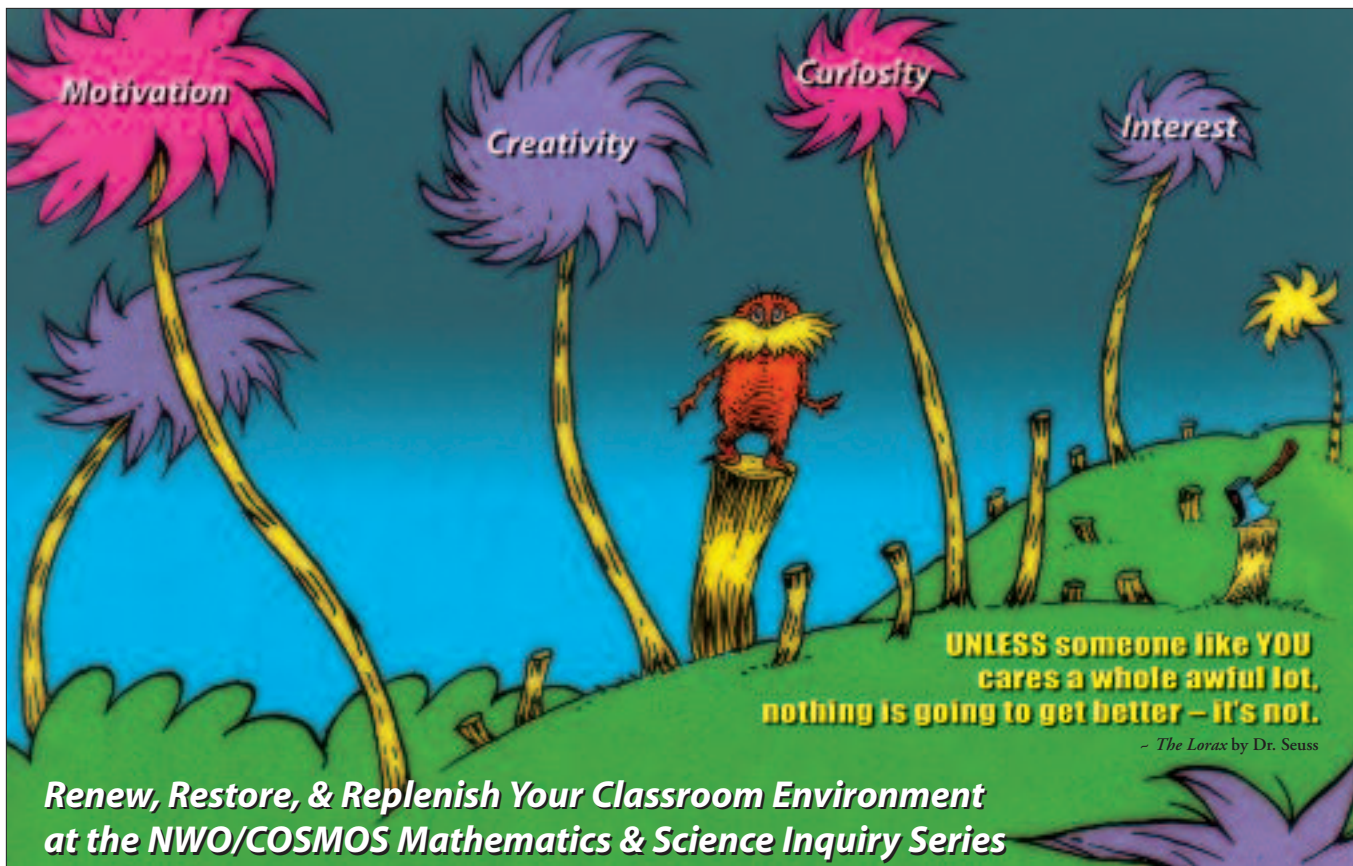


Appendices

- A. 2007-08 NWO/COSMOS Inquiry Series Postcard
- B. 2007 Northwest Ohio Symposium on Science, Math, and Technology Teaching Program
- C. DREAMS Recruiting Postcard
- D. NWO TEAMS Recruiting Brochure
- E. RIPE Recruiting Brochure
- F. 2008 Future Teacher Conference (FTC) Flyer
- G. 2007 Xtreme Degrees Advertising Flyer
- H. 2008 Ohio Junior Science and Humanities Symposium (OJSHS) Postcard
- I. COSMOS Research Learning Community
- J. NWO Research/Scholarship
- K. Teacher and Faculty Recognition
- L. Larabee Mini-Grant: Bio Tour
- M. NWO Evaluation Report: MetriKs Amerique



Appendix A: 2007-08 NWO/COSMOS Inquiry Series Postcard



and Science Teachers!

Choose the NWO/COSMOS Inquiry Series option that meets your professional development needs*

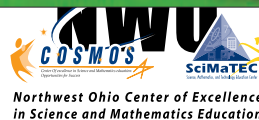
- Inquiry in the Classroom Keynote Presentations (see list below)
- Action Groups Focusing on Inquiry in the Classroom
- Environmental Education Curriculum Series: Population Connection and Projects Wet, Wild, and Learning Tree
- Curriculum Topic and Lesson Study Groups

*Graduate Credit (2 hours) offered with full tuition scholarships available.

Come to the Blast Off September 15 at BGSU...Enjoy the full breakfast buffet, keynote presentation by informative and entertaining Ed Berger, mathematics consultant to tv's "Numbers", and find out more about these opportunities!

DATE	KEYNOTE PRESENTATION TOPIC	TIME	PLACE
Sept. 15 [Sat]	BLAST-OFF – Crafting Creative Thinkers Professor Edward Burger, Williams College	8:30-12:30	210 Math Science Building, BGSU
Oct. 18 [Thurs]	Student Motivation	5:00-8:00	Owens CC (toledo campus)
Nov. 3 [Sat]	Northwest Ohio Symposium	8:00-4:00	Owens CC (toledo campus)
Dec. 6 [Thurs]	Planning for Inquiry – Supercharge Your Lessons!	5:00-8:00	Owens CC (toledo campus)
Jan. 17 [Thurs]	Attacking the Hands-On, Minds-On Gap	5:00-8:00	Owens CC (toledo campus)
Feb. 21 [Thurs]	From Hands-On to Minds-On: Questions Matter	5:00-8:00	Owens CC (toledo campus)
Mar. 13 [Thurs]	Assessing Inquiry	5:00-8:00	Owens CC (toledo campus)
Apr. 19 [Sat]	NWO/COSMOS Summit	8:30-12:30	210 Math Science Building, BGSU

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



Northwest Ohio Center of Excellence in Science and Mathematics Education

Jodi Haney, PhD, Director
241 Math Science Bldg., BGSU
Bowling Green, OH 43403-0212
(419) 372-2718

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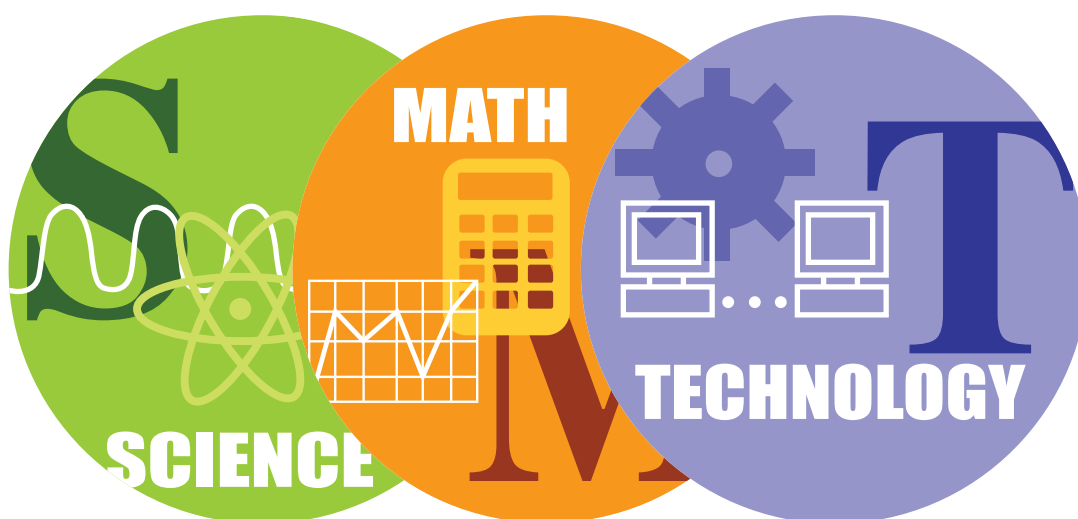


COSMOS is a partner of the Northwest Ohio Center of Excellence in Science and Mathematics Education (NWO).

