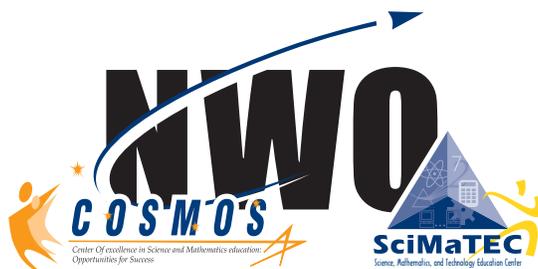


2005 NWO Center of Excellence Annual Report



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**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**

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Table of Contents

NWO Vision	3
NWO Mission	3
NWO Goals	3
Annual Report: FY 2005	4
FY Expenditures for July 1, 2004 - June 30, 2005	6
Accomplishments	7-14
Other Accomplishments & Completed Activities	15-19
Continuing Activities	20
Projected FY 2006 Goals & Activities	21-23
Issues, Problems & Anticipated Solutions	24
Resource Development & Sustainability	25
ORC Collaboration	26
NWO Center: We're on the MOVE!	27
Appendices	
Memorandum of Agreement	1-4
2005 Northwest Ohio Symposium on Science, Mathematics and Technology Teaching Program	5-22

NWO VISION

The Northwest Ohio Center of Excellence aims to advance science, technology, engineering and mathematics (STEM) education for people of all ages. Our purpose is (1) to work with community partners to generate new knowledge about the science of teaching and learning, (2) apply this knowledge by developing the expertise of K-12 educators and higher education faculty, (3) increase public support for, and understanding of, the STEM subject areas and (4) to stimulate the interest of young people, especially those in under-represented groups, in these rewarding fields of study and career opportunities.



NWO Mission

... Advancing science, technology,
engineering and mathematics
education for people of
all ages



NWO GOALS

- **Recruit** teachers and faculty into science and mathematics education and promote **retention** in these fields;
- **Improve preparation** of pre-service and in-service teachers and faculty in science and mathematics education;
- Enhance capacity of schools, especially urban and at-risk schools, to **improve K-12 student achievement** in science and mathematics through partnerships;
- Strengthen **coordination** and **collaboration** among institutions of higher education, schools, the Ohio Resource Center, Regional Professional Development Centers, business & industry, and community; and
- Heighten **professionalism** of all NWO partners.

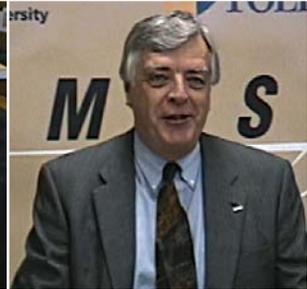


NWO Center of Excellence



ANNUAL REPORT: FY 2005

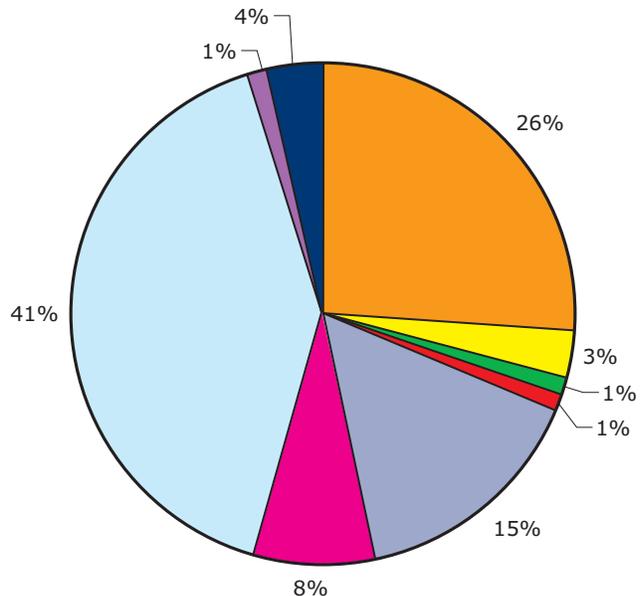
In this report, we provide the quantitative measures of our activities and accomplishments. However, effects cannot always be measured by quantitative data. The NWO community of learners, consisting of faculty, K-12 teachers, school administrators, graduate students, post-doctoral fellows, and a myriad of community partners, is beginning to respect and call upon each other to assist one another in science and mathematics education matters. Cultural change is a gradual process; snags are often encountered. But what exists today in Northwest Ohio is a very different community from what existed in 2001.



Expenditures

FY EXPENDITURES FOR JULY 1, 2004 - JUNE 30, 2005

Personnel, including faculty, external speakers, evaluators, post-doctoral fellows, consultants, student assistants & fringes	\$ 68,804
Supplies and services	\$ 7,994
Equipment	\$ 2,767
Conference travel, registration, mileage	\$ 2,844
MAT scholarships in science and mathematics	\$ 40,639
Other	\$ 20,710
UT Subcontract	\$108,468
Owens Subcontract	\$ 2,019
Indirect costs	\$ 9,288
Total Direct Costs	\$254,245
TOTAL	\$263,533



- Personnel, including faculty, external speakers, evaluators, post-doctoral fellows, consultants, student assistants & fringes
- Supplies and services
- Equipment
- Conference travel, registration, mileage
- MAT scholarships in science and mathematics
- Other
- UT subcontract
- Owens subcontract
- Indirect costs

Below, a table exists with each of the above categories for each of the years of funding and the amount spent in each of the categories. For each of the years, a total is provided, followed by the amount of carry-over. All but approximately \$55,000 of the carry-over has been earmarked for new collaborative projects that will take place in 2005-2006. We will address the new projects and related expenses later in this report.

Expenditures/Funding Year	2002-2003	2003-2004	2004-2005	Projected 2005-2006
Personnel	\$ 4,663	\$ 50,600	\$ 68,804	\$124,422
Supplies & services	\$ 6,752	\$ 2,410	\$ 7,994	\$ 63,436
Equipment	\$ 0	\$ 3,409	\$ 2,767	\$ 5,000
Conference travel, registration, mileage	\$ 2,908	\$ 2,563	\$ 2,844	\$ 10,000
MAT tuition waivers	\$ 11,913	\$ 12,510	\$ 40,639	\$ 40,000
Other	\$ 16,079	\$ 0	\$ 20,710	\$ 38,183
UT subcontracts	\$ 16,394	\$ 36,092	\$108,468	\$ 70,260
Owens subcontracts	\$ 0	\$ 4,188	\$ 2,019	\$ 30,000
Indirect costs	\$ 4,557	\$ 6,626	\$ 9,288	\$ 16,453
Total Direct Costs	\$ 58,709	\$111,772	\$254,245	\$381,301
TOTAL	\$ 63,266	\$118,399	\$263,533	\$397,754
Cumulative Carry-over	\$186,734	\$268,335	\$201,127	\$ 3,373

ACCOMPLISHMENTS

How many faculty members in mathematics and in specific science fields were involved in professional development seminars?

- Approximately 60 faculty from mathematics and in specific science fields were involved in some capacity, in the professional development seminars (COSMOS Study Groups, UT Dialogues Across College Barriers, NWO Symposium, Junior Science and Humanities Symposium, Learning Sciences Ph.D. program committee). Key A & S partners include:



Accomplishments

Van Hook, Laird, Moran	BGSU - Physics & Astronomy
Waggoner, Heddle, Myers-Jones	BGSU - Environmental Programs
Moses, Carothers, Little	BGSU - Mathematics
Panter, Elkins	BGSU - Geology
Midden	BGSU - Chemistry
Partin, Underwood	BGSU - Biological Sciences
Gromko	BGSU - Vice Provost
Bullerjahn, Krompak, Roehrs, Schmoekel, Salahat	Owens - A & S faculty
Busby, Perry, Bazer, Way	Owens - Biology/ A & S Administrators
Duran, DuBrul, Leady, Creutz, Leaman, Quinn	UT - Biological Sciences
Bjorkman, Bopp	UT - Physics and Astronomy
Spongberg, Czajkowski	UT - EEES
Funk	UT - Chemistry
Ford	UT - Pharmacy



What evidence-based outcomes can be attributed to the professional development seminars?

- A white paper describing a proposed BGSU Ph.D. Program in the learning sciences focusing on science and mathematics education was submitted to the Ohio Board of Regents. The program has received seven responses by Ohio higher education institutions, most responses are very favorable and the general consensus is for BGSU to submit a full proposal.
- The Dialogues Across College Barriers Forum at UT is a popular and well-attended event. To date, 100+ faculty from 4 higher education institutions and 5 colleges have participated.
- In the last 10 years, BGSU and UT have obtained over 20 million dollars in grant projects with scientists, mathematicians and educators as collaborative PIs (TAPESTRIES, GK-12 PRISM, PCC, EXCITE, Gear-up, Improving teacher quality, UT3, etc.). Much of our success is due to collaborations that are fostered by the Center.
- Interview data and classroom observation data were obtained, but not yet analyzed to examine changes to faculty beliefs about teaching and learning and related teaching practices. Refining and following through on the NWO evaluation plan is a primary goal of the 2006 activities.

How many students were enrolled in university courses where improved lessons or revised course content were employed? Were there measurable gains in student knowledge attributable to these improved lessons? What did data from pilot studies indicate about the preparedness of pre-service students to teach knowledgeably about mathematics or specific fields of science?

- There were approximately 300 students enrolled in modified courses at BGSU (Mathematics for Middle Childhood Majors, Bio 450: Teaching Evolution and the Nature of Science, ENVS 416: Environmental Education and ENVS 415 Investigating Earth as a System). This number will grow dramatically, as the Teaching Evolution and the Investigating Earth course are now required of all science education majors seeking Adolescent/Young Adult licensure to fulfill NCATE requirements. The mathematics content course for all middle childhood majors (regardless of their area of concentration) was revised to place a greater emphasis on both proportional reasoning and algebraic reasoning. This course alone affects approximately 250 students per year.
- At BGSU, a new placement exam has been created for admission to the mathematics course taken by all early childhood pre-service teachers. If early childhood majors cannot pass the placement exam, they are being directed to a remedial type course. This will allow for the standard early childhood mathematics course to address major issues in mathematical content without getting bogged down with remedial type errors. No data have been obtained, but with the additional time obtained by not going over remedial material, it is presumed that the students will be better prepared.



