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NWO Hands-On Activity



Snow Pollution

Since winter weather in northwest Ohio often provides us with plenty of the fluffy white stuff, this is an excellent time to take advantage of snow for some interesting science experiments.

K-16 STEM in the NEWS

The Northwest Ohio Center for Excellence in STEM Education Needs Your Help

We need your help. The Ohio STEM Committee, the Ohio Board of Regents, and the Ohio Department of Education awarded a \$1 million grant to the Northwest Ohio Center for Excellence in STEM Education (NWO/COSMOS) at Bowling Green State University to improve STEM education for our region. One important part of this project is the development of a regional strategic plan. To do this, we need to hear from you about your current STEM programs, what you would like to do to improve student achievement and success, and what you would need in order to do that. Using the information that we collect from K-12 school districts, colleges and universities, businesses, and non-profit organizations throughout the 29 counties of Northwest Ohio, we will collaboratively craft a plan for improving STEM education across the entire region. We want to find the best ways to share expertise and efforts so that we can optimize use of resources by strengthening existing partnerships and building new ones. We believe that funding agencies will find such a truly regional, collaborative approach to education innovation very appealing and thus likely to provide major funding.

As you know, STEM stands for Science, Technology, Engineering, and Mathematics but it represents much more than that. It is an innovative approach to teaching and learning that is intended to benefit *all* students. It is not aimed at producing only better scientists, engineers, or mathematicians. Instead, it is designed to promote mastery of all the STEM knowledge and skills students need in order to function effectively as responsible citizens and savvy consumers in a 21st century global society. Best practices in STEM education include active, hands-on inquiry and problem-based learning as well as the development of 21st century skills. Hands-on inquiry and problem/project-based learning have been found to be much more effective than rote learning from textbooks at promoting the successful achievement of critical STEM learning outcomes by *all* students.

So that you can be part of the plan and participate in our future grant proposals, we would like to contact your school to learn what you are doing related to STEM education and what you would like to implement that is new. Please let us know how we can best contact your school or school district to get this information.

We also want to publicize any special achievements or successes that you have had related to STEM education. If you have student projects that you would like to publicize, awards or recognitions that you've received, or any other notable successes or accomplishments, please let us know. We'll put it in our newsletter and/or post it on our website to help get the word out. One of the most important strategies that we want to use to advance STEM for students is to expand and strengthen collaboration among teachers since that appears to be the most powerful way to spread success. So please let us know what you are doing. You can contact us by email: nwo@bgsu.edu or phone: (419) 372-2718.

This activity is safe for ages Kindergarten and up

Only 3% of the water on Earth is fresh water that we can use for drinking. One way the Earth's population can increase the amount of drinking water is to use rain and snow. In fact, snowmelt in the spring and summer actually provides a great source of fresh water for a lot of communities. It is estimated that around 75% of water used in the western United States is from stored up snowmelt. But how clean is the snow we have in our schoolyards and backyards at home?

Try this experiment and find out.

What You Need

For each group of 4-5 students

- 3 one-cup measuring cups or glass beakers of at least 750 mL
- 6 large coffee filters
- 3 clean plastic or clear glass pickle jars or other containers for the water from each cup to strain into
- A magnifying glass
- Extra large rubber bands

What To Do

1. Collect the same amount of snow in each graduated glass beaker or measuring cup from three different sources. (One in an undisturbed area of your schoolyard, another near a driveway, and another on the playground.)
2. Allow the snow some time to melt.
3. Then arrange one coffee filter over the top of each jar and fasten them all with a rubber band.
4. Carefully pour each cup of the melted snow through one of the coffee filters and watch it strain into each jar.

Observe

Label each filtered container of water so you can tell them apart (undisturbed, driveway, playground).

We are also creating a Clearinghouse with information about STEM education that will be designed to best serve the needs of Northwest Ohio educators. We will be announcing this addition to our website later this semester so look for this within the next few months. Please let us know if you have advice about what we should include in this resource that would be most helpful for you. We do not intend to duplicate information available on other sites but instead to provide links to those. However, we will be sure to include information about successes and achievements in our region so that you can find others who might be able to advise or assist you in your efforts to accomplish similar outcomes. We believe that teachers working together are the most potent and powerful strategy to enhance student learning.

We are striving to become one of the most valuable resources that you have for promoting the highest possible level of student academic achievement. Despite the decline in public funding available for education overall, funding for STEM education still is available and is perhaps more abundant than most other types of education funding. We hope to be able to create plans that will maximize access to this funding for everyone in Northwest Ohio. We look forward to working with you to help you maximize your success.

Bob Midden
Director of NWO/COSMOS

Community STEM in the NEWS

Tiger Team 2010



Ohio is filled with examples of revolutionary advances in science and technology. The Wright brothers invented powered flight; Ohioans were the first to orbit the earth and the first to walk on the moon. Northwest Ohio and the Toledo area have fostered pioneers and leaders in the glass industry and automotive industry and currently are leading the way with innovations in both wind and solar power. Despite Ohio's place in history as an innovator in science, technology, engineering, and math, our schools are falling woefully behind when it comes to student achievement in these areas.

A new project, **Tiger Team 2010**, funded by The Martha Holden Jennings Foundation partners Challenger Learning Center of Lucas County (CLCLC) and Lucas County Educational Service Center with the Northwest Ohio Center for Excellence in STEM Education (NWO) at BGSU to engage students in real world STEM experiences to improve academic achievement and prepare them for success in the 21st century.

Tiger Team 2010 is designed to engage teachers and students in a robust curriculum that bridges informal science education and public middle and high schools through programs built on ongoing university educational research and teacher professional development. The project is focus on inquiry-based problem solving meshed with STEM content-rich activities.