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

Appendix B: 2007 Northwest Ohio Symposium on Science, Math, and Technology Teaching Program

***Saturday, November 3, 2007
at Owens Community College
(Toledo Campus)***



Northwest Ohio Symposium on Science,
Math, and Technology Teaching

www.nwohiosymposium.org

Appendix C: DREAMS Recruiting Postcard



Turning your DREAMS into reality!

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: jbelle@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 D: 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

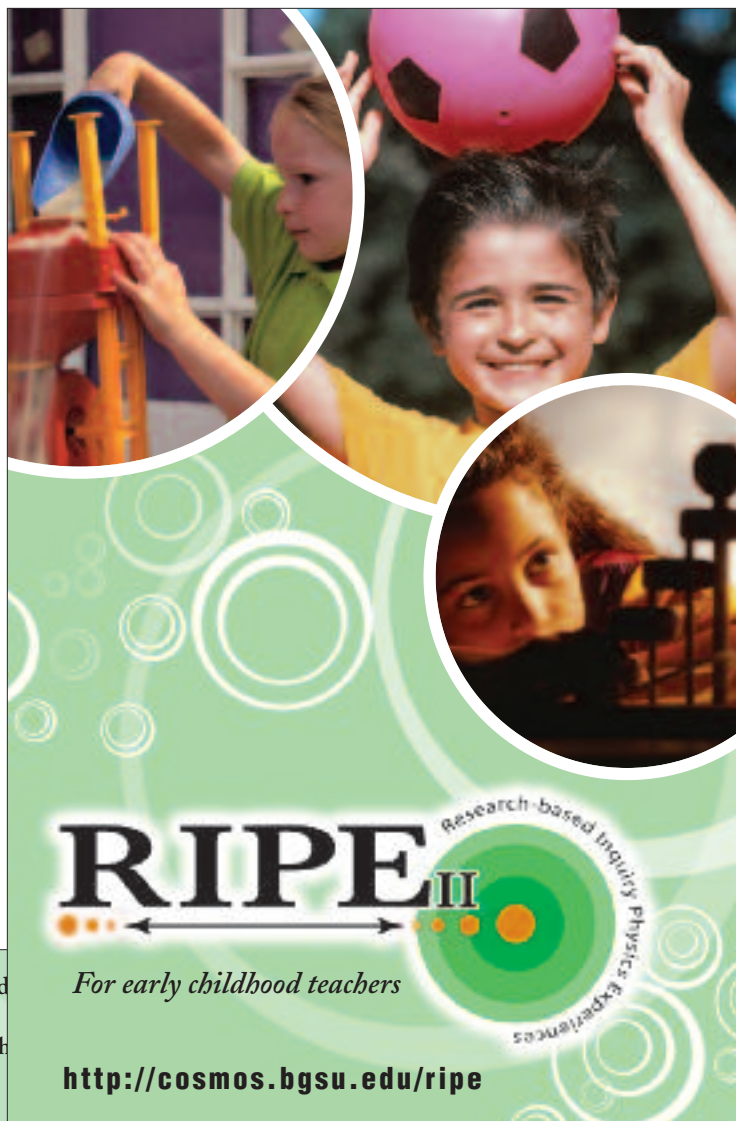
I teach special ed. science both

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 E: RIPE Recruiting Brochure



The brochure features a green background with white circular patterns. At the top, there are three circular inset photos: a child in a green shirt playing with wooden blocks, a child in a yellow shirt holding a pink ball, and a close-up of a child's face. The text 'RIPE II' is prominently displayed in a large, bold, serif font. To the right of 'RIPE II' is a circular logo with the text 'Research-based Inquiry Physics Experiences' around its perimeter. Below the logo, the text 'For early childhood teachers' is written in a smaller font. At the bottom, the website address 'http://cosmos.bgsu.edu/ripe' is provided.

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 to 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>

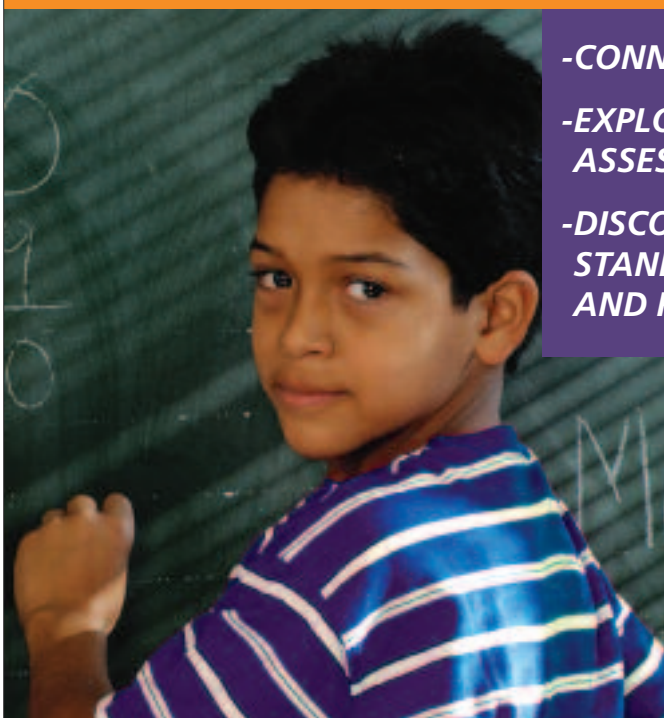
Funded by the Ohio Board of Regents Improving Teacher Quality 2008 grant program

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 Success (COSMOS), and the Northwest Ohio Center of Excellence in Science and Mathematics Education (NWO).

Appendix F: 2008 Future Teacher Conference (FTC) Flyer

CONNECT, EXPLORE, AND DISCOVER

at this year's NWO Future Teacher Conference April 12, 2008
from 8:30 am – 3 pm on The University of Findlay Campus



- CONNECT WITH FUTURE COLLEAGUES
- EXPLORE CLASSROOM TEACHING AND ASSESSMENT STRATEGIES
- DISCOVER EXCITING LESSON PLANS, STANDARDS-ALIGNED ACTIVITIES AND RESOURCES

This year's conference will feature sessions and resources especially for pre-service teachers to smooth the pathway from college student to classroom teacher. You may register online for the conference at <http://cosmos.bgsu.edu/nwoFutureTeacherConf>

COST: \$10 (includes certificate of completion, lunch, prizes and take home activities).

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



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

future
TEACHER CONFERENCE



Appendix G: 2007 Xtreme Degrees Advertising 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 H: 2008 Ohio Junior Science and Humanities Symposium (OJSHS) postcard



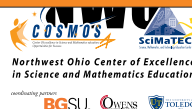
Research Papers & Posters

Sponsored by the Northwest Ohio Center of Excellence in Science and Mathematics Education (NWO) and 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.