Accomplishments

- Approximately six new courses are currently under development at UT as one of the goals of the U.S. Department of Education Grant, UT3.
- At Owens, efforts to recruit students into education were made, including developing a proposed introductory course in education that would be taught by a BGSU faculty member. Jamal Salahat was developing this proposed Mathematics for Educators course. He is a member of the Math/Science Department. Last year, the Education Department at Owens moved from the School of Business and Information Technology to the School of Arts and Sciences. This course is not yet offered at Owens, as administrative personnel changes in the School of Arts and Sciences created unforeseen delays. However, new attempts to resurrect this course will be made in the upcoming year.
- To date, no data has been gathered as to measurable gains in student knowledge, etc. Refining and following through on the NWO evaluation plan is a primary goal of the 2006 activities. Specifically, new studies examining student misconceptions about global warming, ozone depletion, energy and evolution are in development as part of the activities of the NWO Research Community (described later). Moreover, PRAXIS II test scores will be used to assess the impact of the redesigned courses on undergraduate student achievement (as compared to students in traditional courses and in comparison to years of baseline data).

What specific activities were carried out with school districts and teachers? How many teachers and administrators were involved? What impact did these activities have on participants? To what extent has the Center been able to identify specific improvements in teaching and student achievement?

- The NWO Symposium held in December attracted 350 teachers. This included faculty from several higher education institutions (UT, BGSU, Findlay, Owens, Lourdes and Defiance – approximately 40 in number), in-service teachers throughout Northwest Ohio (approximately 250 in number) and pre-service teachers (approximately 60 in number). The symposium had speakers from higher ed as well as K-12 teachers who presented lessons that were in line with the standards and were inquiry-based. The sessions were so well received that plans have been made to expand the Symposium from a Saturday only affair to a Friday and Saturday event, with special Friday sessions for higher education faculty. The NWO Symposium program is included in the appendices.





recruit

Accomplishments

- COSMOS Study Groups (monthly professional development seminars) were held from September, 2004 through May, 2005 at different locations throughout Northwest Ohio. The fall semester had the theme of technology in science and mathematics, and the spring semester had the theme of science and mathematics in our environment.
 - **September (at COSI Toledo):** Hand-held Technologies: Breakout sessions on TI graphing calculators in the classroom, on integrating palm pilots in instruction, and on using a GPS in physics classrooms (30 in attendance).
 - **October (at WGTE):** Computer Technologies: After a look at the ORC website using a SMART board, there were breakout sessions on digital microscopes, digital cameras, design of a web page (session led by a WGTE employee), and innovative computer software for physics instruction (35 in attendance).
 - **December (at Clarion Westgate):** Northwest Ohio Center of Excellence Symposium for science, mathematics and technology education (350 in attendance).
 - **February (at Bowling Green High School):** The ORC – Writing Inquiry-Based Lesson Plans for submission to ORC (40 in attendance).
 - **February (at BGSU):** Successful Grant Writing in Science and Mathematics Education: Tips for Faculty and K-12 Teachers (40 in attendance).
 - **March (at Owens):** Green Power – Understanding Solar, Wind and Other Green Sources of Power (45 in attendance)
 - **April (at Maumee Valley Country Day School):** Science and Mathematics in the School Yard (25 in attendance).
 - **May (at BGSU):** Project Wet training for teachers who wish to include environmental activities in their classrooms. (12 in attendance).
- Two Center faculty (Dr. Barbara Moses and Mrs. Debra Shelt) were involved in a pilot with mathematics materials from LessonLab involving lesson study. Although teachers from many different locations were involved, two districts “bought into it.” Rossford teachers (approximately 20) were involved in three 2-credit modules (specifically Ratio and Proportion, Problem Solving, and Solving Equations). The district picked up 2/3 of the tuition, which was at a reduced rate due to a grant from the Ohio Department of Education. Also, Perrysburg teachers were involved. The superintendent strongly encouraged their participation. He had planned to attend the sessions, but his schedule did not permit him to participate. This year Dr. Moses intends to evaluate the effects of this professional development, both on teacher change and on student achievement.



- In total, over 450 teachers were involved in all NWO activities. Limited data has been gathered in the form of teacher surveys, interview and classroom observations (none of which has been analyzed) to follow-up on populations of teachers or pre-service teachers to determine effects of Center activities on teachers and teaching practices. Refining and following through on NWO evaluation plan is a primary goal of the 2006 activities.

What kind of formal relationships have been established by the Center with participating school districts?

- Currently, individual teachers from over 10 counties and 20+ school districts participate in NWO events. Formal relationships with individual schools are underway and are highlighted below.
- A primary goal for 2006 is to formalize relationships (establish professional development/partner schools) with at least 3 school districts. Since this fall, we're in the initial phases of development with East Toledo Junior High School (mathematics education program - MATH QUEST), Toledo-Waite High School (science and mathematics education programs), and Maumee City Schools (science short-cycle assessment project). These partnerships will offer sustained support and partnerships and as well as a source of revenue for the Center.

To what extent has the Center been able to follow-up populations or population samples of teachers who have participated in workshops or leadership experiences to determine the impact of programs or program characteristics on teaching and learning? Similarly, to what extent has the Center been able to follow-up pre-service teachers to determine effects of university teaching and/or curricular improvements on students' practice teaching and/or on their effectiveness as first- or second-year teachers?

- Limited data has been gathered in the form of teacher surveys, interviews and classroom observations (none of which has been analyzed) to follow-up on populations of teachers or pre-service teachers to determine effects of Center activities on teaching practices. Refining and following through on the NWO evaluation plan is a primary goal of the 2006 activities.

What measures has the Center been using (or will be using) to determine whether measurable gains in pre-service students' knowledge and skill can be attributed to course or teaching improvements?

- To date, no data has been gathered as to measurable gains in student knowledge as a result of course modification/redesign, etc. Refining and following through on NWO evaluation plan is a primary goal of the 2006 activities.
- In 2006, we plan to use PRAXIS II data to compare science and mathematics achievement of students taking redesigned and traditional courses.

prepare



Accomplishments

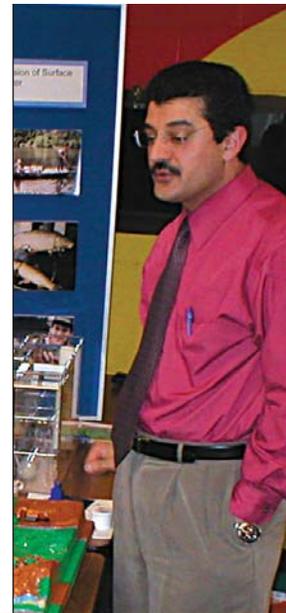
What results have your recruiting efforts produced? To what extent has the Center been able to identify baseline data and recruiting trends for its recruiting programs? To what extent has the Center been able to identify more and less successful recruiting strategies?

- Recruiting efforts have been particularly strong at UT. Pre-pharmacy, pre-engineering and other students majoring in sciences, but not yet admitted into a program, have been recruited as science education majors. This major recruiting effort is lead by the Department of Education grant project, UT3. UT-SciMaTEC hopes to play a significant role in this recruiting project.
- At the Future Teacher Conference, UT, BGSU and Owens undergraduate pre-service education students are provided rich opportunities to discuss issues related to education as a career choice with in-service teachers and faculty. This event is organized by pre-service teachers and is co-sponsored by SciMaTEC and the NWO Center.
- The Ohio Junior Science and Humanities Symposium brings to Northwest Ohio the brightest high school students from across Ohio that are involved in conducting high quality research projects. Approximately 100 students attend this event which is sponsored by Academy of Applied Sciences and co-sponsored by the NWO Center.
- SciMaTEC sponsors summer camps for kids called the "Real Reality" Series, including Survivor Seagate, CSI: Toledo and Jurassic Park. These camps provide young learners opportunities to experience the wonders of science first-hand.
- At BGSU, the following tenure-track faculty were hired since 2000: physics educator, biology educator, chemistry educator, geology educator and environmental educator. These Arts & Science faculty work closely with the College of Education and Human Development faculty, specifically through the Center. Two post-doctoral fellows (physics and environmental science) were also hired to work directly with COSMOS. In 2002, Dr. Haney accepted a joint appointment in the Colleges of Education and Human Development and Arts and Sciences at BGSU. Dr. Heddle was hired as a visiting assistant professor in environmental programs after serving as COSMOS post-doctoral fellow at BGSU. Her research now focuses on environmental pedagogy. At UT, Dr. Emilio Duran was hired into a tenure-track position in the department of biological sciences, after a previous science education coordinator position was reconstructed. Dr. Debra Johanning was hired as a tenure-track assistant professor in mathematics education at UT and a educational research post-doctoral fellow was hired to work with the UT3 grant.
- A visiting professor of mathematics (Dr. Richard Little) was at BGSU for the year. He assisted in several COSMOS activities, including a presentation about the ORC and a presentation at the Symposium about geometry challenges. He was an active member of the book club. He also taught geometry for AYA majors.
- Twenty one BGSU MAT students were given full tuition to pursue their master's work in a content area (physics or mathematics). This tuition was funded roughly 50% by COSMOS and 50% by the Graduate College at BGSU. MAT programs in both mathematics and physics were redesigned to meet the needs of teachers (aligned with national standards/PRAXIS requirements, appropriate pre-requisites, offered after school hours or in the summer, etc.).
- To date, baseline data has not been obtained regarding recruiting efforts, however, a model for successful appointments (hybrid committees consisting of faculty across colleges and institutions) has shown to be beneficial. Without College of Education representation on the newly established "educator" positions in the College of Arts and Sciences, there would much confusion and competing expectations as to the role of the new hire. Dr. Czerniak and Dr. E. Duran at UT are currently working on a publication outlining an effective collaborative partnership model.

OTHER ACCOMPLISHMENTS & COMPLETED ACTIVITIES

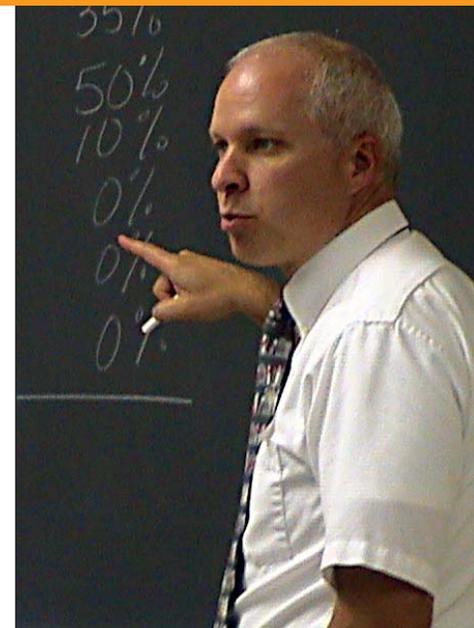
Building of relationships

- Perhaps the most significant relationship that has been strengthened is that between BGSU and UT. During summer 2004, a memorandum of agreement was written and was approved during Fall, 2004. Since this time, a new director of the UT group was appointed (Dr. Emilio Duran) and in July 2005 a new director of the BGSU group was hired (Dr. Jodi Haney). During the 2004-2005 year, the two institutions jointly planned the Symposium for Northwest Ohio, and additional joint activities are planned for FY 2006. The memorandum of agreement is included in the appendices.

