INTERCHANGE

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From the Regional Math & Science Center at Grand Valley State University

Our Vision: ***Math and Science: Excitement in Learning for Success in Living***

Our Mission: ***Provide and coordinate leadership, programs and services to achieve excellence for all in the teaching, learning and application of mathematics and science.***

In this Issue...

Attend Math In Action

Plans for the annual Math In Action Conference are underway. This year's conference theme is "Data Analysis throughout the Mathematics Curriculum." The philosophy of Math In Action is to provide sessions in which K-12 educators and pre-service teachers experience an active learning environment through a variety of means: exemplary lessons including use of real world applications, manipulatives, technology, inquiry, and pedagogical considerations that are consistent with current mathematics education reform efforts. The goal is to provide practicing and future teachers an opportunity to grow both mathematically and pedagogically so that they can directly apply new ideas and materials in their own teaching.

The day features four sets of concurrent, interactive, small-group sessions designed for teachers across the mathematics curriculum. In addition, renowned educator and researcher, Deborah Ball, will be the focus speaker for all to hear.

Sessions will highlight practical suggestions and activities that illustrate how to incorporate data analysis in the teaching and learning of mathematics. Contexts and problems will be shared that allow students to be introduced to new mathematics concepts. Attention will be given to pedagogical concerns

See "Math in Action" on page 2

A middle school teacher examines Wisconsin Fast Plant flowers during the 2001 workshop. For full story see "Attend New Fast Plants Sessions" on page 3

Math in Action

Continued from page 1

about teaching concepts and assessing for understanding. Here is a sample of some of the sessions being planned: "Do Dogs Know Calculus?" (When Elvis, the dog, plays fetch, does he choose the quickest running / swimming path?); "How Long Until We 'Pig Out'?" a dice game; "Helping Middle School Students Make Sense of the Statistical Investigative Process", and the "Pros and Cons of Block Scheduling: Problems and Successes of three different kinds of blocks will be discussed."

A brochure announcing the full details of the conference will be mailed to area teachers and teacher educators in early January. Mark your calendar and plan to join us from 8:40 - 3:00 on Thursday, February 26, 2004 at the Eberhard Center on the Robert C. Pew Campus of Grand Valley State University for an exciting and informative conference!

INTERCHANGE

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These materials were developed under a grant awarded by the Michigan State Board of Education.

More information can be found on the web at www.gvsu.edu / math / MathInAction. A complete schedule and listing of the concurrent sessions will be on display at the site as soon as the schedule is complete. Questions may be addressed to Will Dickinson at dickinsw@gvsu.edu or (616) 331-3745 or to Marge Friar at friarm@gvsu.edu or (616) 331-2304.

Apply for Dockeray Science Scholarships

Graduating high school seniors in the Kent, Muskegon and Ottawa Intermediate School Districts interested in pursuing a career in science, are eligible to apply for one of two $1,000 scholarships from the Mary Jane Dockeray Scholarship Fund. Seniors must be from public or private schools within these three Intermediate School Districts which were chosen by the Scholarship Endowment Fund. The Mary Jane Dockeray Scholarships for Careers in Science can be used by the winners to help with expenses at the college or university of their choice.

This scholarship, administered by the Regional Math and Science Center at Grand Valley State University is in its fourteenth year of awards. The scholarships honor Mary Jane Dockeray, long-time naturalist, and founding curator of the Blandford Nature Center in Grand Rapids.

Applications for this scholarship are due March 1, 2004. The completed application should consist of the completed application form, a personal essay, a high school transcript and two recommendations in support of the application. One recommendation should come from a teacher at the student's school and the other one from someone not connected with the school. Scholarship recipients will be selected on the basis of past academic achievement and their potential for success in a science career.

Detailed information and application forms were recently mailed to all high school counselors in the three intermediate school districts listed above. High school seniors who cannot obtain materials through their school may obtain application forms by calling the Regional Math and Science Center at (616) 331-2267.

Enter Statistics Poster Competition

Even though the February 27 entry deadline for the 2004 Michigan Statistics Poster Competition (MSPC) is quickly approaching, there is still time to make and submit an award-winning poster. The 2004 MSPC is sponsored by the Department of Statistics and the Regional Math and Science Center at Grand Valley State University and is open to all K-12 Michigan students. Awards are given in four grade level categories: K-3, 4-6, 7-9, and 10-12.