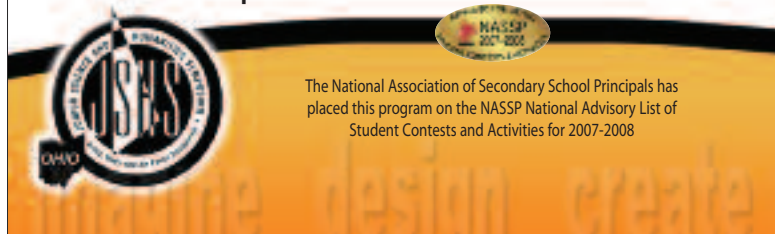
Important Deadline ~ February 25, 2008

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

Appendix I: COSMOS Research Learning Community

Research Learning Community Members 2007-08

Name	Department	College
Cindy Bertelsen	School of Teaching & Learning	Education
Ann Bragg	Physics & Astronomy	A&S
Mohammed Darabie	School of Teaching & Learning	Education
Emilio Duran	School of Teaching & Learning	Education
Lena Ballone Duran	School of Teaching & Learning	Education
Jude Edminster	English	A&S
Daria Filopova	Mathematics & Statistics	A&S
Jodi Haney, Co-Facilitator	School of Teaching & Learning/ Environmental Programs	Education/A&S
Mandy Heddle, Co-Facilitator	COSMOS	Graduate College
Tracy Huziak-Clark	School of Teaching & Learning	Education
Chris Keil	Environmental Health	Health & Human Services
Dale Klopfer	Psychology	A&S
John Laird	Physics & Astronomy	A&S
Steve Langendorfer	School of Human Movement, Sport & Leisure Studies	Education
Neocles Leontis	Chemistry	A&S
Lan Li	School of Teaching & Learning	Education
David Meel	Mathematics & Statistics	A&S
Stephanie Messersmith	Chemistry	A&S
Bob Midden	Chemistry	A&S
Barbara Moses	Mathematics & Statistics	A&S
Julie Nurnberger-Haag	COSMOS	Graduate College
Richard Oldrieve	School of Teaching & Learning	Education
Matt Partin	Biological Sciences	A&S
Hassan Rajaei	Computer Science	A&S
Amy Scheuermann	Intervention Services	Education
Karen Sirum	Biological Sciences	A&S
Eileen Underwood	Biological Sciences	A&S
Rick Worch	School of Teaching & Learning	Education

Appendix J: NWO Research/Scholarship

Faculty Refereed Publications

Articles by NWO core faculty & staff published in FY 2008 that are directly related to NWO/COSMOS activities

- Duran, E., & Burgoon, J. (2008). *Physical science misconceptions identified in third and fourth grade teachers from northwest Ohio during a professional development program entitled NWO-TEAMS (Teachers Enhancing Achievement in Mathematics and Science)*. Manuscript submitted for publication.
- Heddle, M., Burgoon, J., & Duran, E. (2008). *Identifying physical science misconceptions held by primary teachers*. Manuscript submitted for publication.
- Huziak-Clark, T., Van Hook, S. J., Nurnberger-Haag, J., & Ballone-Duran, L. (2007, December). Using inquiry to improve pedagogy through K-12 university partnerships. *School Science and Mathematics*, 107(8), 311-324.
- Lark, A., Kramp, R., & Nurnberger-Haag, J. (2008, January). My pet rock. *Science & Children*, 45(5), 24-27.
- Leow Klinger, M., & Duran, E. (2008). *Partners in inquiry: Involving the community in high-quality professional learning*. Manuscript submitted for publication.
- Van Hook, S. J., & Huziak-Clark, T. (2007, Fall). Tip to tail: Developing a conceptual model of magnetism with kindergartners using inquiry-based instruction. *The Journal of Elementary Science Education*, 19(2), 45-58.
- Van Hook, S. J., & Huziak-Clark, T. (2008, Summer). Lift, squeeze, stretch and twist: Developing kindergartners' understanding of energy using inquiry-based instruction. *The Journal of Elementary Science Education*, 20(3), 1-16.
- Van Hook, S. J., Huziak-Clark, T., Nurnberger-Haag, J., & Ballone, L. D. (2008). *The impact of the partnership for reform through inquiry in science and mathematics (PRISM) on teacher and scientist notions of inquiry*. Manuscript submitted for publication.

Articles by NWO core faculty and staff published in FY 2008 that are related to NWO goals but NOT directly related to NWO/COSMOS activities

- Duran, E., Ballone-Duran, L., Haney, J. J., & Beltyukova, S. (2008). *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*. Manuscript submitted for publication.
- Duran, E., Ballone-Duran, L., & Haney, J. J. (2008). *Project ASTER III: A model for teacher professional development integrating science museum exhibits with state and national science education content standards*. Manuscript submitted for publication.
- Duran, E., Ballone, L., & Worch, E. (2008). *Papier mâché animals: An integrating theme for elementary classrooms*. Manuscript submitted for publication.
- Haney, J. J., Keil, C. P., & Zoffel, J. (2007). From problem solving to taking action: A problem-based learning model for the middle grades. *Ohio Middle School Association Journal*, 30(1), 6-11.
- Haney, J. J., Keil, C. P., Zoffel, J., & Wang, J. (2007). Enhancing teachers' beliefs and practices through the implementation of problem-based learning focused on locally pertinent environmental health science issues. *The Journal of Environmental Education*, 38(4), 25-33.
- Keil, C. P., Haney, J. J., & Zoffel, J. (2007). *Improvements in science process skills using environmental health science problem-based learning curricula*. Manuscript submitted for publication.

Appendix J: NWO Research/Scholarship cont.

- Nurnberger-Haag, J. (2007, September). Integers made easy: Just walk it off! *Mathematics Teaching in the Middle School*, 13(2), 118-121.
- Scheuermann, A. M., Deshler, D. D., & Schumaker, J. B. (2008). *The effects of the explicit inquiry routine on the performance of students with learning disabilities on one-variable equations*. Manuscript submitted for publication.
- 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.
- Van Garderen, D., Scheuermann, A. M., Jackson, C., & Hampton, D. (in press). 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*.
- 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 2008 that are directly related to NWO/COSMOS activities

- Beltyukova, S., Haney, J., Duran, E., & Ballone-Duran, L. (2008, January). *Looking for a better way to measure change in science teacher beliefs: A comparison of categorical rating scales and absolute magnitude estimation scaling approaches*. Paper presented at the 6th annual Hawaii International Conference on Education, Honolulu, HI.
- Beltyukova, S., Stone, G., Duran, E., Ballone-Duran, L., Haney, J. J., & Heddle, M. L. (2008, January). *Using magnitude estimation scaling in measuring test efficacy and predicting test performance*. Research paper presented at the 6th annual Hawaii International Conference on Education, Honolulu, HI.
- Duran, E., Ballone, L., Belcher, J., Beltyukova, S., Burgoon, J., Fox, C., Heddle, M., Haney, J., Pollock, J., & Shafer, M. (2008, April). *Assessment of the content knowledge of elementary and middle school science teachers during a professional development program entitled NWO-TEAMS (Teachers Enhancing Achievement in Mathematics and Science)*. Paper presented at the National Social Science Association Conference, Las Vegas, NV.
- Duran, E., Ballone, L., Beltyukova, S., Fox, C., Heddle, M., Shafer, M., & Haney, J. (2007, April). *The impact of a professional development program entitled NWO-TEAMS (Teachers Enhancing Achievement in Mathematics and Science) on the content knowledge and teaching skills of elementary and middle school science and math teachers*. Paper presented at the National Association for Research in Science Teaching Conference, New Orleans, LA.
- Heddle, M., Burgoon, J., Shafer, M., Haney, J., Ballone-Duran, L., & Duran, E. (2008, January). *Elementary teacher misconceptions in physical and earth sciences*. Paper presented at the Association for Science Teacher Education International Conference, St. Louis, MO.
- Heddle, M. L., & Haney, J. (2007, November). *Educational strategies for overcoming misconceptions about global climate change*. Paper presented at the International Conference on Environmental Education, Ahmedabad, India.