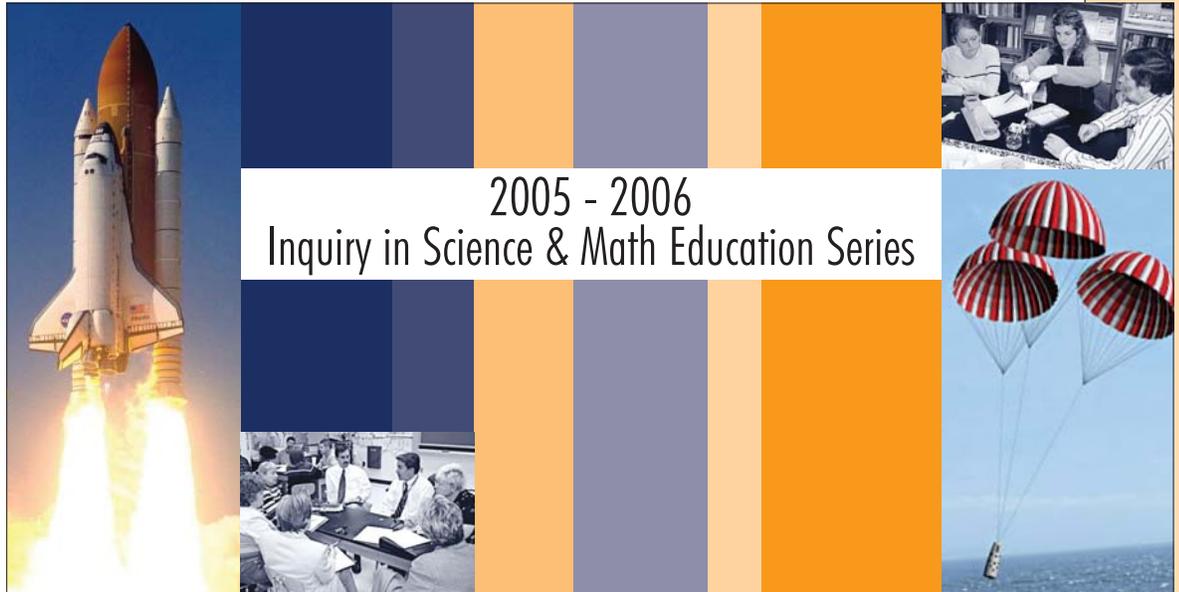


Other Accomplishments & Completed Activities

- Relationships with community agencies that deal with science and mathematics were enhanced. A study group meeting was held at COSI Toledo and another study group was held at WGTE (the public broadcasting station in Toledo). Both agencies are interested in collaborating further with the Northwest Center.
- Relationships between the Colleges of Education and Arts & Sciences have been enhanced. A new tenure-track faculty member in the Department of Biological Sciences (A & S) was hired this year at BGSU to fulfill the role of a biology educator (Sirum).
- The alignment of partner organizations and the Center is stronger. Some meetings have been planned jointly.
- Collaboration with the K-12 school teachers has been enhanced through mini-grants and through assistance with ORC submissions.
- NWO Partners and the newly united NWO Advisory Board include the following groups:
 - Faculty from Colleges of Education and Arts & Sciences (BGSU, Owens, UT)
 - Pre-service teachers (BGSU, Owens, UT)
 - In-service teachers, including master's degree-seeking students
 - Public school administrators
 - Educational service centers
 - Post-doctoral fellows (2)
 - Business partners (7)
 - Community agencies (12) - Toledo Zoo, COSI-Toledo, Metro & County Parks, Botanical societies, technology agencies, Soil and Water Districts, etc.



- Monthly study group meetings and symposia have reached out to different sets of teachers and will include more focused study topics. The 2005 Inquiry in Science and Mathematics Series includes focused presentations on how to use inquiry in the classroom and how to assess students as they inquire. Each session is also coupled with grade level/subject area study groups where teachers will pilot inquiry rich activities and assessments in their classroom and then bring back anonymous samples of student work to discuss with other teachers. At the first event, 100 people registered, of which 83 attended. The participants included faculty from 3 higher education institutions, teachers from regional school districts, and undergraduate students



2005 - 2006 Inquiry in Science & Math Education Series

Blast-Off to Splash-Down

<http://cosmos.bgsu.edu>

Date	Topic	Time	Place
Sat. Sept. 17th, 2005 Blast-Off	Inquiring Minds Want to Know... The What, Why and How? Keynote Speaker – Dr. Dan Brahier	8:30 am-12:30 pm	Life Science Bldg., Rm 112, BGSU
Thurs. Oct. 6th	From Hands-on to Minds-on... Questions Matter!	4:30-7:30 pm	To Be Announced [TBA]
Fri. Nov. 4th (faculty) Sat. Nov. 5th (teachers)	Northwest Ohio Symposium on Science, Mathematics and Technology Teaching	1:00-5:00 pm 9:00 am-5:00 pm	Clarion Hotel - Westgate, Toledo
Thurs. Dec. 1st	Inquiry Meets the Test - Standardized Tests & Inquiry	4:30-7:30 pm	TBA
Thurs. Jan. 19th, 2006	Planning for Inquiry - Supercharge Your Lessons!	4:30-7:30 pm	TBA
Thurs. Feb. 16th	Assessing Inquiry via Writing	4:30-7:30 pm	TBA
Thurs. March 16th	Assessing Inquiry via Performances and Projects	4:30-7:30 pm	TBA
Sat. April 29th	COSMOS Summit - Present an Exemplary Lesson or Come Take It All In!	8:30 am-12:30 pm	Student Union, Rm 308, BGSU
Sat. May 13th Splash-Down	Math & Science the Cedar Point Way! Families Welcome. One free ticket if you attend all COSMOS events throughout the year.	Park opens at 10:00 am	Cedar Point, Sandusky, OH

Tell Your Colleagues!



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**HIGHLY QUALIFIED TEACHER
OPPORTUNITY!**

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

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



CEU's available or 2 paid graduation credit
hours (you pay only the general fee and
registration - approximately \$70 per hour!)

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

Other Accomplishments & Completed Activities

- New Toledo Public Schools teachers are part of the MAT program in science and mathematics.
- A second post-doctoral fellow in physics education, Dr. Tim Moran, was hired to assist in curriculum development in physics courses for teachers. Dr. Moran also directed the book club, modified the introductory physics course and had the manuscript, "SoundSpectrum Analysis Software" accepted for publication in *The Physics Teacher*. Dr. Moran and Dr. Stephen Van Hook submitted a paper titled "Teaching scientific methods using peer review in an undergraduate physics seminar class" to the *Journal of College Science Teaching*. It is still in review. Dr. Moran also presented at a poster session at the 2005 American Association of Physics Teachers conference. Soonhye Park, a post-doctoral fellow at UT will be working with the UT3 project on the research component of this project.
- Spring semester 2005 included a weekly book club for faculty at BGSU. The selected book was *The Teaching Gap* and was led by the physics post-doc. On some weeks, there were as many as 15 faculty in the discussion, many of whom had never attended anything offered by the Center. Some were from the hard sciences, and others were from education. The theme throughout was "teaching as a cultural activity" and the non-American faculty made significant contributions to these discussions.
- The NWO Mini-Grant Program for K-12 Teachers was developed and the first round of funding was awarded in September, 2005. A grant selection committee was established to review applications and one mini-grant was awarded to Van Buren Elementary School (placed-based education project using a community garden as a context for learning). Beginning this year, we will name this grant program "The Larabee Science and Mathematics Mini-Grant Program" in honor of a highly active local science and mathematics teacher who recently passed away from a tragic bicycle accident. Mr. Larabee was a member of OCTM and SECO as well as local science and mathematics organizations.
- Dr. James Stigler, author of *The Teaching Gap* and many other books and articles, including an in-depth analysis of the TIMSS videos, presented during summer 2005. COSMOS and the NWO Center jointly sponsored his visit, in collaboration with the PMET workshop being held in Bowling Green.
- Two COSMOS faculty, Dr. Barbara Moses and Mrs. Debra Shelt, were on writing teams for OMAP, helping to develop the 3-6 module on Connecting Algebra, Numbers and Probability (Dr. Moses was a team leader). Teachers who had participated in several other COSMOS activities were invited to be writers (Shelly Gilbert) or facilitators (Nikki Fort). These are small signs that COSMOS activities are encouraging good teachers to become more professionally involved.
- Dr. Stephen Van Hook and Dr. Lena Ballone Duran are Co-PI's on an NSF-funded GK-12 project. This project pairs graduate students in science and mathematics with K-12 teachers in Northwest Ohio. This has been an extremely successful project, both for the graduate students (many of whom have completed doctorates and have been offered jobs in Colleges of Arts and Sciences by many institutions) and for K-12 teachers (who have gained a better understanding of the content involved). Moreover, the Center has gained from the presence of both of these groups who are active participants in the COSMOS Study Group meetings and the NWO Symposium.