A statistics poster is a visual display that uses one or more related graphs to summarize data, discuss different points of view, and answer question(s) about the data. Winning posters (particularly in the upper grade level categories) investigate a research question using several graphs, at least one of which compares two or more variables. A series of four articles that appeared in the October 1999, November 1999, December 1999 / January 2000, and February 2000 issues of *Interchange* explain in detail the process used to create a statistics poster. A copy of these articles, pictures of last year's winning posters, and an online entry form can be obtained by visiting the MSPC website at www.gvsu.edu/stat/statposter/index.htm.

The MSPC committee also extends to you the opportunity to have a local statistician come speak to your class about the competition. We model the process from idea inception through data collection to poster completion. You may contact John Gabrosek at (616) 331-3691 or via email at gabrosej@gvsu.edu to arrange a visit.

We look forward to receiving hundreds of posters from all over the state again this year. It is a real treat for us to see the halls of Grand Valley State University strewn with statistics!

Are you a "Highly Qualified" Teacher?

The Elementary and Secondary Education Act (ESEA) also known as No Child Left Behind has many Michigan teachers asking questions such as:

- What is the definition of "highly qualified teacher"?
- Do I meet the guidelines?
- If I don't meet the guidelines, what do I do?

The MEA website at www.mea.org offers helpful information about ESEA. The site includes:

- a list of frequently asked questions and answers
- a step-by-step checklist to use in determining if you are highly qualified
- an official document certifying that teachers meet Michigan's definition of highly qualified (Completed forms must be submitted by June 30, 2006.)
- a chart of classes that can be taught by holders of various endorsements and the impact of ESEA in the endorsement area.

The Regional Math and Science Center offers a variety of workshops and classes that are designed to assist teachers as they seek to achieve or maintain highly qualified status.

Learn more about RMSC on Website

Do you sometimes want to know more about what the Regional Math and Science Center has to offer without searching for your last issue of InterChange or checking your archived email? The website of RMSC at www.gvsu.edu/rmsc/ is an important communication tool which contains comprehensive information about RMSC's services, programs, and resources and offers links to relevant sites. The **Home Page** features details about upcoming events with links to the corresponding brochures. Another useful section is **Resources for Teachers** with details about such projects as *Building a Presence for Science*, EcoBus, Battle Creek Science Kit Training, and the Project NEED workshop. The **Students and Teachers** section offers information about a Statistics Poster Competition, Michigan Science Olympiad, and much more. The **Community** section highlights our community partners and provides links to the websites of local formal and informal educational institutions. In the **About Us** portion of our site, you can learn more about our mission and purpose, the region we serve, how to contact the Center, and the names and titles of staff members. Archived issues of the *InterChange* are also available on the website. Our future plans include more extensive use of the website to disseminate news about our leadership efforts, programs, and services designed to achieve excellence for all in the teaching, learning, and application of mathematics and science.

Attend New Fast Plants Sessions

Learn how to bring Wisconsin Fast Plants to your classroom by attending this four-session introductory workshop. Fast Plants was developed at the University of Wisconsin by Dr. Paul Williams as a teaching tool to demonstrate plant growth in the classroom. Their rapid growth cycle allows teachers to illustrate and teach key aspects of plant biology, ecology, genetics, and physiology using the plant specimens. Dr. Jann Joseph, a biology and integrated science professor at GVSU, trained with Dr. Williams and will lead the sessions. This introductory workshop is geared for teachers of upper elementary and middle schools students. The workshops are on January 22, February 5 and 19, and March 11, 2004. See "Calendar of Events" in this issue for details. The cost is $160 for all four sessions and includes materials and light supper. Materials include free equipment and plant kits to get you started. Graduate credit is available with additional fees for tuition. For additional information, contact Mary Watters, Regional Math and Science Center, (616) 331-2273 or go to www.gvsu.edu/rmsc/2004fast-plants.pdf to read or download a brochure.

