

**Bringing Math and Science Together
– a workshop for middle school
teachers**

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Delaware Space Grant Consortium

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Meeting

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Summary

- What we did and (briefly) how it came about
- Did it work? Most spectacular example of follow up activities of any workshop I have ever done
- Did it work? Teacher responses to our standard DESGC questionnaire

What We Did

- Early “planning” conversations several years ago suggested that it might be a way go to
- Separate statewide curriculum planning in both science and math led to K-8 consensus in both areas
- Trial run presentations for MASST (statewide Math and Science Specialist Team) led to joint planning by Jon Manon (math faculty development specialist at UD) and Shipman (astronomer with long experience in working with public K-12 school teachers)
- Fall 2008: Encouragement and funding from Delaware SG program led us to go ahead

The summer 2009 workshop

- Planned by Jon Manon and Harry Shipman, our consensus led to:
- Individual workshops by the two of us
- Joint workshops by Valerie Bergeron and Kim Gregor, two instructors at Delaware Technical and Community College, who have taught a joint math-chemistry developmental course for several years
- 26 participants from all around the state, nearly half from one school district

Workshop Goals

- We sought participants who could form a math + science team within a school or school district
- For the most part we were successful; wildly so in one district (Brandywine)
- We allotted time for the teams to work together on projects, which would continue, and have continued, into the fall.....

For example: the seasons

- Can ANYONE come up with something new about seasons? Surprisingly, yes.
- A suggestion by Jon Sypher of Springer Middle School: Use layers of modeling clay to teach the concept of light concentration
- Used in the 8th grade curriculum. A test at college level showed that specifically using clay improved students' understanding of

Light Concentration: a key concept

- Part of many people's pre-instruction explanations of the seasons is that the tilt of the earth's axis brings part of the earth closer to the sun.
- I never understood why people said this until one workshop with elementary teachers.
- Teachers are searching for a mechanism to connect the tilt of the axis with seasons, and this is one that makes sense to them.

Pre-service elementary teachers, Spring 2009, including the clay

- PRE: 7/49 (14%) gave acceptable explanations.
2 mentioned light concentration (one with a completely incorrect explanation!)
- POST: 44/49 (90%) gave acceptable explanations of why seasons happen.
14/49 (28%) mentioned light concentration

Did it work?

- All participants said they would engage in follow up activities, and for many participants I know this is happening
- A request from one participants to earn graduate credit for this workshop mushroomed into a course, specifically for the Brandywine School District, with 11 student participants
- Two participants working together will lead to a masters' thesis for one of them at Wilmington University; Shipman is on her thesis committee

Did it work? Questionnaire results

“Loved the workshop. I leave very excited to integrate math and science using specific units and lessons.”

[an example of an activity I will use is] “NASA activity of scale model of planets etc. in the solar system.”

“Outstanding.”

“Ratios, M+M’s, Eraser activity, Cylinder activity—
Great Math.”

- “Using density examples in math class while teaching density in ‘Properties of Matter’ in science class.”
- “great – more informative than I expected.”
- “super-worthwhile.”

Standard DESGC questionnaire results

- Will you use the materials and activities presented in the workshop in your classes? Yes 20, maybe 1, no 0
- 21/21 respondents gave specific examples of something they would use in class
- Was the workshop worthwhile? 3 “extremely” (unsolicited response), yes 18, sort of 0, no 0
- Did the workshop concentrate on subjects which are related to one or more STEM curricular areas? Yes 21, sort of 0, no 0

What next?

- We'll follow through on the graduate course.
- We'll do it again.
- We're considering having a nationally visible math presenter.
- We're still working on ways, other than money, to attract teachers to workshops. The landscape of K-12 professional development in Delaware is changing. Courses? Participation credits?