Presentations by NWO core faculty and staff in FY 2008 that related to NWO goals but are NOT directly related to NWO/COSMOS activities

- Hansen, M. J., Huerta, J. C., & Midden, W. R. (2007, November). *Implementing comprehensive assessment strategies for learning communities*. Paper presented at the 12th annual Learning Communities Conference, Indianapolis, IN.

Appendix J: NWO Research/Scholarship cont.

- Midden, W. R. (2007, October). *Assessment of higher order cognitive skills in residential learning communities*. Paper presented at the National Conference of Living Learning Programs, St. Louis, MO.
- Midden, W. R. (2007, November). *Assessment of higher order cognitive skills in residential learning communities*. Paper presented at the 12th annual Learning Communities Conference, Indianapolis, IN.
- Midden, W. R., & Elola, V. (2007, October). *The influence and impact of returning students to a first year learning community*. Paper presented at the National Conference of Living Learning Programs, St. Louis, MO.
- Midden, W. R., & Holden, B. (2007, November). *Building an interdisciplinary set of service learning courses from the ground up*. Paper presented at the 12th annual Learning Communities Conference, Indianapolis, IN.
- Midden, W. R., & Orlando, M. (2007, October). *Collaboration of residence life staff and academic faculty: The synergism of RA & faculty connections*. Paper presented at the National Conference of Living Learning Programs, St. Louis, MO.
- Nurnberger-Haag, J. (2008, April). *Children's books about shape: A resource for developing geometric reasoning or a source of misconceptions?* Research presentation at the annual meeting of the National Council of Teachers of Mathematics, Salt Lake City, UT.

Grant Submissions and Awards

- National Science Foundation. *Science, Engineering and Technology Gateway Ohio (SETGO)*. Co-I: Tracy Huziak-Clark. \$1,276,749 (2008-2013).
- NWO Center of Excellence in Science and Mathematics Education: Larabee K-12 Education Grants for Excellence in Science and Mathematics Teaching. *Virtual Bio-Lab Tour III: Extreme Adaptations*. Matt Partin. \$2,000.
- Ohio Board of Regents, Improving Teacher Quality State Grants Program. *Research-Based Inquiry Physics Experiences II (RIPE II)*. PI: Tracy Huziak-Clark. 186,764.00.
- Ohio Board of Regents: Choose Ohio First Scholarship Program. *Science and Math in Action*. PI: W. R. Midden. \$5,600,000.
- Ohio Department of Education: Mathematics and Science Partnership (MSP) Grant. *DREAMS*. PI: Eileen Underwood; Co-I: Matt Partin & Julie Matuga. \$482,792.
- Ohio Department of Education: Mathematics and Science Partnership (MSP) Grant. *NWO TEAMS*. PI: Emilio Duran; Co-I: Lena Ballone Duran, Jodi Haney, Rick Worch, & Amy Scheuermann. \$733,487.
- Ohio Department of Education: Seed Grant. *Partners in Inquiry Resources and Research (πr^2)*. PI: Emilio Duran. \$25,000.
- U.S. Army, Navy, Air Force and the Academy of Applied Science. *2008 Ohio Junior Science and Humanities Symposium*. PI: Emilio Duran. \$20,000.
- U.S. Department of Agriculture. *Sources of Pathogens in Surface Water and Ground Water in an Agricultural Watershed and the Relationship of Pathogen Levels to Nutrient and Sediment Levels*. PI: W. R. Midden; Co-I: Donna Francy. \$400,000 requested. Submitted January 2008.
- Western Lake Erie Basin Partnership. *A Comprehensive Study of Water Quality in the Portage River Watershed*. PI: W. R. Midden. \$800,000 requested. Submitted January 2008.

Appendix K: Teacher and Faculty Recognition

COSMOS

BOWLING GREEN STATE UNIVERSITY

BGSU Monitor

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BGSU MONITOR

Water is undercurrent of New Music and Art Festival

This year's 26th annual New Music and Art Festival, Oct. 17-20, has an added dimension. The four-day international festival is the focus for Water Week, a semester-long focus on water issues and conservation that has involved students and faculty from around campus, along with community members.

The multidisciplinary project is also bringing to campus a number of respected artists and activists, and is designed to spur conversations and activities around topics ranging from environmental concerns to the economic and politics of water. "This is a wonderful opportunity to engage the entire regional community in a focus on one of our most precious commodities," said BGSU Galleries Director Jacqueline Nathan.

Highlighting the project is a visit and an exhibition of works by famed photographer Robert Glenn Ketchum, who for 28 years has helped define color photography while addressing critical national environmental issues. His "Southwest Alaska: A World of National Parks and Wildlife Refuges" will be part of the "Water Week" exhibition opening at 7:30 p.m. Oct. 20 in the Dorothy Ober Bryan Gallery in the Fine Arts Center. Ketchum will speak on "Conservation and Photography: A Long, Diving History" at 5:00 p.m. that afternoon in 115 Oldcamp Hall.

Named by the Audubon Society as among 100 people "who shaped the environmental movement of the 20th century," and by *American Photo* magazine among the 100 most important people in photography, Ketchum is the recipient of awards from the United Nations and other international groups. His photos will be shown along with installations and project documentaries by artist-activists Rensy Damon, Stacy Levy, Eve Andrea Luzzanes, Jackie Brooker and Raska Inland. Gallery hours are 10 a.m. to 4 p.m. Tuesday-Saturday and 1-4 p.m. Sundays.

"Ketchum's work is both beautiful and relevant to today's issues," Nathan said, adding that she was inspired by the timing of the exhibition during the New Music and Art Festival to broaden the focus beyond just one artist's work. Researching other artists who are also concerned with conservation issues, "I discovered the amazing work being done by Stacy Levy, Raska Inland, Jackie Brooker and Rensy Damon," she said.

BGSU students in various disciplines have been engaging with the water issue, and "Soak," an exhibition of their projects, will be displayed in the William Wernsdorfer Gallery in the Fine Arts Center Nov. 15-17.

Reaching out to the community, COSMOS (Center of Excellence in Science and Mathematics Education: Opportunities for Success) will host two sessions of Project WET: Water Education for Teachers, on Oct. 16 and Oct. 5, in which teachers and student teachers will explore lesson plans about water-related environmental issues.

Part of an Oct. 18 New Music and Art Festival concert will be "Los Fuegos de Peribynka" at 8:00 p.m. in Kopschler Hall in the Moore Musical Arts Center. Composed by Larry Austin for film, digital video animation and electronic beats, the performance will feature Nina Anastasiopoulos, musical arts, on flute and the University Performing Dancers. Celeste Harazit is the artistic director and coordinator. Also featured on this concert will be BGSU world music ensembles and quartet (Liu Zhou Yi, a pipe virtuoso, Tabela) and 85 for students and senior citizens and 85 for other adults. For tickets, call 2-8171.

Water Week kicks off

Water Week, the first phase of Water Week, begins today (Oct. 6) with a 12:30 p.m. College of Arts and Sciences Forum in 207 Bowen-Thompson Student Union, featuring Damon, an environmental artist and activist. The founder of the national organization Keepers of the Waters designs large scale art parks and public art events that help clean up urban waterways and promote global awareness of water issues.

Damon's free talk, "The Living Water Garden and Other Projects: It Takes a Village," begins at 12:30 p.m. following a noon lunch.

