

Math and Science Partnership of Greater Philadelphia

Lehigh Valley Group

Issue 1

MSPGP People and Activities

Math Faculty Symposium

Seventeen secondary teachers and college faculty attended the second Lehigh Valley Mathematics Symposium at held at Saucon Valley High School on January 26. The event was co-convened by **Dan Waller and Lisa Allen, Saucon Valley High School and Ned Schillow, Lehigh Carbon Community College**. The symposium focused on best practices. Who else but mathematicians could share activities involving Batmobiles, bungee Barbie, cans leaking water, cucumbers drying in the heat and cubes having their sides painted? In other words, we looked at teaching ideas, problems and investigations, and spent some time discussing how to make room for such hands-on, open ended activities while trying to cover a curriculum that already fills the calendar. The next symposium will be held in early April. Contact Ned Schillow at nschillow@lccc.edu for details.

Lehigh Valley American Chemical Society

The **Da Vinci Center** was very pleased to welcome the Lehigh Valley Chapter of the American Chemical Society to our facility on January 24th. A number of chemists from MSPGP partners were in attendance.

NASA Explorer Team at Harrison Morton Middle School

Harrison Morton Middle School in Allentown welcomed astronaut Paul Richards, veteran of STS-102 on January 20th. Local dignitaries in attendance included Lehigh Valley Representative, Hon. Charles Dent. Harrison Morton MS was chosen as this year's NASA Explorer School from Pennsylvania, a collaboration that will continue for three years. A team of students from the school also helped the **Da Vinci Center** unveil a new Hubble Space Telescope image of the Orion Nebula on January 11, and were featured in a photo in the Morning Call. Anyone interested in working with the school on space-related topics should contact the head of the school's NASA Explorer team, **Jennifer Walz**, walzi@allentownsd.org. The school is also developing a Mars landscape and robotics project in collaboration with Lehigh University and under the leadership of technology teacher **Don Stahl**, stahld@allentownsd.org.

Formative Assessment Workshop

Twenty secondary teachers and college faculty from MSPGP partners are participating in a five month long workshop on formative assessment. This workshop is being led by **Dylan Wiliam, Educational Testing Service**, author of "Assessment for Learning: Putting it into Practice" and "Working Inside the Black Box". Each participant will collaborate on the development of strategies for using formative assessment practices in the classroom. Participants include faculty from **Allentown School District, Bethlehem Area School District, Cedar Crest College, Lehigh Community College, Muhlenberg College, Northampton Area School District, and Northampton Community College**.

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Ben Salem High School Teachers and MSP College Faculty Develop Interdisciplinary Science Curriculum

A team of science teachers from Ben Salem High School and MSPGP college faculty are developing an interdisciplinary 9th grade curriculum called "*Science Through Inquiry*" which centers around the science of energy. The curriculum includes three units; (1) What happens when animals and non-living things "use" energy?, (2) How is energy obtained by living and non-living things? and (3) What are the consequences of using and obtaining energy?. Among the concepts explored are the conservation of energy, the transformation of energy, the relationship between energy and work, fossils fuels, energy flow within an ecosystem, and the environmental impact of fossil fuel exploration and use. The team includes **Ben Salem High School** teachers **Jerry Weiner, Kate Gallagher, Eileen Mika, Doug Hansbury, and Dan Shuchat** along with **Deborah Pomeroy and Manny Curotto, Arcadia University, Stefan Samulewicz, LaSalle University, Mary Byrne, Muhlenberg College and Donna Cleland, MSPGP.**

MSPGP Planning Math and Science Education Research Conference

The MSPGP First Annual Math and Science Education Research Conference will be held on March 25 at **Bryn Mawr College**. This conference is a gathering of all who care about the teaching of science and mathematics in the Greater Philadelphia area. This conference is for secondary teachers and administrators and higher education faculty members in the sciences, mathematics and related teacher education programs. While this conference seeks to bring together and support STEM educators at all levels to share strategies, successes, and struggles it is also designed to help all participants begin to articulate researchable questions and identify appropriate research strategies so that their experiences can be transformed into a body of valuable research for others to draw upon.

Morning sessions will include panel discussions on the use innovative teaching techniques such as formative assessment, inquiry, POGIL, service learning, differential instruction and new course design. The panels will be a mixture of secondary teachers and college professors who have used similar techniques successfully in their classrooms. There will also be a poster session on innovative teaching and higher education initiatives to increase and improve pre-service teacher training.

The afternoon is devoted to learning various approaches used to research the effectiveness of using innovative techniques in the classroom. The keynote speaker will be **Dr. Sharon Ravitch, Arcadia University**, known nationally for her work in practitioner research and action research. Her talk will include the use of qualitative and quantitative research in education. Concurrent afternoon sessions will allow participants to examine education research publications for the key elements addressed in Dr Ravitch's talk and explore how to ask good research questions to analyze their own classroom practices. Proceedings of this conference will be published on the MSPGP website. For more information about this conference go to www.mspgp.org.