SCIENCE AND MATH UPDATE

Exercise – Drano® for the Heart

By Dawn P. Coe, Department of Movement Science

Previous research has shown that children as young as two years old begin to develop plaques on their arteries. Although the development of cardiovascular disease begins early in life, the disease does not manifest until adulthood. This fact illustrates the importance of reducing cardiovascular disease risk early in life. A recent study at the University of Western Australia found that obese children as young as six had thickening of the artery walls, indicative of early heart disease. Researchers looked at 35 obese youth (ages 6-16), who were divided into 2 groups by age. Each group undertook an eight week exercise program, with the younger children playing running games and the older children lifting weights. Diet was not altered in this study. The children did not lose weight. However, they did lose body fat, especially in the abdominal area, and gained muscle mass. The exercise program actually reversed the thickening of the arteries. The children were followed for an additional eight weeks. Youth who continued with the exercise program maintained the decrease in the thickening of the arterial walls and those who did not exercise regressed back to their original arterial condition. This study provides an impetus to get our youth active, so that may have a high quality of life now and in the future. Reference: Danny Green and Katie Watts, University of Western Australia, presented at the American Heart Association Conference.

Coffee=Anticancer?

By Linda Goossen, Department of Health Sciences

Scientists have suspected for years that coffee drinking may confer a protective effect against certain cancers due to the high antioxidant content of the popular beverage. And now, a recent German study has actually identified the specific anticancer compound in coffee. While human studies have yet to be done,

> **“...obese children as young as six had thickening of the artery walls...”**

Thomas Hoffman, Ph.D. professor and head of the Institute for Food Chemistry at the University of Munster in Germany predicts that “drinking coffee may offer some protection, especially if it’s strong”.

Hoffman and his associates at the German Research Center for Food Chemistry in Garching performed in vitro as well as rat studies to investigate the theory that coffee fights cancer. Both the laboratory preparations of human intestinal cells as well as the rats showed a dose-dependent increase in phase II enzyme activity as compared to control groups. These enzymes are thought to protect against colon cancer.

Analysis of the coffee extract showed the most active anticancer compound was methylpyridium. Methylpyridium is found almost exclusively in coffee, and while the compound is not found in raw coffee beans, it is formed during the roasting process from its chemical precursor, trigonellin. Methylpyridium is found in caffeinated and noncaffeinated coffee as well as in instant coffee.

The researchers plan to conduct additional human studies to determine whether methylpyridium is an effective cancer-fighter in humans. Results of this study could lead to the development of a dietary supplement or pill enriched with methylpyridium so even those who do not drink coffee could benefit from its anticancer benefits.

Source: American Chemical Society.

Big Waist...Want not

Steve Glass, Department of Movement Science

Americans are well known around the world as one of the most obese populations on earth. Watch commercials and magazine ads and you’ll also see that Americans seem obsessed with the need to reduce body weight. Most Americans have tried some sort of diet / weight loss plan at some point in their lives. However, most research has shown that “dieting”, or a short-term adjustment in eating patterns, do not result in long-term weight control. In addition, most are interested in FAT loss, not just weight (which includes bone, muscle water and fat). Here are some interesting points to consider:

- While genetics do play a role in obesity, the dramatic increase in obesity in the last 25 years is due to reduced physical activity and excess eating.

- Carbohydrates are not the enemy! Excess calories are. In fact you need carbohydrates in your diet to fuel your brain (which runs on carbohydrates) and to ensure proper metabolism of fat. The carbohydrates should be complex carbohydrates with plenty of nutritional content.
- Just cutting calories way back may result in a loss of muscle mass and a reduction of metabolic rate. With a severe reduction of calories (under 1200 per day) we use our muscle as a fuel. This makes it easier to gain fat after the diet and harder to lose weight the next time.

With the holidays approaching, what can we do?

1. Get some kind of physical activity. Choose a modest intensity; this will help you go longer and actually helps maximize fat utilization. A nice rule of thumb: Walk 1 mile- 100 calories, Run 1 mile – 100 calories! Intense exercise uses mostly carbohydrates as a fuel, whereas moderate exercise uses more fat (just takes longer to cover the distance). So take it easy!
2. Reduce the size of your food portion. We just can't use a huge meal, so we store much of it as fat. Reduce the size of the meal and eat more often.
3. Start with baby steps. Trying to change a lifestyle does not happen overnight; make changes that you can handle.
4. Avoid the magic pill habit; quick weight loss schemes will promote water and muscle loss, not fat loss.

A Fitting End To 2003 In Chemistry

By Sheldon J. Kopperl, School of Biomedical and Health Sciences

This past October, the winners of the 2003 Nobel Prizes were announced. One of the recipients of the prize in chemistry is Roderick MacKinnon, professor of neurobiology and biophysics at Rockefeller University in New York City. His award was for explaining the structure and mechanisms of ion channels, particularly the potassium channel. The December 2003 issue of *Scientific American* names him its Top Fifty Research Leader of the Year (pg. 56).