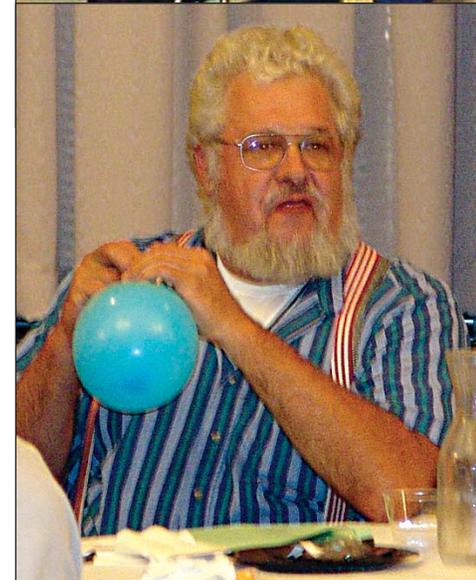
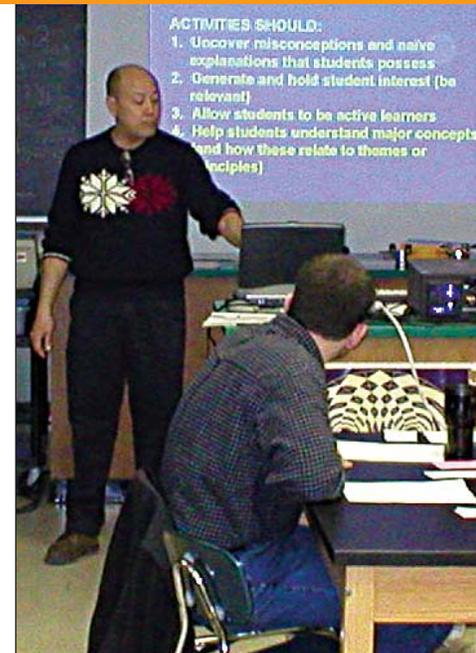
achieve





Other Accomplishments & Completed Activities

- Dr. Jodi Haney has been Co-PI on an EXCITE project, funded by the National Institute of Environmental Health Sciences. This project aims at helping interdisciplinary middle grade teacher teams examine, design, develop, pilot, revise and publish problem-based curricula focusing on local environmental health problems (<http://www.bgsu.edu/colleges/edhd/programs/excite>). Many EXCITE participants present their developed lessons at COSMOS study group meetings or the NWO symposium.
- Dr. Lena Ballone-Duran and Dr. Emilio Duran are Co-PIs on ASTER III, a state-sponsored, Improving Teacher Quality grant aimed at improving inquiry-based physical science instruction in grades K-3. The grant also works with COSI-Toledo as a community partner. ASTER teachers present at COSMOS study group meetings or the NWO symposium.
- SciMaTEC and NWO Center faculty continue to support the recruiting efforts undertaken by the UT3 grant, aimed at recruiting students into science and mathematics education.
- SciMaTEC is working on a Accelerating Achievement in Mathematics and Science in Urban Schools federal grant. A five year research and demonstration grant with fall, spring and summer programs works with urban students in the Toledo Public and Dayton Public schools . The purpose is to raise the achievement of urban 4th and 5th grade students with a high potential for science and mathematics.





Continuing Activities



CONTINUING ACTIVITIES

- The Northwest Ohio Symposium on mathematics, science and technology will expand to a two-day conference, with the first day being directed towards higher education faculty.
- Presenters who can address the issue of good inquiry-based teaching are being recruited to present at NWO events. During the summer, Dr. Edward Burger, chair of the mathematics department at Williams College, modeled a lesson with pre-service middle school teachers, at the Bowling Green PMET workshop. The mathematicians in the audience (higher education faculty) finally saw that it could be done!
- Faculty from BGSU, Owens and UT are being strongly encouraged to submit collaborative proposals to the state-sponsored Improving Teacher Quality grant program and a collaborative proposal from the NWO partners will be re-submitted to the National Science Foundations - Mathematics and Science Partnership (MSP) Program.

Goal 1: Enhanced teacher and faculty performance through high quality professional development

- Faculty from the Center will take leadership roles in activities involving OMAP and OSCI.
- Faculty from the Center will continue to assist in professional development using LessonLab materials. This professional development is being extended to regions throughout the state, and faculty from the Northwest Center will assist in the training of higher education faculty from other universities.
- The monthly Study Group meetings will continue throughout the year. The theme for the 2005-2006 year will be inquiry, with the keynote speaker at the Blast-Off in September being Dr. Daniel Brahier, BGSU mathematics educator. For further details on the monthly meetings, visit the website at <http://cosmos.bgsu.edu> or see the Inquiry in Mathematics and Science Education Series postcard.



Projected Goals & Activities

- This year there will be a concerted effort to provide professional development opportunities for the faculty, instructors and teaching graduate assistants who have not yet been involved in Center activities. These seminars will be coordinated with centers for teaching and learning on both the BGSU and UT campuses. A NWO Summer Inquiry Institute, with special sessions for these groups, is envisioned.
- Provide additional field/teaching experiences in science and mathematics education to Owens' pre-education students.
- Extend Future Teacher Conference to Owens undergraduate students.
- Recruit more students from Owens to participate in undergraduate professional development opportunities.
- Expand MAT programs (Integrated Science MAT?).
- Apply research-based professional development models with partner schools (i.e. include a critical mass of teachers, administrative buy-in and "REAL" support, goal alignment, focus on standards, monitor evolving beliefs, provide opportunities to practice, etc.).
- Provide tutoring/enrichment opportunities for at-risk students in partner schools and PRAXIS II tutoring for science and mathematics education majors.
- Include programming for community awareness of, support for and involvement in school science and mathematics.



Goal 2: Dissemination of results and products

- COSMOS and NWO have established a learning community to study research in science and mathematics education. In this research learning community, faculty, graduate students and others with a common interest in the science of learning meet to critique related research and design and conduct collaborative research of their own. Members will collaborate to share collective knowledge and research experiences in order to generate new knowledge. At each meeting, a research learning community member will present a proposed, "in the works" or completed research project and lead a discussion of the project to elicit constructive feedback. Small group critiques on assigned journal readings of top-tier research on the learning sciences will follow. The main goal of this research learning community is to provide a foundation and support for faculty interested in pursuing research on how K-16+ students learn science and mathematics. We aim to generate new knowledge about how people of all ages learn science and mathematics, disseminate knowledge via conference presentations and publications to top-tier professional organizations and apply this new knowledge to the evolving professional development programs offered through the Center. At the first two meetings of the year, 16 and 19 faculty attended and participated (representing 3 colleges and 7 departments).

Whoever Says There Is No Such Thing As A FREE Lunch...



Doesn't Know About the COSMOS Research Community.

Our Goal: To generate new knowledge about how students learn science & mathematics.

- Be a part of an interdisciplinary team on the move
- Collaborate on existing research projects
- Propose and lead new research projects
- Travel money for conference presentations
- Seed money for research
- Answer questions that apply back in your classroom
- All this and a FREE lunch!

Sign up at <http://cosmos.bgsu.edu>

Co-sponsored by
COSMOS & CTLT




COSMOS Research Community

Fall 2005 Schedule
Thursdays 11 am - 12:30pm

Sept. 1	Room 024, Kohl Hall
Sept. 15	Room 024, Kohl Hall
Oct. 13	Room 024, Kohl Hall
Oct. 27	Room 024, Kohl Hall
Nov. 10	Room 024, Kohl Hall
Dec. 8	Room 024, Kohl Hall

Sign up at <http://cosmos.bgsu.edu>
Co-sponsored by COSMOS & CTLT
Contact: Jodi Haney, Ph.D., COSMOS Director
126 LSC Bldg. • 419-372-7361 • jhaney@bgsu.edu

- This fourth year of OBR funding will also be directed toward research and development. The NWO evaluation plan will be reworked in light of current activities at a daylong retreat with participation from BGSU, Owens, UT and school partners. Anecdotal evidence shows that teachers involved in study groups or in the MAT program are much more comfortable with inquiry-based teaching than they had been previously. Evaluation instruments and strategies will be standardized to make the data gleaned more rigorous. The effects of new or modified coursework at the undergraduate level will just begin to show in the student teaching performance of the pre-service teachers. As previously discussed, undergraduate student misconceptions and student achievement as related to redesigned coursework will be examined in the upcoming year.



Projected Goals & Activities

- With the hire of a new COSMOS assistant director, half-time secretary, graduate assistant and research faculty at BGSU (and with the help from other Center partners) stronger efforts will be made to collect NWO data and analyze the data to evaluate the effects of the professional development and the effects of curriculum modifications.

Goal 3: Center administrative and evaluative activities

- With the new directors in place, a new administrative structure is emerging. In addition, there will be one unified governing body (executive committee) to oversee the Northwest Ohio Center of Excellence (see appendices for the Memorandum of Agreement).
- One advisory board will be created to represent COSMOS, SciMaTEC and Owens. The former two boards will be dissolved.

Goal 4: Strengthening of collaborations

- The most obvious goal is to make the collaboration between BGSU, Owens and UT work. All involved parties intend for this to occur.
- Last year some effort was made to set up a professional development school. New partnerships with Toledo Public and Maumee City Schools are in the works.
- Initial attempts at working with community agencies such as COSI Toledo and WGTE were successful. Both agencies have expressed a desire to enhance the collaboration. The governing body of the Northwest Ohio Center will engage in conversation about the types of collaboration that would prove advantageous to all.
- Establish future Teacher of America Clubs for science and mathematics education at local high schools and junior high schools (Collaboration with federal UT3 grant).
- Partner with the OMAP and OSCI efforts in the region.
- Become a Regional Resource Contribution Center for the Ohio Resource Center.

Issues, Problems, Solutions

ISSUES, PROBLEMS & ANTICIPATED SOLUTIONS

- The biggest issue to date has been the relationship between UT and BGSU. However, with the new memorandum of agreement and with the new directors, it appears that the NWO Center is quickly heading in the right direction. We truly believe this issue is behind us. As per the memorandum of agreement, additional activities are being jointly sponsored each year by the three groups (BGSU, Owens and UT). A new NWO website has been created to encompass all of the activities of COSMOS and SciMaTEC (<http://www.nwocenter.org>) and the SciMaTEC newsletter will soon become the NWO newsletter to better serve the entire region. We've jointly created a new mission and vision statement along with corresponding goals to guide our Center activities.
- The second biggest issue has been that of evaluation and research. The evaluator for the project, Dr. Andrew Lumpe, discontinued his efforts with the Center because he has taken a new job as a school curriculum director (leaving the university setting). A new external evaluator will be sought to help enact the evaluation plan and the plan will be revised as previously described. A greater effort will be made to collect numerical data to evaluate the Center. BGSU will fund a three-hour course release for two associate faculty each semester to work on research and grant writing activities as related to the Center. Dr. Van Hook is on a one-course release time schedule. He will be doing research related to misconceptions and pedagogy in physic. Dr. Heddle will be leading a collaborative research project targeting undergraduate student misconceptions related to global warming and ozone depletion. Dr. Moses, who is on faculty improvement leave (FIL), will be conducting research related to mathematics pedagogy. A top priority for this fiscal year will be to redesign the evaluation plan at a one-day Center retreat and then enact the plan fully, so data sets (and subsequent analysis thereof) are available this time next year.



RESOURCE DEVELOPMENT & SUSTAINABILITY

- At BGSU, the administration has extended strong financial support to COSMOS this year. The newly hired Director is being paid by university monies. In addition, the University is paying for a half-time secretary and approximately 75% of the assistant director salary and benefits. BGSU will also fund a three-hour course release for two associate faculty each semester to conduct research and contribute to grant-writing efforts. Center space is currently being remodeled (6 offices and a conference room). Moreover, COSMOS now has an internal budget of \$15,000/year for the first year and \$10,000/year thereafter to serve as a university hybrid (research and teaching) center. COSMOS is now officially “housed” in the graduate college to promote quality research and grant writing activities. This support will ensure the life of the Center beyond Ohio Board of Regents funding. The University of Toledo provides similar support structures for SciMaTEC.