Spectroscopy Across the Sciences

On February 9, 16 teachers from the Lehigh Valley and MSPGP college faculty joined **Carl Slater, Moravian College**, in a workshop about the use of spectroscopy in the science classroom. Carl demonstrated a number of ways spectroscopy can be used to teach basic science principles in chemistry, physics and biology. This event was hosted by **Beth Guarriella at Liberty High School**. The spectrometers used in this workshop are available on loan to teachers from Carl. If you would like more information about this topic and the spectrometer loan program contact Carl at csalter@moravian.edu.

Summer Workshops

As last summer, the **MSPGP** will offer a number of professional development workshops in math and science teaching. For a complete list and description of these courses go to www.mspgp.org.

Governor's Urban Academy

The Governor's Academy for Urban Education provides educators in grades K-8 an intensive, rigorous professional learning opportunity designed to improve teaching and learning in Pennsylvania's urban classrooms. The goals of this Academy include: (1) to provide teachers and administrators with strategies for effective ways for coping with educational issues in schools, especially those schools in urban settings; (2) to enable participants to gain specific knowledge of how to assist students to read critically in mathematics and science content areas, to analyze and interpret literature, and to improve the quality of their reading and writing skills; and (3) to develop and strengthen participants' ability to maximize the effective use of mathematics and technology resources, such as calculators, high-quality Internet web sites to supplement classroom instruction, and computer software. **Muhlenberg College** will again host the Governor's Academy, June 24-29, 2006. For more information about the Governor's Urban Academy go to www.pa-academy.org/gua.

Innovative Teaching

Using Formative Assessment Grading Practices

Jackie Clymer, Quakertown Community School District

Have you ever been frustrated by issuing a student a higher grade than you thought their level of understanding warranted? These students have a terrific work ethic. They work hard, do extra work, add glitter to every project, and do what ever it takes to get their total points high enough to earn that good grade without truly understanding the content! Of course the inverse is true as well. Students have failed because they have not done the required work, yet they can pass the tests. Formative assessment can change all of that!

The key is to change your focus from the accumulation of points and averages to proving mastery of content. I started the year by introducing the “Traffic Light Scoring” system where students complete classroom assessments in the form of homework, labs, conclusion, graphic organizers, performance assessments, and written response for my review. I examine them for evidence of mastery in predetermined content/skill areas. I provide specific written feedback aimed at improving student achievement. If a score is recorded on a paper, it is a “+”, “=”, or “-“. A “+” is issued for work that is better than work the student has produced in the past. An “=” is issued for work that is equal to what they have done in the past and a “-“ is work that is unacceptable or not as good as what they have done in the past.

These classroom assessments are used to rate the students’ level of mastery based on the rubric below. How the students are doing at the end of the marking period is valued more than how they did on assignments at the introduction of a topic. The students are expected to improve from my instruction, not to arrive already knowing the content. Therefore, how they are doing at the end of a marking period is a better measure of their level of understanding than an average of their work. At the end of unit, a test is given to verify students’ level of mastery in each of the identified content/skill areas. If a discrepancy appears between the classroom assessment ratings and their achievement on the test, the students are interviewed on the specific skills for which they revealed a deficit. Students are provided additional practice and opportunities to learn this material. Conversely, if a student does better than expected, their rating is adjusted accordingly. Portfolios are also used as an avenue to provide evidence of mastery. My students need to master 90% of the content in order to earn an A.

An unexpected outcome was the change in my classroom atmosphere. My students have always been actively involved; but now they are engaged. All students are involved in conversations. All students ask for clarification to ensure their personal understanding. All students have taken responsibility for their own learning!

Green (Mastery)	The student consistently meets and often exceeds the content standard. The student, with relative ease, grasps, applies, and extends the key concepts, processes, and skills for the grade level.
Yellow (Developing)	The student regularly meets the content standard. The student, with limited errors, grasps and applies the key concepts, processes, and skills for the grade level.
Red (Beginning or below basic)	The student is beginning to, and occasionally does, meet the content standards or the student is not meeting the content standards. The student is beginning to grasp and apply the key concepts, processes, and skills for the grade level but produces work that contains many errors.

Collaborative Student Activities

Sharon Lee-Bond and Pam Tabery, Northampton Community College

Sharon Lee-Bond and Pam Tabery, Northampton Community College, presented a workshop at the National Association of Biology Teachers (NABT) national convention that highlighted a variety of collaborative student activities. These materials which increase student learning and involvement included a) problem-based learning, b) POGIL (Process Oriented Guided Inquiry Learning) and c) role playing of bioethical issues. Using these methods, biology students (both majors and non-majors) are actively engaged in the learning process by working in collaborative groups that are presented various types of problems that require critical thinking and communicative skills.