Damon also will take part in a symposium on "The Future of Lake Erie," from 2:30-4 p.m. this afternoon in the Union Theater. Also participating are BGSU biological sciences instructor Christopher Winslow; Alan Seidenmeier, Ohio State University Wood County extension educator; Dr. Patrick Lawrence, geography and planning, University of Toledo, and chair of Partners for Clean Streams Inc.; Dr. Gary Winslow, director of the National Center for Water Quality Research at Heidelberg College, and Philip E. Senesky, senior planner with the Planning Branch of the U.S. Army Corps of Engineers, Buffalo, N.Y.


On Thursday (Oct. 11), art and science will again come together in "Water Matters," at 7 p.m. in 060 Overman Hall. Rose Keren Colgo, general studies writing, will begin the evening with new poetry, followed by a screening and discussion of "A Watershed Mentality," a WPA-PSS documentary on the Maumee River Basin. The largest tributary and watershed in the Great Lakes/BGSU Lawrence River system, it is home to several unique species and one of the largest natural fish nurseries on the Great Lakes, but is threatened with enough toxic sediment to endanger those species. Winslow will lead a discussion after the screening.

Broad support

Water Week has had support and participation from the community and a number of faculty and campus areas, including the Bowling Green Community Foundation and the Medid Clinic; Dr. Charles Cheski, director of the School of Earth, Environment and Society; Erik Messenger, general studies writing; Julie Numbarger Heagy, COSMOS; Peter Kuebeck, College of Arts and Sciences; Dr. Alice Calabrese, professor emerita of English, Arts and Sciences; the Fine Arts Center Galleries; the School of Art, Arts Village; COSMOS; the Institute for the Study of Culture and Society; the Chapman Community; and the geography department.

October 8, 2007

BOWLING GREEN STATE UNIVERSITY



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BGSU MONITOR

Forum focuses on changing face of BGSU, Ohio higher education

Three BGSU administrators offered a glimpse at the University's financial and academic future, and that of Ohio higher education in general, at an Oct. 30 forum in Obicamp Hall. Hosting the forum were Provost and Vice President for Academic Affairs Shirley Baugher and the Faculty Senate Executive Committee.

While there is still much uncertainty, given ongoing changes on campus and in Columbus, some specifics were presented:

University budget
• Discussing BGSU's \$3 million budget deficit, Chief Financial Officer Sheridwan Stoll said there will be no across-the-board cuts.

One-time and permanent reductions will be made, she said, pointing out that University divisions have been identifying potential short- and long-term cuts, and should be putting them in draft form early this month. Some positions will be eliminated, but she doesn't expect large-scale layoffs, Stoll added, saying she's also investigating previously untapped revenue possibilities.

Balancing the budget by the end of the year will be doable "without too much difficulty," she predicted.

Heading Stoll's list of current issues other than the deficit is deferred maintenance, which she said will demand prioritized spending of \$2 million-\$3 million per year for at least 10 years.

University System of Ohio
• An initial draft of a 10-year master plan for Ohio higher education could be posted on the new University System of Ohio's Web site any day, said Sandra MacNevin, associate vice president for governmental relations. [On Nov. 2, Eric Fingerhut, chancellor of the Ohio Board of Regents, released the first section of his report, addressing the goal of educational attainment and delineating four ways to measure the University System's success in creating an educated work force. Visit <http://www.universitiesystem.ohio.gov/master-plan> to view the announcement.]

Fingerhut, who will visit campus Wednesday and Thursday (Nov. 7 and 8), is asking each university to identify its strengths, or "centers of excellence," in relation to economic development and work-force preparation for its community, region and the state, MacNevin said.

While social and cultural goals are "why we're here," Baugher added, "I don't have a concern with translating what we do to economic development." Addressing the former goals while also meeting the latter imperative will be among BGSU's challenges, she said.

According to Baugher, the University is looking to identify its centers of excellence. The state will expect each university's unique mission differentiation to be aligned with work-force development as well, according to MacNevin. Fingerhut will hear presentations from the Center of Excellence in Science and Mathematics Education: Opportunities for Success (COSMOS) and the Academic Investment in Math and Science (AIMS) program this week, she continued, noting the importance to the state of the STEM disciplines—science, technology, engineering and mathematics. The chancellor will also learn more about BGSU's programs in digital arts, business, music and technology.

BGSU's strategic plan will identify "signature programs" along with the interdisciplinary centers of excellence. The values initiative, for example, is "clearly a signature of this University," Baugher said, and "we want to make sure it's part of everything we do." The provost mentioned, too, that a current "structural budget analysis" will help recapture funds for the designated centers of excellence, signature programs and foundational excellence.

In the new statewide environment, the direction of funding and other decision-making will be based on collaboration and cooperation, MacNevin said. "I think we're going to see more and more collaboration" with both public and private institutions, she replied to an audience question, noting that a study group of northeast Ohio universities, plus NEOUCCOM, is bringing private colleges into its discussions.

As BGSU clarifies its mission and strengths, it can learn from the innovative and aspirational thinking that went into the visioning process at the new University of Toledo as a result of its merger with the Medical University of Ohio, MacNevin said. That kind of visionary planning is "the kind of thinking we now need to do," she maintained. It's important, she said, so the University can shape its own destiny rather than having it mandated by others.

"I do think the chancellor is definitive in the goals he has established," said Baugher, promising changes at BGSU in response. "We're defining our future."

To see the forum in its entirety, go online to <http://ctss.bgsu.edu:8080/bgsuprovocforum/>.

November 5, 2007

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CEE IN THE NEWS

2008 Women in Science program offers learning opportunities for high school girls

January 10, 2008

BOWLING GREEN, O.— Technology, engineering, math and science are just a few of the in-demand career fields for women today. High school girls from around the region have the chance to learn more about these professions at the annual Women in Science, Math, Engineering and Technology program at Bowling Green State University.

The 2008 Women in Science, Math, Engineering and Technology program for high school girls grades 9 through 12, is scheduled for Friday, February 29, from 8:30 a.m. to 1:30 p.m. at the Bowen-Thompson Student Union. The event is sponsored by Continuing & Extended Education and The Center of Excellence in Science and Math Education (COSMOS).

What began as Women in Science in 1988 was expanded to include math, engineering and technology in 1999. More than 500 young women in grades 7 through 12 attend each year to learn from successful professionals in these fields about the exciting and rewarding scientific careers open to them.

This year, the keynote presentation is a live animal outreach program from the Lake Erie Nature & Science Center. This program includes hands-on activities and students will be introduced to wildlife, domestic and exotic animals, including a hawk, opossum, chinchilla and snakes.

High school girls will also learn why it is essential to take math and science courses now to prepare them for a career in math, science, engineering or technology.

The fee is \$15 for students and \$12 for accompanying adults and includes lunch. To register, or for more information, visit <http://pace.bgsu.edu> or call 419-372-8181 or 1-877-850-8165.

[Back to CEE in the News](#)

Appendix K: Teacher and Faculty Recognition cont.

NEWS

NEWS RELEASE

Ohio Junior Science, Humanities Symposium

BOWLING GREEN, O.—Ohio's top high school science whizzes will present the results of their original research during the 45th annual Ohio Junior Science and Humanities Symposium (Ohio JSHS) April 2-4 at Bowling Green State University.

The free, public event is patterned after research sessions at professional meetings, and both paper and poster sessions will take place.

At stake is more than \$20,000 in scholarship money and cash awards for the winners. In addition, the top five paper presenters will receive an all-expenses-paid trip to the National JSHS to take place in Orlando, Florida, April 30-May 4.

The top two presenters at the national event will have the opportunity to compete for one of six, \$16,000 scholarships and a trip to the International Fortnight in London. This year, the top poster presenter at the Ohio symposium also will attend the national event to present his or her results in a noncompetitive forum.

Approximately 75 high school students from all over the state will present research on topics from all areas of science. The symposium will be held in the Bowen-Thompson Student Union.