Observe

Label each filtered container of water so you can tell them apart (undisturbed, driveway, playground).

What sorts of things did the coffee filter trap? Use a magnifying glass to get a better look.

How does the water look? Is it clear? Is there anything floating in it?

Record your observations from each jar of filtered snow.

Based on your observations, how clean was the snow? Which snow was cleaner - undisturbed, driveway, or playground?

Why do you think some snow was cleaner than other snow? Without filtration, would the snow be clean enough to drink?

Snow is a fairly efficient pollution collector when it is in the air. Snow is formed by water vapor that moves in clouds in cold air. As the water vapor moves in the cold air, it sticks to tiny pieces of dust particles and then has other water molecules attach to it, forming a crystal. Once formed, the crystal can continue to grow and can stay in the air for hours before it falls to the ground. During this time the snow crystal can collect pollutants that are present in the air. Scientific studies show, however, very low amounts of pollution in fresh snow. According to the National Snow and Ice Data Center, "clean" snow is edible. The largest dangers seem to be in urban areas, particularly where lead and other toxins may contaminate it. Still, it is wise when attempting to eat clean, white snow to restrict that activity to wilderness areas.

Investigate

- Put a jar outside to catch snow as it's falling and scoop up snow on the ground in another jar. Melt the snow in each and compare them. Does freshly fallen snow appear to be cleaner?

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Eighteen teachers from a diverse array of rural and urban districts such as Toledo Public Schools, Findlay City Schools, Swanton Local Schools, Perrysburg Exempted Village Schools and Vermillion Schools volunteered for participation in the project. One group of teachers and their students will participate in a field trip mission to the CLCLC; the other group will participate in Tiger Team Distance Programs. The teachers attended one of two professional development workshops at the CLCLC in January. Beginning in February, teachers will engage their students in pre-flight/connection activities in their classrooms culminating with unique combined on-site Challenger Mission-Tiger Team connections with their students in March and April. Unlike previous distance connections that utilized Polycom equipment, this project is testing inexpensive webcams and microphones to deliver an authentic experience via Skype or WebEx to the schools.

On the day of the field trip, students at the CLCLC will "return to the Moon". During their mission, they will experience a specific challenge, an Apollo 13-style capsule malfunction, that their corresponding Tiger Team (a team of students back in a classroom) must troubleshoot and repair in order to rescue the astronauts on board the shuttle. Just like the real emergency back in 1970, time is of the essence and the Tiger Team must utilize only the same few materials available to the astronauts to solve the problem. Approximately 750-800 northwest Ohio public school students will directly benefit from this program, which combines science, technology, mathematics, social studies and language arts content in an exciting, real world setting.



STEM Opportunities

Ohio eTech Update

The 2011 Educational Technology Conference in Columbus, OH features more than 450 sessions, 200 displays and 225 exhibitors. Come experience a variety of hands-on learning opportunities and hear from leading experts in education technology field. Whether you are a teacher, faculty member, librarian, instructional designer, administrator, student, or technician, you can customize your conference experience and discover innovative approaches to integrating technology into the learning experience.

Early bird registration has closed but you may still register online or on-site. Student and team rates are also available.

Visit <http://www.eteach.ohio.gov/conference/> for conference registration and information.

- Look at melted snow under a microscope. What can you see with the microscope that you didn't see with your magnifier?
- Fill a glass with tap water and another with bottled water. Filter the two types of drinking water through two coffee filters and compare them with your melted snow results.
- Collect snow at home, filter it and compare it to your school results.

Further Reading

The National Snow and Ice Data Center
<http://nsidc.org/snow/faq.html> has more good information about snow.

NWO/COSMOS

[NWO/COSMOS website](#)

SECO 2011 Professional Development Conference

February 10 - 12, 2011
John S. Knight Center, Akron, OH

For those of you who have not registered as yet-**it is not too late** to take SAVE on your registration costs.

Don't miss the 2011 SECO Professional Development Conference! Register NOW!

Preparations are underway and the program is filled with dozens of great sessions.

- To register to attend, complete the Registration Form.
- To exhibit, complete the Exhibitor Form.
- For additional information, visit SECOonline.org

Toyota TAPESTRY Grant

Application deadline is Tuesday, February 23, 2011

Science educators with innovative project ideas that enhance science education in their school and/or school district are encouraged to apply. The program is open to middle and high school science teachers and elementary teachers who teach some science in the classroom.

Fifty large grants totaling \$500,000 will be awarded this academic year. Individual science teachers or a team of up to five can submit proposals in the category of environmental science education. Subcategories from which applicants may choose include: biotic (all living factors) and abiotic (all nonliving factors such as pollution, oil, energy, human interventions, water, soil, air, temperature, etc.).

To apply for funding, qualified teachers must write a Toyota TAPESTRY proposal according to the proposal requirements. The deadline for the completion of the online application is 11:59 p.m. EST Tuesday, February 23, 2011. Recipients of Toyota TAPESTRY grants will be notified in April 2011. Nonrecipients will be notified in June 2011.

[Click here](#) to visit the TAPESTRY website for complete details.

2011 Tropical Biology Scholarships

Ken Miller and Joe Levine are again pleased to announce that we are personally sponsoring a scholarship program to enable two high school biology teachers to participate in "**Inquiry and Conservation in Rain Forests**." Also, Pearson Education is joining to sponsor two additional middle- or high-school teachers. Scholarship awards include tuition, in-country expenses, and round-trip airfare to San José.

To learn more information and how to apply visit the website by [clicking here!](#)

STEM Education Updates

Thank you for your support of NWO, our programs, our activities and our partners. Please feel free to send us feedback and suggestions regarding this newsletter.

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