"...coffee drinking may confer a protective effect against certain cancers..."

His name became a household word for chemists in 1998 when his research group was able to form crystals of the potassium channel, a membrane protein which is extremely difficult to crystallize. This feat enabled the investigators to obtain x-ray crystallography data on this protein to a high enough resolution to deduce its structure. That in turn made it possible to propose a reason for its specificity: Only potassium ions could be transported through this channel. This year he and his colleagues discovered the mechanism for how this molecule can sense electricity. As the *Scientific American* article explains it, his work "should guide the development of drugs for neuromuscular and other disorders, such as cystic fibrosis and cardiac arrhythmias. Drug companies should show particular interest in the implications for arrhythmia, a common pharmaceutical side effect in numerous patients that has cost them billions in failed clinical trials (*ibid.*)."

Why is this a "fitting end to 2003 in chemistry?" Fifty years ago this same technique of x-ray crystallography made it possible for James Watson and Francis Crick (with help from Rosalind Franklin and Maurice Wilkins) to deduce the structure of DNA. While the technique has become more sensitive and sophisticated, the same physical properties of this substance are still required (a nearly perfect crystal of sufficient size and purity). For MacKinnon and Franklin (who took the actual x-ray photographs) the crystallization problem was the hardest of the experimental steps. Today nuclear magnetic resonance (NMR) can be used to obtain structures of small soluble biologically important molecules that cannot be crystallized. However, the potassium channel is far too large and insoluble to be subjected to NMR analysis. History does repeat itself in science as in most other human endeavors.

Correction: Last issue's Update story "How Much is a Trillion?" was written by Matt Boelkins, not John Gabrosek as indicated. The editors apologize for this error.

These pages are produced by faculty from GVSU.

Science Investigation on the Web

In an article in the Fall 2003 *MSTA Journal*, pages 32-34, Theron Blakeslee of the Jackson County Mathematics and Science Center writes about a project in which Michigan Science Teachers Association teamed with Michigan Mathematics and Science Centers to develop a set of science investigations using an inquiry format. The investigations are based on several constructing and reflecting state benchmarks as well as at least one Earth, life, or physical science benchmark and can be used in classrooms to replace the investigations that were cut from the MEAP tests. The tests can be found at www.msta-mich-org.

The investigations are in PDF format and include the following:

- Earth and Water (How Earth materials interact with water) for grades 4 or 5
- Block Busters (Force, motion, and friction) for grades 4 or 5
- Bird Building (Animal Adaptations) for grades 3-5
- Wondering about Water (Dew and Condensation) for middle school
- Maps and Me (Using maps to identify landforms and sources of water) for middle school*
- Rolling On (Inherited vs. acquired traits) for middle school
- Exercise and Body Systems for middle school
- Reflections on Reflection (How light interacts with surfaces) for middle school*

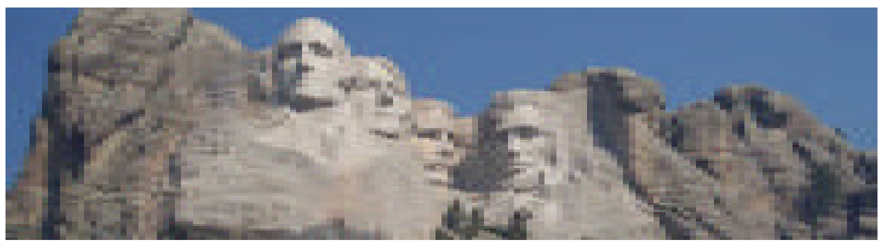
The investigations are thorough and include a complete set of instructions for the teacher, graphics, and student sheets. Comments for improvement are welcome and teachers are invited to submit their favorite investigation for use on the site.