Resource Development & Sustainability

- At BGSU, a proposal has been submitted for the creation of a new doctoral program in the learning sciences as related to science and mathematics education. Based on the needs of the state, as well as national needs, it has been documented that the supply of science and mathematics educators with strong backgrounds in the sciences or mathematics is totally insufficient. The proposed doctoral program would look for talented scientists and mathematicians and provide them opportunities for substantial research in the understanding of how people learn science and mathematics. The establishment of such a program would guarantee that the Center, its faculty and graduate students, would be expanded to include additional faculty, senior researchers, additional graduate students and new post-doctoral fellows. As mentioned earlier, the seven responses received by other Ohio institutions are generally very positive.
- Additional plans are being made to secure outside funding for many of these opportunities. One such local source of Center funding is the establishment of professional development/partner schools. Other sources include the National Science Foundation, and The Department of Education.





ORC COLLABORATION

The Center has been actively involved in promoting the ORC, in courses, in Center programs aimed at fostering research-based best practices, and in other professional development offered by the Center faculty.

- The LessonLab materials in mathematics that are being shared with school districts are notably aligned with state and NCTM best practices. Moreover, they promote the use of lesson study. During this professional development, Dr. Moses and Mrs. Shelt referred the participants to the ORC website.

ORC Collaboration



- In most of the science and mathematics methods classes, students have assignments that involve the use of lesson plans from the ORC. Similarly, in some of the mathematics classes for early childhood majors and for middle childhood majors, students must search for a lesson plan on a given topic and explain how they would adapt the lesson to the grade level they would like to teach.
- Many of the MAT scholarship students and NWO teachers are using the ORC lesson plans in their classrooms and are presenting the results of the lesson implementation to the NWO partners at the Blast-Off (beginning of the year), Symposium (mid-year) or Summit (end of the year) events.
- We have started the discussion with the ORC as to how we may serve as a regional lesson submission site. We could encourage teachers to submit lessons to our website, we could give an initial review using the ORC rubrics and then the ORC could access these “ready to review” lessons from our website.

NWO CENTER: WE'RE ON THE MOVE!

In light of our past accomplishments, current activities, and future goals, we've reallocated remaining funds to secure resources needed to take our next steps as a more collaborative Center. Much more money is being dedicated towards Center-related activities to foster greater collaboration among partners. We've hired a part-time school liaison/recruiter to help establish and foster partner school relationships and a part-time graphic designer to foster our goal of greater public relations and to assist with newsletter, website graphic development,



We're on the MOVE!

new Center logo and identity. We have also budgeted more money for the development of the NWO website, newsletter and Center evaluation activities. We believe we have re-allocated our carry-over money in a manner that will enable us to better achieve the 2006 NWO Center goals outlined in this report.

Together, the NWO partners have created a newly revised mission, vision and set of goals. We have a new collaborative structure in place including one united advisory board and executive committee. We've created a new NWO logo, letterhead, newsletter and website to document and convey our move forward as a Center. We believe as a collective, we provide second-to-none professional development to our region's teachers and higher education faculty. Together, we will rebuild an evaluation plan to better measure the impact of our work. In sum, we are a Center on the move. Our partnerships are becoming true and solid. We are proud of our past accomplishments and dedicate ourselves to achieving our new goals and providing evidence of these collaborative efforts. To repeat an important theme, what exists today in Northwest Ohio is a very different community from what existed in 2001.





APPENDICES

- I. Memorandum of Agreement
- II. 2005 Northwest Ohio Symposium on Science, Mathematics and Technology Program

Appendix I



Bowling Green State University
443 Math Science Building
Bowling Green, OH 43403-0221
Phone: 419-372-2737
Fax: 419-372-6092



SciMaTEC

The University of Toledo
2020 Gillham Hall
Toledo, OH 43606
Phone: (419) 530-8456
Fax: (419) 530-8459

September 28, 2004

TO: Provosts John Folkins and Alan Goodridge
Research Officers Heinz Bulmahn and Frank Calzonetti
Deans Josue Cruz and Thomas Switzer
Deans Donald Nieman and David Stern

FROM: Barbara Moses, Director COSMOS
Emilio Duran, Director SciMaTEC

RE: Memorandum of Agreement COSMOS-SciMaTEC

Summary

In this memorandum, we propose a new structure for the Ohio Board of Regent's Center of Excellence in Northwest Ohio. Under this new organizational structure, the **Center Of Science and Mathematics Education: Opportunities for Success (COSMOS)** will become the name of the science and mathematics center at Bowling Green State University. The University of Toledo's Science, Mathematics, and Technology Education Center (SciMaTEC) will continue under the name it has held since 1992. The COSMOS and SciMaTEC Centers will forge a new partnership between them and other educational agencies in Northwest Ohio to form a collaborative, regional center of excellence entitled *The Northwest Ohio Regional Center of Excellence in Science and Mathematics Education*.

Proposed Changes

To create a mutually acceptable regional Center of Excellence in Northwest Ohio, we propose to dissolve the UT-COSMOS center. COSMOS will become the name of the mathematics and science center at Bowling Green State University (BGSU). SciMaTEC will remain the name of the science, mathematics, and technology education center at The University of Toledo (UT).

The reconceptualized *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* will be the combined efforts of BGSU's COSMOS, UT's SciMaTEC, and programs in other Northwest Ohio educational schools and agencies (i.e. Owens Community College, Toledo Zoo, COSI, Lourdes College, University of Findlay). COSMOS and SciMaTEC will be autonomous centers with their own separate procedures as determined by each university (i.e., operating procedures, governance, advisory boards, budgets*).

Each partner in the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* could use the tag line “A partner in the Northwest Ohio Regional Center of Excellence in Science and Mathematics Education” on stationery, literature, web sites and other promotional materials. Joint letterhead and other artifacts of communication for the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* will be developed by the Executive Board (described later) and used for any communication to the OBOR and on any collaborative projects or jointly funded grants. The names of all institutional partners will be positioned on the left hand side of the letterhead.

All OBOR funding originally designated to BGSU or other partners will remain the same as originally negotiated. All OBOR funding originally designated to UT-COSMOS will go to UT’s SciMaTEC in the same amounts originally negotiated through 2006. All funding solicited under the umbrella of COSMOS prior to July 1, 2004 (i.e., Congressional Briefing written by Barbara Moses and Charlene Czerniak) will be divided between BGSU (COSMOS) and UT (SciMaTEC) as negotiated.

An Executive Board for the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* will make all future partnership budget decisions. Any new OBOR Center of Excellence funding that might come to NW Ohio will go to the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education*, and the Executive Board will make all subsequent budget decisions regarding the regional funding.

* NOTE: For COSMOS to serve as the science and mathematics center at BGSU, it will need university funding similar to that enjoyed by UT’s SciMaTEC. SciMaTEC has a \$15,000 yearly operating budget provided by the University of Toledo. The Colleges of Education and Arts and Sciences negotiate workload for the center directors as per the UT-AAUP contract. The College of Education provides a 1/2-time secretary and office space to SciMaTEC. SciMaTEC is a UT Board-of-Trustee-approved center. It is recommended that BGSU move to make COSMOS a recognized university center with appropriate university funding.

Proposed Governance Structure

The *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* (depicted as the center overlap in the Venn diagram in Figure 1) will have an Executive Board (depicted in red) responsible for planning, implementation of collaborative projects, overseeing collaborative budgets, and writing reports to the OBOR or other agencies that collaboratively fund projects.

We propose that the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* Executive Board be composed of:

- The director of BGSU’s COSMOS (Barbara Moses at the current time),
- The director at UT’s SciMaTEC (Emilio Duran),
- An equal number of representatives from each of COSMOS and SciMaTEC’s Advisory Boards to represent the two Center’s constituents (e.g., K-12, business/industry, educational agencies) as determined by the Directors of COSMOS and SciMaTEC,
- One representative from The Northwest Ohio Educational Partners (e.g., Owens Community College, Lourdes College, or University of Findlay),
- The PI from any grant written for the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education*. The PI of any grant for the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* will be on the Executive Board as long as funding for the grant continues. At this time, the only person in this position is Barbara Moses as PI of the OBOR grant.

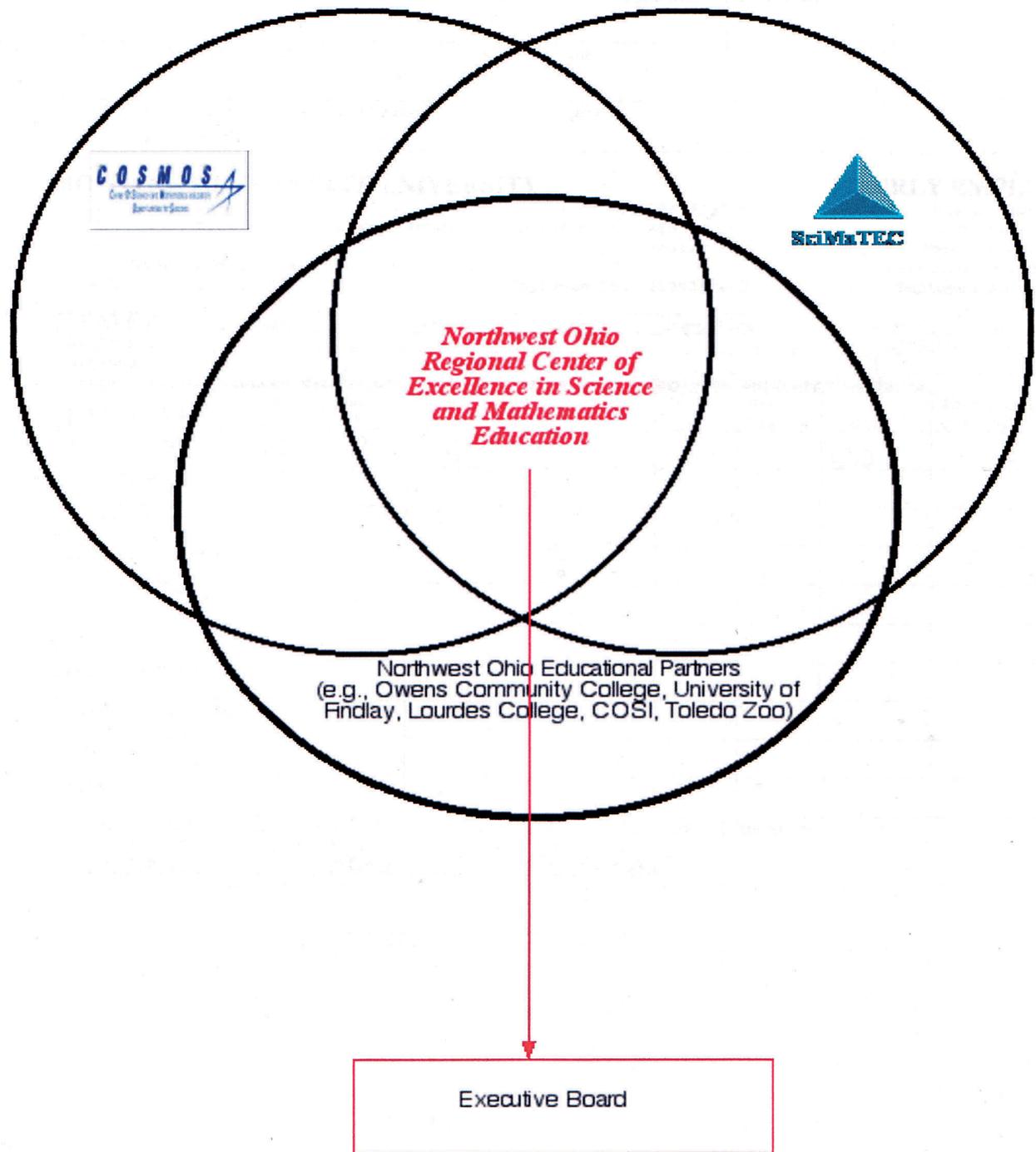


Figure 1. *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* Governance Structure