Northwest Ohio high school teachers and BGSU faculty members, undergraduates and graduate students will chair the sessions and serve as judges. Other Ohio high school students and teachers are expected to attend the event as well to observe, learn and network with the best science students and teachers in the state.

Sponsorship awards are being provided by the Academy of Applied Science; the Northwest Ohio Center of Excellence; COSMOS; BGSU's Department of Physics and Astronomy, Department of Chemistry, and Colleges of Arts and Sciences and Education and Human Development; Perstorp Polyols, Inc., and the U.S. Army, Navy and Air Force. Libbey Glass Inc. of Toledo is providing T-shirts.

The program consists of seven paper sessions and four concurrent poster sessions.

Dr. Emilio Duran of the BGSU School of Teaching and Learning and director of the Ohio JSHS, will give the opening remarks.

Also participating in opening ceremonies will be Dr. Shirley Baugher, provost and vice president of academic affairs; Dr. Rosalind Hammond, interim dean of the College of Education and Human Development; Dr. Don Nieman, dean of the College of Arts and Sciences, and Major Steven J. Letzring, U.S. Army, Commander and professor of military science, all of BGSU.

Several special events have been planned for the visitors in connection with the symposium. On Thursday afternoon, COSI will present "Extreme Science" demonstrations in the Sky Bank Room of the Union. Thursday evening, the keynote speaker at the banquet will be Dr. John Laird, a professor and chair of Bowling Green's Department of Physics and Astronomy, who will present his research on "The Fossil Record of the Milky Way." The participants will then go to BGSU's planetarium for a presentation titled "Dinosaur Light."

On Friday, Toledo Zoo volunteers will bring animals to enlighten and entertain the students regarding their lives and habitats.

For more information, call Dr. Emilio Duran, School of Teaching and Learning, at 419-372-1262, or Iris Szelagowski, OJSHS coordinator in the Graduate College, at 567-277-0055.

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(Posted April 01, 2008)

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TEAMS

BOWLING GREEN STATE UNIVERSITY

BGSU Monitor

BGSU MONITOR

BGSU aiding math and science TEAMS, DREAMS

More than 100 elementary and secondary school teachers, most of them from northwest Ohio, will spend several summer days at BGSU as part of ongoing grant-funded projects aimed at improving mathematics and science education.

The University is hosting an eight-day summer institute for Northwest Ohio Teachers Enhancing Achievement in Mathematics and Science (NWO TEAMS), which enters its first year as a fully BGSU project, and third year overall, with an infusion of about \$733,500 from the Ohio Department of Education's Ohio Mathematics and Science Partnership Program.

That state program is also funding, with just under \$483,000, a second year of Developing Regional Excellence for Achievement in Mathematics and Science Education (DREAMS). Participants in that teacher-education project will be on campus the third week of June for a STEM Leadership Academy.

STEM stands for science, technology, engineering and math, and both projects represent a continuation of Bowling Green's efforts to improve instruction in those disciplines.

Up to 100 teachers of grades 3-6 will be part of NWO TEAMS, which started as a joint effort between BGSU and the University of Toledo but is now strictly a Bowling Green project. The grant has risen from \$350,000 two years ago and about \$634,000 last year.

Also changing this year are the composition and focus of TEAMS. The project will address only science, and special education teachers have been invited to join their regular-classroom colleagues, with a goal of learning "differentiated instruction" for all students, said Jessica Belcher, program manager for the professional-development project as well as for DREAMS.

"We took the advice of our previous participants who wanted more special education focus," she noted, adding that those teachers had said "we need more help in teaching to the gifted and the special-needs students in our classrooms."

The decision to limit the project's scope to science was for "no reason other than time constraints," Belcher explained, saying there are more topics to cover in science and insufficient time to cover math as well. Participants learn different classroom approaches and how best to address state standards.

Drs. Emilio Duran and Lena Balona Duran, School of Teaching and Learning, are principal project leaders. Dr. Amy Scheuermann, intervention services, is the lead instructor of participating special educators, while Dr. T. Berry Cobb, a professor emeritus of physics and astronomy, will be one of two scientists teaching the teachers. Also instructing them will be other, leading K-12 teachers from the area, Belcher said.

Following the summer institute June 23-27 and June 30-July 2 will be eight days of school-year follow-up—four each in the fall and spring—plus another four days in summer 2009. Participants will receive stipends of \$400 for this summer and the 2008-09 school year and \$200 for summer 2009. In addition, through a leasing program with Delta Education and Carolina Biological, teachers will be able to use science kits not only this summer but also in their classrooms next school year.

DREAMS provides scholarship money for teachers to pursue master's degrees in physics, biology, interdisciplinary science (for grades 6-8) or math, or toward obtaining a specialist endorsement in science or math.

Under a cost-share agreement, the Graduate College and Continuing and Extended Education at BGSU contribute about half of the funding for the project. It pays for eight graduate hours of instruction, while individual teachers pay for one credit hour of instruction up front and all general fees—an arrangement that Belcher called "an excellent deal" for participants.

A group of about 50 teachers started in the program last summer, taking graduate courses at Bowling Green, and is continuing this year. Their four-day leadership academy will begin June 16, while the new group—which has room for 65 participants—will come to campus the following day to start their leadership training. It will include such topics as leading organizational change, working with adult learners and identifying best practices in their field, according to Belcher.

"Our focus is to make them leaders in math and science education" in their schools, districts and the region, along with giving them content-area skills for master's degrees, she said. "They have to have the content to become a leader."

Dr. Eileen Underwood, biology, is the project leader on the DREAMS grant, which is also increasing after starting this year at about \$350,000.

May 27, 2008

Appendix K: Teacher and Faculty Recognition cont.

NEWS

NEWS RELEASE

Summer programs boost math, science education

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Dr. Eileen Underwood, an associate professor of biology at BGSU, is the project leader on the DREAMS grant, which is also increasing after starting this year at about \$350,000.

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Editor's note: For more information about NWO TEAMS and DREAMS, contact Jessica Belcher at 419-372-5571 or jbelche@bgsu.edu.

(Posted May 20, 2008)

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Future Teacher Conference (FTC)

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College of Education to Host NWO Future Teachers Conference
Tuesday, April 01, 2008

The University of Findlay's **College of Education** will host the Northwest Ohio Future Teachers Conference from 8:30 a.m. – 3 p.m. Saturday, April 12, on campus.

Pre-service teachers and others who have an interest in education are invited to connect with future colleagues; explore classroom teaching and assessment strategies; and discover lesson plans, standards-aligned activities and resources. In-service teachers also will gain knowledge on new strategies or resources available to help create engaging lessons for students.

The conference will feature sessions and resources especially for pre-service teachers to smooth the pathway from college student to classroom teacher.

Register online at <http://cosmos.bgsu.edu/nwoFutureTeacherConf/>. The cost is \$10, which includes a certificate of completion, lunch, prizes and take-home activities.

Session presenters include Jim Bado, creator of learning board games Planet Quest and Skeletons in the Closet; Dr. Leigh Chiarelott, University of Toledo; Jodi Haney, Bowling Green State University; Dr. Karen Ackerman-Spain, The University of Findlay; Jim Taylor, The University of Findlay and Anjali Gray and Brenda Leady from Lourdes College. A superintendent and principal panel, as well as a student teacher panel, also will be held.

In addition, the following vendors will be on site: Challenger Learning Center of Lucas County; COSI Toledo; Lourdes College Theatre Vision; Mother Hubbard's Learning Cupboard; Ohio Historical Society; Ohio Resource Center for Mathematics, Science and Reading; Reading Railroad; Sauder Village; Seven Eagles Historical Center; The Toledo Blade; The Mazza Museum; Toledo Area Metroparks; Toledo Botanical Garden; Toledo Zoo; and WGTE.