*Not available as of 11/10/2003

Explore the Geology of the Black Hills

The geology of the Black Hills serves as a spectacular outdoor classroom. From Archean basement rocks to Pleistocene fossil beds, the geology of this region is diverse and beautiful. This trip will focus on the geologic history of Black Hills and adjacent Badlands and Devils Tower, with special emphasis on building your knowledge of geology and how to use what we see in your classroom. We'll investigate ancient granitic rocks and gold deposits in the center of the Hills, see the spectacular Paleozoic and Mesozoic stratigraphy on the flanks of the uplift, explore the Tertiary fossil-rich beds of the Badlands, and watch the excavation of Pleistocene mammoths. In addition, we'll see the world-class mineral exhibits at the South Dakota School of Mines and Technology and dinosaur fossils at the Black Hills Institute. Class meets the last Wednesday each month (January to May) and travels to the Black Hills June 21-July 2, 2004. Three graduate credits in science are available. Estimated cost $300 plus meals.

Contact Steve Mattox, GVSU Geology Department at (616) 331-3734 or mattoxs@gvsu.edu



Announcing *Science Of The Future* Contest

The Western Michigan Section of the American Chemical Society is sponsoring a fun and unique contest for high school students in Western Michigan. The Society's "Chemagination" contest challenges students to forecast the future by answering, "What breakthrough or innovation related to chemistry will improve the quality of a teenager's life 25 years from now?" Students will submit articles in one of four categories, written as if they were to appear in an issue of *ChemMatters* magazine 25 years from now. *ChemMatters* magazine is the Society's publication for high school chemistry students. The categories are biotechnology, medicine/healthcare, new materials and transportation/environment.

The contest specifics are as follows:

- Articles are limited to 1,000 words.
- Submissions may include drawings, diagrams, illustrations, chemical descriptions and technological considerations.
- A cover for the proposed issue of the magazine must be created.
- Winning team members will split $300 and $50 will go to the teacher for classroom supplies.

All submissions must be mailed to ACS at PO BOX 150255 Grand Rapids MI 49515-0255 by the deadline. The deadline for the Intent to participate forms is January 11, 2004. Papers are due February 11, 2004 and posters are presented at a dinner on February 25th at GVSU. Photos will be taken of the student winners and release forms will be provided for signatures and approvals.

For more information about *the Western Michigan section* and the American Chemical Society, see our website membership.acs.org/w/wmi.

CALENDAR OF EVENTS

DECEMBER

10 Wednesday

Building Confidence in Inquiry Learning begins with **What is Inquiry Learning?** at GVSU's RMSC, 8:30 a.m.-3:30 p.m. in 303 Henry Hall, Allendale Campus. Contact Karen Meyers (616) 331-2267 or visit www.gvsu.edu/rmsc.

15 Monday

Deadline for teacher and student submissions to the **2004 Annual Essay Contest of the Michigan Society for Medical Research**. For additional information visit www.mismr.org.

JANUARY

7 Wednesday

Building Confidence in Inquiry Learning continues with **Designing Inquiry Learning**, at GVSU's RMSC, 8:30 a.m.-3:30 p.m. in 303 Henry Hall, Allendale Campus. Contact Karen Meyers (616) 331-2267 or visit www.gvsu.edu/rmsc.

21 Wednesday

Building Confidence in Inquiry Learning concludes with **Assessing Inquiry Learning**, at GVSU's RMSC, 8:30 a.m.-3:30 p.m. in 303 Henry Hall, Allendale Campus. Contact Karen Meyers (616) 331-2267 or visit www.gvsu.edu/rmsc.

22 Thursday

Wisconsin Fast Plants workshop begins. 4:30-8:30 p.m. in 303 Henry, GVSU Allendale Campus. For additional information, contact Mary Watters (616) 331-2273 or visit www.gvsu.edu/rmsc/2004fastplants.pdf

FEBRUARY

5 Thursday

Wisconsin Fast Plants workshop continues. 4:30-8:30 p.m. in 303 Henry, GVSU Allendale Campus. For additional information, contact Mary Watters (616) 331-2273 or go to www.gvsu.edu/rmsc/2004fastplants.pdf

19 Thursday

Wisconsin Fast Plants workshop continues. 4:30-8:30 p.m. in 303 Henry, GVSU Allendale Campus. For additional information, contact Mary Watters(616) 331-2273 or go to www.gvsu.edu/rmsc/2004fastplants.pdf

20-21 Friday-Saturday

Seventh annual **User's Conference for the Connected Mathematics Project Curriculum**. Kellogg Hotel & Conference center at Michigan State University. For more information contact Judith miller at miller@math.msu.edu or (517) 432-2870.