We propose that the Chair of the Executive Board alternate yearly (or similar time frame as agreed upon by the Executive Board) between the Director of COSMOS and the Director of SciMaTEC (the two universities that originally wrote proposals to the OBOR for the Center of Excellence funding and that have teacher education licensure programs and Masters Degree programs in science and mathematics education).

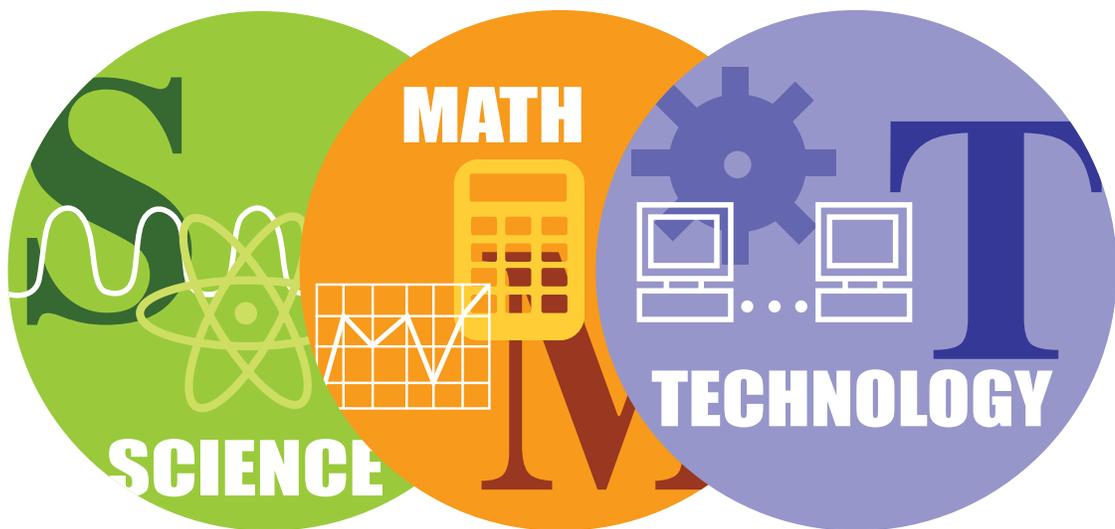
The Executive Board will meet a minimum of two times a year – once a semester (or more often if determined by the members of the Executive Board). At the Fall Semester meeting, the Executive Board will propose goals and activities for the year and allocate budgets accordingly. At the Spring Semester meeting, the Executive Board members will provide reports of accomplishments and budget expenditures. The Executive Board will oversee budget requests (within existing budget allocations for the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education*) and approve all annual reports prior to submission to OBOR (or any other funding agency for the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education*).

The inaugural Executive Board will create terms of office, bylaws, or any other procedures as they see necessary to conduct the business of *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education*.

We anticipate that the *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* will aim to write externally funded grant proposals yearly to sustain funding and collaborative projects. The *Northwest Ohio Regional Center of Excellence in Science and Mathematics Education* plans to develop one new collaborative activity/project each year with some budget allocation dedicated to the collaborative project.

_____ John Folkins, Provost, BGSU	date	_____ Alan Goodridge, Provost, UT	date
_____ Heinz Bulmahn, Vice Provost, BGSU	date	_____ Frank Calzonetti, Vice Provost, UT	date
_____ Josue Cruz, Dean, BGSU	date	_____ Thomas Switzer, Dean, UT	date
_____ Donald Nieman, Dean, BGSU	date	_____ David Stern, Dean, UT	date

Appendix II



engage in **innovative activities**

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

www.nwohiosymposium.org

Clarion Hotel - Westgate

December 4, 2004

7:30 am – 12:30 pm

the place for **K-16 teachers**

Symposium

T able of contents



Conference agenda	1
Today at a glance	2
Presentations	4
Presenter listing	12
Vendor listing	13
Floor plan	14
Notes	15

C onference agenda

7:30 am – 8:30 am	Check-in/breakfast
8:40 am – 9:30 am	Session A
9:40 am – 10:30 am	Session B
10:40 am – 11:30 am	Session C
11:40 am – 12:30 pm	Session D
12:40 pm – 1:30 pm	Special Follow-up Session

* **Special Follow-up Session:** Roundtable Discussion on *Using Inquiry in Higher Education Math & Science Courses*. Only symposium participants who attended at least one of the faculty sessions (B9, C9, D9) and registered for lunch online can attend. Lunch will be provided in Crystal's.





Today at a glance

SESSION A (8:40 am - 9:30 am)

- A1 **Geology and Simulated Space Missions**
Presented by: Julie Muffler, Challenger Learning Center of Lucas County – **Ballroom 1**
- A2 **Earth Counts: Connecting Math With Ecology and Human Geography**
Presented by: Debra Shelt, Bowling Green State University – **Steuben**
- A3 **Connecting Percentages and Fractions Through Useful Real World Concepts**
Presented by: Sheri Disbrow, Lake Local Schools – **Ballroom 3**
- A4 **Edible Models for the Compositional and Physical Layers of the Earth**
Presented by: Christopher Tanner, Bowling Green State University & Lisa O'Leary, Springfield Middle School – **Ballroom 4**
- A5 **180 Days of Fun!**
Presented by: Bob Stover, Calvert High School – **Waterford**
- A6 **Repeat Those Directions, Please!**
Presented by: James Schmidt, The University of Findlay – **Owens**
- A7 **Soil is More Than Dirt**
Presented by: Jamie Kochensparger, Lucas Soil and Water Conservation District – **Wedgewood**
- A8 **Maple Sugaring: A World of H₂O Properties and Seasonal Change**
Presented by: Sandra Stutzenstein, The University of Toledo Stranahan Arboretum – **Room 1116**
- A9 **Project ASTER - Active Science Teaching Encourages Reform: Collaborative Effort among BGSU, UT and COSI Toledo.**
Presented by: Betsy Hood, COSI & Tammy Conlan and Julie Buehrer, Shoreland Elementary – **Room 1120**

SESSION B (9:40 am - 10:30 am)

- B1 **Teamwork & Problem Solving - From the Classroom to Space**
Presented by: Reed Steele, Challenger Learning Center of Lucas County – **Ballroom 1**
- B2 **Northwest Ohio GLOBE Program**
Presented by: Jodi Haney & Jessica Belcher, Bowling Green State University – **Steuben**
- B3 **Mathematical Language: How It All Adds Up**
Presented by: Cherie Hunter, Monroe County Intermediate School District – **Ballroom 3**
- B4 **Fruit DNA Extraction**
Presented by: Tamara Trouts, Bowling Green State University & Mary Potter, Elmwood High School – **Room 1120**
- B5 **The Field Trip that Comes to You**
Presented by: Maureen Schell, Eco Discovery – **Waterford**
- B6 **Preparing 9th Grade Science Students for the OGT**
Presented by: Ann Hajibrahim, Central Catholic High School – **Owens**
- B7 **Toys in Cereal Boxes**
Presented by: Tim Jacobbe, Bowling Green State University – **Wedgewood**
- B8 **On-line Courses for a Master of Science and Education**
Presented by: Eric Dubrul, The University of Toledo – **Room 1116**
- B9 **Faculty Workshop - Using Inquiry-Based Learning in YOUR Classroom**
Presented by: Scott V. Franklin, Rochester Institute of Technology – **Ballroom 4**



CANCELLED

T

oday at a glance cont.



SESSION C (10:40 am - 11:30 am)

- C1 **Backwards Design**
Presented by: Janet Struble, The University of Toledo – **Ballroom 1**
- C2 **Fun with Fractions**
Presented by: Janet Emerine, Bowling Green State University – **Steuben**
- C3 **Making the Math and Literature Connection**
Presented by: Nickie Myerholtz, Walbridge Elementary/Lake Local Schools – **Ballroom 3**
- C4 **Looking for Algebraic Thinking in Unexpected Places**
Presented by: Debra Johanning, The University of Toledo – **Ballroom 2**
- C5 **Erosion on Mars**
Presented by: Matthew Steele, Bowling Green State University & Hans Glandorff, Bowling Green High School – **Room 1120**
- C6 **Using “Wild M&M Candies” to Demonstrate Random Sampling Technique**
Presented by: Kimberly Keller, Bowling Green State University – **Waterford**
- C7 **Using an Educational Game to Motivate Students and Improve the Academic Achievement of Sixth Grade Science Students**
Presented by: Andrea Milner, The University of Toledo – **Owens**
- C8 **Radiation Experiments With a Free Geiger Counter (continued in Session D)**
Presented by: Larry Grime and Dave Briden, American Nuclear Society – **Ballroom 4**
- C9 **Faculty Workshop - Biology Inquiry with Invertebrates**
Presented by: Charlie Drewes, Iowa State University – **Wedgewood**

SESSION D (11:40 am - 12:30 pm)

- D1 **Summer Camp: Adventures in Biology**
Presented by: Brenda Leady, The University of Toledo – **Ballroom 1**
- D2 **Mathematics From Our Past**
Presented by: George Shirk, The University of Toledo – **Steuben**
- D3 **The JASON Project**
Presented by: Betsy Fried, Toledo-Lucas County Public Library – **Room 1116**
- D4 **Mapping your Science Curriculum to the Ohio Academic Content Standards**
Presented by: Mark Templin, The University of Toledo – **Ballroom 2**
- D5 **Demonstrating Statistics Using Hands-On Activities**
Presented by: Tim Moran, Bowling Green State University – **Waterford**
- D6 **Curiosities for Curious Kids**
Presented by: Ray Heitger, Bowling Green State University – **Ballroom 3**
- D7 **aspexTabsMST 3D Design & Mathematics**
Presented by: Olaf Trunzer, The Knowledge Tree, Inc. – **Owens**
- D8 **Radiation Experiments With a Free Geiger Counter (continued from Session C)**
Presented by: Larry Grime and Dave Briden, American Nuclear Society – **Ballroom 4**
- D9 **Faculty Workshop – Teaching Mathematics Via Inquiry Strategies**
Presented by: Richard Little, Bowling Green State University – **Wedgewood**





SESSION A (8:40 - 9:30 am)

Geology and Simulated Space Missions

A1

Your students can become interplanetary geologists as they study rock samples, conduct investigations, and compare the samples to “Mars” samples. Come join the staff of the Challenger Learning Center for this exciting in class simulation. Then learn more about how to involve your students in the Challenger Learning Center mission experience.