Problem based learning (PBL) is utilized as an introduction to certain scientific principles, such as the scientific method and the characteristics of life. Students research available resources and then share the attained information/data with their group, who then try to reach a consensus. POGIL activities that they developed under the MSPGP grant cover process-oriented topics, such as osmosis, protein synthesis and genetic problems. Students are presented models (diagrams) and their inquiry is guided by a series of questions related to the models. The POGIL activities are designed to allow students to discover basic principles and related terms. In the third method students research and portray roles from numerous bioethical issues such as eco-tourism, genetic engineering and fetal tissue research. The student audience (non-presenters) must respond and defend their answers to controversial questions using information and data they have gleaned from the talks.

If any teachers are interested in hearing about and receiving a copy of these materials (40 pages) please e-mail Sharon = slee-bond@northampton.edu or Pam = ptabery@northampton.edu and we will find a time to present the materials at a Lehigh Valley science symposium or discussion group.

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The Math and Science partnership of Greater Philadelphia is an National Science Foundation funded research grant whose aim is to improve student access to, and achievement in, challenging and advanced courses in mathematics and science; to improve the quality, quantity, and diversity of the teacher workforce through cultivation and professional development; and to understand, through research, how to effectively perform those tasks.

For more information about the Math and Science Partnership of Greater Philadelphia go to www.mspgp.org

Upcoming Events

Brain Awareness Day — March 18, 2006

Brain Awareness Day is designed to promote public awareness of the functions of the central nervous system as well as current advances in brain and spinal cord research. This program will provide hands-on activities for children (K-8) and their families. Students studying neuroscience at Moravian, Muhlenberg and Cedar Crest Colleges will join their professors in the implementation of the activities. This event will be held at the Da Vinci Center on March 16, 10-4. Middle school teachers of the Lehigh Valley are invited to participate in the day's events. Packets of information about hands-on activities for use in the classroom are available. Contact Cecilia Fox, Moravian College at cfox@moravian.edu.

First Annual MSPGP Research Conference—March 25

See page two for information about this research conference on science and math education.

Math Symposia — April 6, 2006

The next Math Symposium will be held at Muhlenberg College on April 6 from 4:30-6:30. The conveners are Christa Wolak, Raub Middle School and Ned Schillow, Lehigh Carbon Community College. For information contact Ned at nschillow@lccc.edu.

Sciences, Math and Related Technologies (SMART) Career Workshop— April 16, 2006

SMART is a one day workshop with hands-on interactive presentations from area faculty and college students and industry scientists and . This workshop is intended for middle school girls and their parents. This event will be held at Northampton Community College on April 16 from. For more information contact Barbara Canfield at bcanfield@northampton.edu.

For more information about all of these events go to www.muhlenberg.edu/mspgply/

Topics for Professional Development

Science and math faculty from MSPGP partners have developed a number of professional development courses that can be used for secondary teachers. These courses are free to MSPGP partner districts and can be presented for teacher in-service. The following is a list of course titles. A complete description of each course and contact information can be found on www.muhlenberg.edu/mspgplv/. Please contact the individual faculty members if you are interested in scheduling any of these courses.

1. ***Biotechnology I and II***, (1.5 hours each) Amy Hark, Muhlenberg College
2. ***Teaching Freshman Biology: Skills College Professors wish their Students Had***, (45 minutes) Erika Iyengar, Muhlenberg College
3. ***Aquatic Biology in your Backyard***, (three 3 hours sessions) Erika Iyengar, Muhlenberg College
4. ***Marine Biology in Action***, (1.5 hours) Erika Iyengar, Muhlenberg College
5. ***Current Controversies in Evolution***, (3 hours) Erika Iyengar, Muhlenberg College
6. ***Bugs, Slugs and other Cool Creeping Crawlers***, (3 hours) Erika Iyengar, Muhlenberg College
7. ***The Amazing Brain***, (3 hours) Cecilia Fox, Moravian College
8. ***Teaching Evolution***, (6 hours) Frank Kuserk, Moravian College
9. ***Ethics and Reproductive Biotechnology***, (3 hours) Karen Kurvink, Moravian College
10. ***Vertebrate Comparative Anatomy***, (3 hours) Mary Byrne, Muhlenberg College
11. ***Nature of Inquiry***, (3 hours) Mary Byrne, Muhlenberg College
12. ***Critical Thinking and Role Playing of Bioethical Issues***, (1.5 hours) Pam Tabery, Northampton Community College
13. ***Using POGIL to Teach Chemistry***, Liz Smith, Northampton Community College
14. ***Using the Geometer's Sketchpad in the Classroom***, (3 hours) Doris Schattschneider, Moravian College
15. ***The Geometers Sketchpad for Mathematics Teaching/Research***, (3 hours) Doris Schattschneider, Moravian College
16. ***Fractals in the Classroom***, (3 hours) Michael Fraboni, Moravian College and Trisha Moller, DeSales University
17. ***An Introduction to Linux and Open Source***, Stephen Corbesero, Moravian College