26 Thursday

Annual **Math In Action Conference** for elementary, middle, and high school teachers. 8:40 a.m.-3:00 p.m. at GVSU's Eberhard Center on the Robert C. Pew campus. For more information contact visit www.gvsu.edu/math/MathInAction or contact Will Dickinson at dickinsw@gvsu.edu or (616) 331-3745 or to Marge Friar at friarm@gvsu.edu or (616) 331-2304.

27 Friday

Deadline for the **2004 Michigan Statistics Poster Competition**. For additional information visit www.gvsu.edu/stat/statposter/index.htm.

MARCH

1 Monday

Deadline for applications for the **Mary Jane Dockeray Scholarship**. See this volume of the *Interchange* for more details or contact the Regional Math and Science Center at (616) 331-2267.

11 Thursday

Wisconsin Fast Plants workshop concludes. 4:30-8:30 p.m. in 303 Henry, GVSU Allendale Campus. For additional information, contact Mary Watters (616) 331-2273 or go to www.gvsu.edu/rmsc/2004fastplants.pdf

JUNE

21-25 Monday-Friday

Workshop on **Getting to Know the Connected Mathematics Project** for teachers and administrators grades 6-8. 8:15 a.m.-4:20 p.m. Michigan State University's Union Building. For more information see www.math.mus.edu/cmp or contact Judith miller at miller@math.msu.edu or (517) 432-2870.

ASIMO makes a new friend

Humanoid Robot Tours in the US!

The ASIMO (Advanced Step in Innovative Mobility) robot is the world's most advanced humanoid robot. Halfway through a 15-month tour of the country, ASIMO has educated and entertained 37,000 students and visitors at science museums and other educational institutions this year. For a tour schedule, photos, and more, go to www.asimo.honda.com Public and private elementary, middle, junior high, and high schools in the contiguous U.S. states can enter an essay contest to win a visit from ASIMO in March, 2004. Essays should describe student's vision of the role of humanoid robots in our society in the future. The contest ends December 31, 2003. Forms are at www.asimo.honda.com/contest.asp

Preserve Wildlife

Students, teachers, and community groups working for wildlife in their local communities are invited to apply for support through the 2004 SeaWorld / Busch Gardens / Fujifilm Environmental Excellence Awards program.

For more than a decade, the program has recognized and rewarded K-12 student groups working at the grassroots level to protect and preserve their local environment. Beginning in 2004, eligibility for the awards has been expanded beyond school groups to recognize the efforts of community groups such as 4-H clubs, public recreation centers, scouts, and other community-service organizations working creatively to solve local environmental challenges.

Project submissions should demonstrate significant accomplishments completed by the **December 19, 2003 deadline**. The strongest of past winning projects demonstrated ongoing positive environmental impact for at least several years.

The program will accept project submissions from across the United States. Eight organizations will be awarded $10,000 to further their conservation efforts. In addition to receiving funding to support their projects, winning groups also will receive an all-expense-paid trip for three group members and one adult leader to attend the annual awards event at SeaWorld San Diego in April. From the eight projects selected, one "Outstanding Environmental Educator / Leader" will be awarded $5,000 as a special recognition. Each winning group and the outstanding educator also will receive a Fujifilm digital camera.

To learn more about the 2004 SeaWorld / Busch Gardens / Fujifilm Environmental Excellence Awards, visit the program's Web site at www.seaworld.org / EEAwards / eea01.htm.

Free Balance

The balance will be awarded by a drawing held at Education Night in February 25th, 2004. A teacher receives a chance to win by participating in an American Chemical Society event or when her or his students participate in an ACS event, including Education Night.

For additional information visit membership.acs.org / w / wmi / or contact Francis Burns at (616) 331-2732 or burnsf@gvsu.edu.

TAPESTRY Grants

Need $10,000 for Your Science Classroom? Act now to make the January 16, 2004 deadline for the Toyota TAPESTRY Grants for Teachers program, which will award $550,000 in grants to K-12 teachers of science. The 2004 program will award 50 grants of up to $10,000 and at least 20 "mini-grants" of $2,500 for innovative environmental, physical science, and science and literacy programs. Need help getting started? Be sure to catch NSTA's virtual workshop on **Friday, December 5** at 1 p.m. (EST). The live online session will give you an overview of the TAPESTRY program and tips on how to enter and win! It's FREE. Space is limited so register now at www.nsta.org / virtualworkshops. For more information about Toyota TAPESTRY Grants for Teachers, go to www.nsta.org / programs / tapestry.

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