Presented by: Julie Muffler, Challenger Learning Center of Lucas County

Content: Math & Science *Grade Levels:* 5-8 *Room:* Ballroom 1

Earth Counts: Connecting Math With Ecology and Human Geography

A2

Discover interdisciplinary, hands-on activities that use measurement, data analysis, problem solving and representation to make sense of global population and resource consumption trends. Free activity CD!

Presented by: Debra Shelt, Bowling Green State University

Content: Math & Science *Grade Levels:* 5-8 *Room:* Steuben

Connecting Percentages and Fractions Through Useful Real World Concepts

A3

During this session you will explore fractions, percentages, and part to whole relationships through a conceptually based approach; connect parts of time to parts of wholes in different units of measurement; and leave with a lesson and new perspectives to approach teaching with fractions.

Presented by: Sheri Disbrow, Lake Local Schools

Content: Mathematics *Grade Levels:* 2-5 *Room:* Ballroom 3

Edible Models for the Compositional and Physical Layers of the Earth

A4

This activity is a fun (and tasty) way for teachers to help their students differentiate between the compositional layers of the Earth and the physical layers of the Earth. ALLERGY WARNING: Peanuts and peanut butter are used in this activity.

Presented by: Christopher Tanner, Bowling Green State University &
Lisa O’Leary, Springfield Middle School

Content: Science *Grade Levels:* 8-12 *Room:* Ballroom 4





180 Days of Fun!

A5

How long is the banana? 28 years of collecting math “gems”. Come on in and have a great day with “Poems and Prayers and Math Problems”.

Presented by: Bob Stover, Calvert High School

Content: Mathematics

Grade Levels: 8-13

Room: Waterford

Repeat Those Directions, Please!

A6

This presentation includes activities suitable for beginning or supplementing a mathematics lesson.

Presented by: James Schmidt, The University of Findlay

Content: Mathematics

Grade Levels: 5-16

Room: Owens

Soil is More Than Dirt

A7

Hands-on activities for elementary students on rocks, minerals, soils, worms, and composting. Participants will take home their own mini-worm bins, soil horizons, cupcake geology, worm puppets, soil buddies, worksheets, and more!

Presented by: Jamie Kochensparger, Lucas Soil and Water Conservation District

Content: Science

Grade Levels: K-8

Room: Wedgewood

Maple Sugaring: A World of H₂O Properties and Seasonal Change

A8

Participants will take home activities on how water properties and seasonal change allow trees to begin to break their winter dormancy and pull water up into the highest branches. Other activities in plant function and history included as well. Information shared on in-class activities or field trips available. First 10 registrants will receive Maple Fest mug & free ticket for 2005 Maple Sugaring Festival held April 2 & 3.

Presented by: Sandra Stutzenstein, The University of Toledo Stranahan Arboretum

Content: Science

Grade Levels: K-12

Room: 1116

Project ASTER - Active Science Teaching Encourages Reform: Collaborative Effort among BGSU, UT and COSI Toledo.

A9

How can teachers structure classroom field trips? Learn from a group of K-3 teachers that designed inquiry-based lessons that align to COSI programs. Hands-on activities & lessons will demonstrate how inquiry-based strategies can be integrated into science teaching.

Presented by: Betsy Hood, COSI & Tammy Conlan and Julie Buehrer, Shoreland Elementary

Content: Science

Grade Levels: K-3

Room: 1120





SESSION B (9:40 - 10:30 am)

Teamwork & Problem Solving - From the Classroom to Space

B1

This workshop uses a series of hands-on/minds-on activities to bolster students' skills in teamwork, creative problem solving, communication, and decision making skills. Using space as a theme, learn life skills as well as math and science practices.

Presented by: Reed Steele, Challenger Learning Center of Lucas County

Content: Science

Grade Levels: 4-12

Room: Ballroom 1

Northwest Ohio GLOBE Program

B2

GLOBE is a K-16 environmental education program that provides opportunities for students and teachers from over 14,000 schools in over 100 countries to collect and share environmental data with one another and with scientists who use these data for their research. Come see how you can get involved in this standards-based and REAL WORLD program!

Presented by: Jodi Haney & Jessica Belcher, Bowling Green State University

Content: Math & Science

Grade Levels: 4-12

Room: Steuben

Mathematical Language: How It All Adds Up

B3

This session will focus on using children's literature as a tool to introduce mathematical language and the power to communicate mathematically. Participants will be actively engaged using traditional and non-traditional manipulatives. Hand-outs will be provided.

Presented by: Cherie Hunter, Monroe County Intermediate School District

Content: Mathematics

Grade Levels: K-5

Room: Ballroom 3

Fruit DNA Extraction

B4

This presentation will be an interactive lab exercise in which participants will extract DNA from kiwi fruits.

Presented by: Tamara Trouts, Bowling Green State University & Mary Potter, Elmwood High School

Content: Science

Grade Levels: 11-12

Room: 1120

Content: Science

Grade Levels: All

Room: Waterford





The Field Trip that Comes to You

B5

Eco-Discovery! will bring environmental and history programs to you, complete with hands-on experiences! Learn more in this session with Eco-Discovery!

Presented by: Maureen Schell, Eco-Discovery

Content: Science

Grade Levels: All

Room: Waterford

Preparing 9th Grade Science Students for the OGT

B6

Methods used in the classroom to prepare 9th grade science students for the OGT will be discussed. Sample test questions, hands-on activities, and writing development exercises will be presented.

Presented by: Ann Hajibrahim, Central Catholic High School

Content: Science

Grade Levels: 9

Room: Owens

Toys in Cereal Boxes

B7

Sugary cereals will often offer a set of six (or so) toys in the package. The question is: How many boxes will you have to buy to get at least one of each toy?

Presented by: Tim Jacobbe, Bowling Green State University

Content: Mathematics

Grade Levels: 4-6

Room: Wedgewood

On-line Courses for a Master of Science and Education

B8

This presentation will demonstrate samples of on-line graduate science courses that have been developed for K-12 teachers. The courses are interactive, hands-on courses that reflect the 5E learning methodology. We will explain how to complete Master in Science and Education degree from the University of Toledo can be earned "any time any where" via distance learning.

Presented by: Ernie DuBrul, The University of Toledo

Content: Science

Grade Levels: All

Room: 1116

Faculty Workshop - Using Inquiry-Based Learning in YOUR Classroom

B9

I will discuss how to incorporate the fundamental principles of inquiry-based pedagogy into different classroom environments. Examples from physics curricula will serve as a starting point to how these techniques can be applied to different topics.

Presented by: Scott V. Franklin, Rochester Institute of Technology

Content: Science

Grade Levels: HS-College

Room: Ballroom 4





SESSION C (10:40 - 11:30 am)

Backwards Design

C1

What is it? Experience a new twist to planning science lessons that help students achieved the grade level indicators in the Science Academic Content Standards. Become familiar with the lesson template and lessons on ODE website.

Presented by: Janet Struble, The University of Toledo

Content: Science

Grade Levels: All

Room: Ballroom 1

Fun with Fractions

C2

We'll have fun with fractions! Lots of activities to take back to your classroom and use on Monday, Tuesday... If this is a topic you're not comfortable with, this is the session for you!

Presented by: Janet Emerine, Bowling Green State University

Content: Mathematics

Grade Levels: 4-6

Room: Steuben

Making the Math and Literature Connection

C3

This session will show ways and ideas on how to connect picture books to math activities.

Presented by: Nickie Myerholtz, Walbridge Elementary/Lake Local Schools

Content: Mathematics

Grade Levels: K-3

Room: Ballroom 3

Looking for Algebraic Thinking in Unexpected Places

C4

This session will explore ways in which middle school students' informal problem solving strategies can provide opportunities for supporting the transition from arithmetic to algebra. Bring your thinking caps as we work on a few problems ourselves and then look for potential in the work of middle school students!

Presented by: Debra Johannig, The University of Toledo

Content: Mathematics

Grade Levels: 6-8

Room: Ballroom 2

Erosion on Mars

C5

Students become planetary scientists in this inquiry-based lesson on mechanical erosion processes. The students use a simulated Martian surface and familiar terrestrial erosion processes in order to explain real images of Mars.

Presented by: Matthew Steele, Bowling Green State University

Content: Science

Grade Levels: 4-6

Room: 1120





Using “Wild M&M Candies” to Demonstrate Random Sampling Technique

C6

Random sampling activity where participants generate various random sample sizes and calculate estimated population sizes. Comparison to actual population size incorporates practical use of formulas; data analysis demonstrates the correlation between sample size and error.

Presented by: Kimberly Keller, Bowling Green State University &
Hans Glandorff, Bowling Green High School

Content: Math & Science *Grade Levels:* 10 *Room:* Waterford

Using an Educational Game to Motivate Students and Improve the Academic Achievement of Sixth Grade Science Students

C7

Motivation is one critical facet of an intermediate science student’s success in education. The “Great Lakes Game” is a cumulative across units science review board game developed by this author that is specifically designed to motivate students and improve the academic achievement of 6th grade science students in the Toledo Public School System as measured by the Ohio 6th Grade Science Proficiency Test.