Contact Julie McIntosh, Ed.D., at mcintosh@findlay.edu or 419-434-4062, with questions regarding the conference.

1000 North Main Street \ Findlay, OH 45840 \ 1-800-472-9502 \ 419-422-8313 \ Fax 419-434-4822

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Questions? webmaster@findlay.edu

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IN BRIEF

Pulitzer-winning author to speak, receive honorary degree

Dr. Martin Sherwin, Pulitzer Prize-winning biographer and nuclear policy expert, will receive an honorary doctorate from BGSU during a visit to campus this week. Immediately following the conferral of the degree, he will give a talk titled "Oppenheimer's Shadow: His Nuclear World and Ours" at 3:30 p.m. Wednesday (Sept. 5) in the Bowen-Thompson Student Union Theater.

A brilliant physicist, J. Robert Oppenheimer was widely known as "the father of the atomic bomb." After World War II, he became a leading advocate of international control of atomic energy and an opponent of developing the hydrogen bomb. During the post-World War II "Red Scare," his loyalty was questioned in public hearings, and he lost his security clearance. "His life is fascinating and raises important, if troubling, issues that we confront today," said Dr. Donald Nieman, dean of the College of Arts and Sciences, which is sponsoring Sherwin's visit.

A book signing and reception will follow his talk, which is free and open to the public.

Sherwin will also participate Wednesday evening in a panel discussion of the lessons to be learned from Oppenheimer's life. Some of the issues still pertinent today include the control of nuclear power, the proliferation of nuclear weapons and the role of open debate in a democratic society. Moderated by Tom Watson, former editor of the Toledo Blade, the panel will also include Dr. Gary Hess, Distinguished Research Professor of history, and Dr. Walter Grunden, history. It will be held at 7:30 p.m. in 201 Union.

A history professor at Tufts University, Sherwin's writings have influenced national discussion of foreign and national security policy for the past three decades. His 1976 book, *A World Destroyed: The Atomic Bomb and the Grand Alliance*, is a classic analysis of atomic diplomacy and the origins of the Cold War. Sherwin was awarded the 2006 Pulitzer Prize in biography for his book *American Prometheus: The Triumph and Tragedy of J. Robert Oppenheimer*, co-authored with Kai Bird.

In an effort to break down the Cold War barriers between the United States and the former U.S.S.R. on the level of the private citizen, he spent the 1960s traveling and teaching in Russia, and took American students there as part of his "Global Classroom." It was during one of those trips that he met Dr. Douglas Neckers, McMaster Distinguished Research Professor and executive director of BGSU's Center for Photochemical Sciences, and former BGSU President Paul O'Scamp, who were forming an alliance with Mendeleev University in Moscow. Sherwin has also worked extensively with Hess.

Friends seek nominees for author, artist recognition

Chairs and directors of academic departments, schools and programs are asked to nominate individuals for recognition at the annual Authors and Artists Reception, sponsored by the Friends of University Libraries.

For more than 20 years, BGSU faculty and staff have been recognized for their scholarly works and achievements. This year's reception will be hosted on Nov. 7. The deadline for nominations is Sept. 20.

For detailed criteria and submission information, visit www.bgsu.edu/colleges/library/admin/friends/activities.html

All-Campus Picnic, Campus Fest go to 'extreme degrees'

The campus community is invited to enjoy free lunch and a look at campus activities and organizations at the All-Campus Picnic and Campus Fest Friday (Sept. 7). The picnic will be held from 11:30 a.m. to 1:30 p.m. on the University Hall lawn, with Campus Fest tables around the Union Oval.

Be sure to stop by the "COSMOS Extreme Degrees" event that will be going on from about 11:50 to 1:20 p.m. in front of the Mathematical Sciences Building and Overman Hall. Sponsored by COSMOS (Center of Excellence for Science and Mathematics Education), the College of Arts & Sciences, the School of Teaching and Learning, COSI, the Tractor Supply Company and American Rental, the demonstrations are designed to help recruit undecided majors into STEM-related (science, technology, engineering and mathematics) disciplines.

On the program are:

- Extreme Fluids, 11:50 a.m. to 1:20 p.m., in which cornstarch and water create a non-Newtonian fluid that sometimes acts like a solid and sometimes a liquid.
- Extreme Life, 11:50 a.m. to 1:20 p.m., with animals from Dr. Eileen Underwood's Herpetarium.
- COS Extreme Fountain, at 12:21 p.m. See 600 bottles of Diet Coke and mint Life Savers create a chemical and physical reaction that erupts into a fountain, choreographed to music.

The rain date for the picnic is Sept. 14.

September 4, 2007

RIPE

BOWLING GREEN STATE UNIVERSITY

BGSU Monitor

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BGSU MONITOR

RIPE project picked for more grant funding

An elementary science education project will continue at BGSU with a second infusion of grant funding.

Research-based Inquiry Physics Experiences (RIPE) II is among 24 science and mathematics education projects statewide receiving funding through the federal Improving Teaching Quality Program. The Ohio Board of Regents has released more than \$3.2 million for the projects, including \$136,679 for RIPE II.



The project will continue work started last year, when RIPE received \$133,549 for professional development with teachers of preschool through third grade. About 40 teachers from 14 school districts in five northwest Ohio counties came to campus last June for an institute where they learned different classroom approaches to physics and how best to address state standards. The project also offered materials for the teachers to take back to their schools, opportunity for graduate credit and follow-up during the school year.

Project director Dr. Tracy Huziak-Clark, School of Teaching and Learning, said that she and her collaborator, Dr. Stephen Van Hook, formerly of Bowling Green and now at Penn State University, have researched the youngest students' understanding of scientific concepts, based on hands-on learning, conceptual hooks such as songs and phrases, and movements and physical activities.

In RIPE II, they are sharing information about content as well as what they've learned about teaching. Physics content in Ohio's state standards for early childhood education focuses on sound and light, forces and motion, magnetism, astronomy and energy, Huziak-Clark noted.

The teachers at last summer's institute learned not only physical science content, but also how to teach it in an age-appropriate manner. They have since taught similar lessons in their classrooms, and six of them will co-teach and share their experiences with the RIPE II group.

"The response from the teachers and their students was so positive we just had to do this again," said Huziak-Clark. "One participant said, 'I can't believe how much I learned and how interesting physical science can be to learn and teach!'"

"One of the most important findings from RIPE I," the director added, "was the enthusiasm and interest of the K-3 students for learning more about the way things worked in their physical world."

Participants in this summer's institute will again receive a \$600 kit of materials—including magnets, ramps and springs—to take back to their classrooms. All of the teachers must then develop and implement a weeklong unit based on what they learn. That will be among the topics of discussion at three follow-up meetings in the fall.

The project is part of BGSU's ongoing efforts to improve education in the so-called STEM disciplines—science, technology, engineering and math.

March 3, 2008

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NEWS RELEASE

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(Posted March 03, 2008)

Appendix K: Teacher and Faculty Recognition cont.

Sentinel-Tribune

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Bowling Green, Ohio

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BGSU grant will help boost elementary science education

Written by Sentinel Staff
Tuesday, 04 March 2008

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Last Updated (Wednesday, 05 March 2008)

Affiliated Faculty Awards – Amy Scheuermann

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The Outstanding Researcher Award

Purpose and Nature of Award
To promote and recognize research, the COUNCIL FOR LEARNING DISABILITIES annually presents an award for an outstanding manuscript-length paper on learning disabilities based on a doctoral dissertation or master's study completed within the last five years.

The winner will receive a certificate to be presented at the Distinguished Lecture during the annual International Conference on Learning Disabilities. In addition, the paper will be considered for publication in the *Learning Disability Quarterly*.