Presented by: Andrea Milner, The University of Toledo

Content: Science *Grade Levels:* 4-6 *Room:* Owens

Radiation Experiments With a Free Geiger Counter (continued in Session D)

C8

Session I: Learn about radiation and how to do classroom experiments using the free Geiger counter you will receive. Session II: A highly recommended follow-up workshop where you will do experiments with your Geiger counter. Also receive a CD-ROM with lesson plans, PowerPoint slides, numerous experiments and reference material.

Presented by: Larry Grime and Dave Briden, American Nuclear Society

Content: Science *Grade Levels:* 5-12 *Room:* Ballroom 4

Faculty Workshop- Biology Inquiry with Invertebrates

C9

Learn about new materials and approaches for student inquiry in organism-level, laboratory biology. Specific examples will include 1) Open-ended, quantitative investigations of Artemia (brine shrimp) development, and 2) computational and interactive analyses of invertebrate biomechanics (e.g., locomotion, circulation, cell movement).

Presented by: Charlie Drewes, Iowa State University

Content: Science *Grade Levels:* HS-College *Room:* Wedgewood





SESSION D (11:40 am - 12:30 pm)

Summer Camp: Adventures in Biology

D1

Overview of summer camps presented by UT Biological Sciences and SciMaTEC. Future plans for expanding the camps. Groups can also tailor a camp to their needs.

Presented by: Brenda Leady, The University of Toledo

Content: Science

Grade Levels: K-12

Room: Ballroom 1

Mathematics From Our Past

D2

Exploration of archaic mathematics. What are vulgar fractions? Would you rather have a gallon of beer or a gallon of wine?

Presented by: George Shirk, The University of Toledo

Content: Mathematics

Grade Levels: 6-12

Room: Steuben

The JASON Project

D3

The Jason Project combines scientific expeditions, standards-based curriculum and professional development to help teachers bring science to their classroom.

Presented by: Betsy Fried, Toledo-Lucas County Public Library

Content: Math & Science

Grade Levels: 4-9

Room: 1116

Mapping your Science Curriculum to the Ohio Academic Content Standards

D4

How does your present science curriculum align to the Ohio Academic Standards? Experience the process of mapping your curriculum to the Ohio Standards.

Presented by: Mark Templin, The University of Toledo

Content: Science

Grade Levels: K-12

Room: Ballroom 2

Demonstrating Statistics Using Hands-On Activities

D5

Activities using beans and coins illustrate the concepts of standard deviation and exponential decay. The lessons emphasize the surprising result that random events can be understood, especially if large numbers of events are considered.

Presented by: Tim Moran, Bowling Green State University

Content: Math & Science

Grade Levels: 7-12

Room: Waterford



Curiosities for Curious Kids

D6

A few intriguing historical tidbits you can leave as “open questions” for the curious students in your classroom. We will also look at some very interesting related web sites.

Presented by: Ray Heitger, Bowling Green State University.

Content: Mathematics *Grade Levels:* 11-College *Room:* Ballroom 3

aspexTabsMST 3D Design & Mathematics

D7

aspexTabsMST leads students from the abstract of designing 3-D models on the computer to the concrete of printing out the NETS and building the physical three-dimensional models. Enhances special awareness and manipulation of 3-D designs on a 2-dimensional screen.

Presented by: Olaf Trunzer, The Knowledge Tree, Inc.

Content: Science, Math, Technology *Grade Levels:* 3-12 *Room:* Owens

Radiation Experiments With a Free Geiger Counter (continued from Session C)

D8

Session I: Learn about radiation and how to do classroom experiments using the free Geiger counter you will receive. Session II: A highly recommended follow-up workshop where you will do experiments with your Geiger counter. Also receive a CD-ROM with lesson plans, PowerPoint slides, numerous experiments and reference material.

Presented by: Larry Grime and Dave Briden, American Nuclear Society

Content: Science *Grade Levels:* 5-12 *Room:* Ballroom 4

Faculty Workshop – Teaching Mathematics Via Inquiry Strategies

D9

We will explore 4 to 6 problems, the solutions of which lend themselves to inquiry procedures, and which can be solved in various ways, at various grade levels. Some probability, some geometry with an epsilon amount of calculus thrown in for enjoyment.

Presented by: Richard Little, Bowling Green State University

Content: Mathematics *Grade Levels:* 8-College *Room:* Wedgewood

* **Special Follow-up Session:** Roundtable Discussion on *Using Inquiry in Higher Education Math & Science Courses*. Only symposium participants who attended at least one of the faculty sessions (B9, C9, D9) and registered for lunch online can attend. Lunch will be provided in Crystal's.





P resenters

Jessica Belcher, Bowling Green State University

Dave Briden, American Nuclear Society

Julie Buehrer, Shoreland Elementary

Tammy Conlan, Shoreland Elementary

Sheri Disbrow, Lake Local Schools

Charlie Drewes, Iowa State University

Ernie DuBrul, The University of Toledo

Janet Emerine, Bowling Green State University

Scott V. Franklin, Rochester Institute of Technology

Betsy Fried, Toledo-Lucas County Public Library

Hans Glandorff, Bowling Green High School

Larry Grime, American Nuclear Society

Ann Hajibrahim, Central Catholic High School

Jodi Haney, Bowling Green State University

Ray Heitger, Bowling Green State University

Betsy Hood, COSI

Cherie Hunter, Monroe County Intermediate School District

Tim Jacobbe, Bowling Green State University

Debra Johanning, The University of Toledo

Kimberly Keller, Bowling Green State University

Jamie Kochensparger, Lucas Soil and Water Conservation District

Brenda Leady, The University of Toledo

Richard Little, Bowling Green State University

Andrea Milner, The University of Toledo

Tim Moran, Bowling Green State University

Julie Muffler, Challenger Learning Center of Lucas County

Nickie Myerholtz, Walbridge Elementary/Lake Local Schools

Maureen Schell, Eco Discovery

Lisa O'Leary, Springfield Middle School

Mary Potter, Elmwood High School

James Schmidt, The University of Findlay

Debra Shelt, Bowling Green State University

George Shirk, The University of Toledo

Reed Steele, Challenger Learning Center of Lucas County

Matthew Steele, Bowling Green State University

Bob Stover, Calvert High School

Janet Struble, The University of Toledo

Sandra Stutzenstein, The University of Toledo Stranahan Arboretum

Christopher Tanner, Bowling Green State University

Mark Templin, The University of Toledo

Tamara Trouts, Bowling Green State University

Olaf Trunzer, The Knowledge Tree, Inc.



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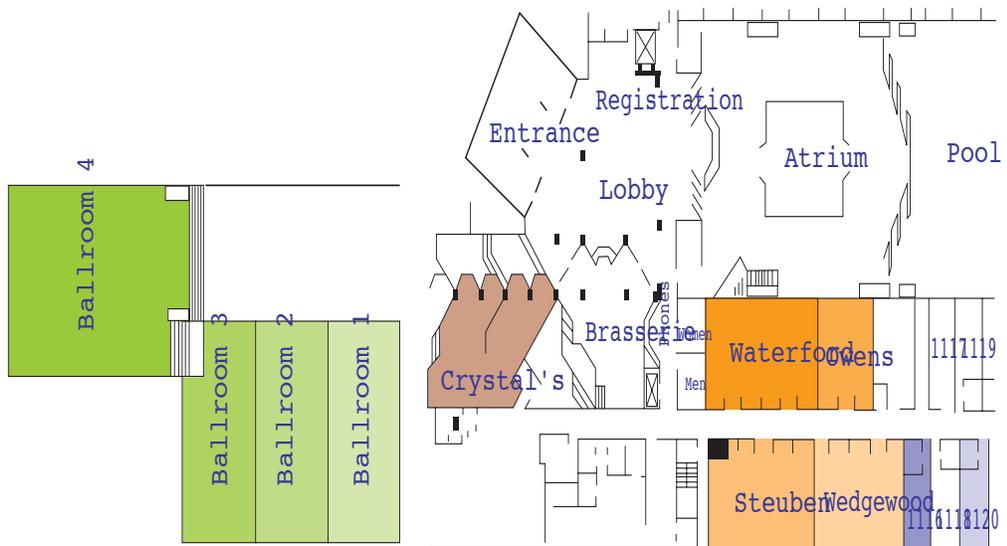
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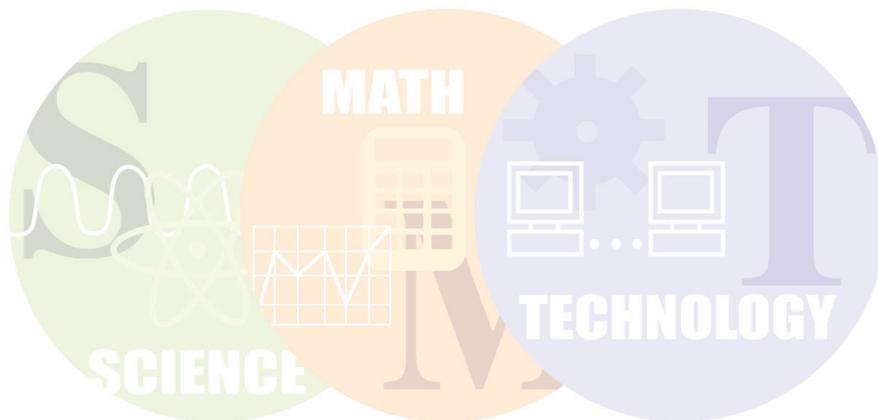




Clarion hotel floor plan

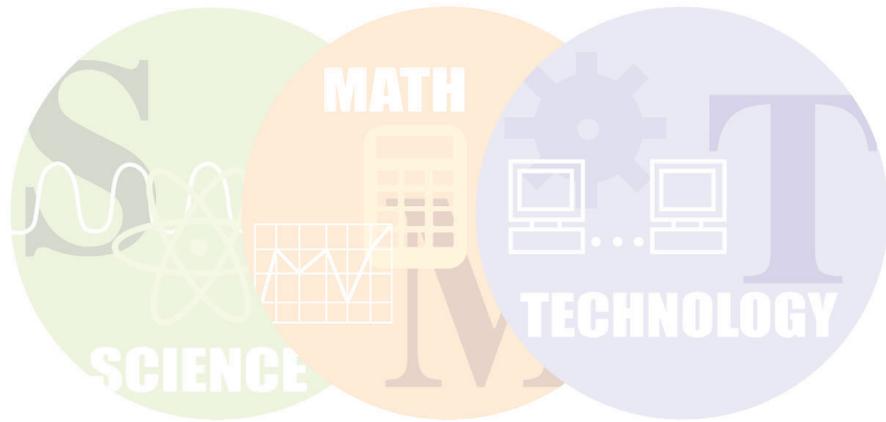


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