Notification Process
Six copies of the APA-style paper (25 pages) should be submitted to:

Linda Nease, Executive Director of CLD
11184 Antioch Road
Box 405
Overland Park, KS 66210

Winners will be notified by August 15.

Deadline: May 15th

2007 Outstanding Researcher Recipient:

Amy Scheuermann, Bowling Green State University
The Effects of the Explicit Inquiry Routine on the Performance of Students with Learning Disabilities on One-Variable Equations

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**Coastal Treasures:
Effective Collaboration and Research-based Teaching 2007
Conference on Learning Disabilities**

The Council for Learning Disabilities hosted the 29th International Conference on Learning Disabilities on October 12-13, 2007, in Myrtle Beach, South Carolina. The conference was met with rave reviews! Participants had the opportunity to attend full-day institutes, half-day workshops, poster sessions, the Master Teacher Showcase and the Presidential Reception on Friday. On Saturday, participants attended concurrent sessions and an outstanding keynote session given by Marilyn Friend. Furthermore, participants had the chance to visit conference exhibitors giving them the chance to learn more about products/services available to teachers of and students with disabilities as well as purchase personal items of interest.

The Council for Learning Disabilities honored several educators for outstanding service to the field of learning disabilities at the conference. Dr. Nancy French (Colorado Chapter) was recognized as the Floyd G. Hudson Award Winner. Sue Cartwright (Colorado Chapter), Chris Blevins (Virginia Chapter), and Stephanie Peysier (Northwest Chapter) were recognized as Outstanding Educators. Finally, Dr. Amy Scheuermann (Bowling Green State University) was recognized as the 2007 Outstanding Researcher.

We invite you to join us for our 30th annual conference in Kansas City, Missouri, in 2008! For more information, [30th Annual CLD Conference](#)

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A Publication of the Council for Learning Disabilities

January 2008

PRESIDENT'S MESSAGE

Dear Friends and Colleagues,

While I was traveling to work the other day, Eric Clapton's "Change the World" was playing on a CD. As the song played, it reminded me of how teachers, educators, and other support personnel help change the world for children with disabilities. The award winners of CLD's 2007 conference have changed the world in powerful ways, and each of us helps to change the world in our own way. For those teachers who work in difficult situations, remember that your role is crucial in the lives of students with disabilities and your hours of hard work pay dividends in improving their lives. As I went through my own career changes, I often reflected on why I am in the field of special education. Time and again, the answer was because I wanted to change the world through improving the lives of students with disabilities. This knowledge has sustained me through my own tough times in special education, and I hope that the same knowledge can also help you on those "tough days" that we all experience as educators.

With CLD's 29th International Conference behind us, I would like to again thank those folks who helped make it a huge success—the Local Arrangements Committee, volunteers, CLD's conference director, CLD's executive director, and the Board of Trustees, including CLD's Executive Committee. I would also like to thank all of those who participated in the conference. Whether you were a speaker, exhibitor, or attendee, thank you for your support of this wonderful event. I would also like to recognize the award winners from the conference. Congratulations to Floyd G. Hudson Award Winner

Nancy French; Outstanding Educators Sue Cartwright, Chris Blevins, and Stephanie Peyser; 2007 Outstanding Research Award Winner Dr. Amy Scheuermann, and CLD's Distinguished Lecturer Dr. Linda Elksnin.



As each of you works to change the world, I would encourage you to participate in professional development opportunities to continue your own growth as a person and an educator. One of the best ways to do this is to attend professional conferences, such as CLD's annual conference, so that you can learn new skills and recharge your batteries. In addition, reading professional journals, such as *Learning Disability Quarterly* and *Intervention in School and Clinic*, helps to keep you abreast of current topics and techniques in the field of special education.

Until next time, keep on changing the world to improve the lives of students with disabilities and don't forget that from time to time we all need to recharge our batteries.

Joseph R. Boyle
CLD President 2007–2008

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Affiliated Faculty Awards – Physics and astronomy chair receives Blinn Award

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BGSU MONITOR

Physics and astronomy chair receives Blinn Award

Dr. John Laird, chair of physics and astronomy, has been named the 2007 recipient of the Elliot L. Blinn Award for Faculty-Undergraduate Student Innovative Basic Research/Creative Work.

Laird, who has involved students in measuring the composition of stars, was presented the award at the annual Faculty Recognition Dinner on Oct. 30. The award is given in memory of the late Dr. Elliot Blinn, a chemistry professor who devoted his career to sharing with undergraduate students the excitement of the discovery process.



Laird received a \$1,000 cash award and his department received \$4,000 for use in supporting further undergraduate research. The award particularly recognizes his work with an undergraduate student in the Academic Investment in Math and Science (AIMS) program, which seeks to encourage more women and minorities to pursue careers in mathematics and the sciences.

Their research was supported by a National Science Foundation (NSF) grant.

A number of years ago, Laird developed a method for measuring the abundance of chemical elements in stars using very low-quality spectra. While achieving about the same precision as conventional detailed analysis of high-quality spectra, the method dramatically reduces observation time, making it possible to analyze large samples of stars.

One of the main limitations to the method is that it measures only the average abundance of a variety of chemical elements, rather than measuring each element individually. While generally acceptable, there is a group of elements, known as "alpha" elements, which vary differently, making them especially important to measure separately from the rest.

As a freshman in the AIMS program, Tannah Graham began working on an independent research project to see whether the alpha elements could be measured separately from low-quality spectra by modifying Laird's original technique. The project was a dramatic success. Her work showed that the new method produced remarkably good alpha measurements comparable to—or even better than in some cases—published work.

Graham then took the project a step further. She applied the results to stars belonging to different groups within the galaxy. The undergraduate combined her alpha element results with previous measurements of the stars' motions to classify the stars according to their population group and time of origin.

She was able to identify a small number of stars with unusually high or low alpha abundances, which suggests they formed in some unusual environment. A key reason to measure alpha elements is to identify such stars, of which only a few were previously known.

Graham presented a poster about her research at the Ohio Science and Engineering Conference in Columbus in August 2006, and presented her findings at two AIMS seminars. In addition, Laird reported her work in a research proposal submitted to the NSF.

"Dr. Laird was a positive influence and offered his help if there were ever any questions," Graham says of her research mentor. "The work load was somewhat intense, being it was my first time doing anything of that nature, but he constantly showed support and encouragement."

"I believe my work with her was invested very well," Laird noted in writing about Graham. "It was eye-opening for her, I think, to realize how even the relatively simple mathematics she had learned before could be applied to achieve such significant results. More importantly, Tannah matured as a young scientist herself. As the project progressed, she developed and began to rely on her own judgment in evaluating the literature data as well as her own."

"Research collaboration provides the most rewarding teaching experience I have had, and benefits my research as well by focusing the attention of both me and the student," Laird wrote.

Ten undergraduates have worked on research projects with Laird over the years. The funds his department received from the Blinn Award will be invested in specialized equipment and travel for future student researchers.

November 5, 2007

Appendix L: Larabee Mini-Grant: BioTour



Virtual BioTour 2008: Extreme Adaptations!

NWO and WBGU-PBS presents **Virtual BioTour 2008: Extreme Adaptations!**, a 55-minute live broadcast on April 17, 2008 at 10:00 A.M.

BGSU Biology faculty will present various organisms from their labs in accordance with the common theme: Extreme Adaptations!, as it relates to the Ohio Academic Content Standards.

We welcome school groups and viewers at home to participate. Teachers and students, grades 7-12, can phone and e-mail questions to be addressed live on the air by BGSU faculty.

Optional pre and post activities will be provided by BGSU and may be facilitated by participating teachers.

For more information or if you are interested in participating in the virtual tour or the companion study, please contact Matt Partin at 419-372-2058 or partim@bgnnet.bgsu.edu. Each participating school must provide a contact teacher's name and contact information.

