Virginia SpaceLink

Virginia Space Grant Consortium

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VIRGINIA'S CENTER FOR INNOVATIVE TECHNOLOGY

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First Student Conference a Success

The Virginia Space Grant Consortium held its first Student Conference on March 29, 1999 at NASA Langley Research Center in Hampton, VA. Scholars and Fellows who received research awards in 1998–99, as well as university faculty, NASA Langley personnel and VSGC staff, participated in the day-long conference. Ten undergraduate and 22 graduate students representing the five Space Grant universities—College of William and Mary, Hampton University, Old Dominion University, University of Virginia, and Virginia Tech—presented their current research.

Opening remarks were made by Dennis M. Bushnell, Chief Scientist for NASA Langley Research Center, in which he provided a glimpse into our future. Edwin J. Prior, Deputy Director for the Office of Education at NASA Langley, followed the opening remarks with a general NASA background. The morning focused on oral presentations by 12 graduate fellows that provided conference participants with an overview of their research efforts. Additionally, 20 graduate fellows and undergraduate scholars participated in poster presentation sessions that allowed for one-on-one interaction with NASA Langley scientists and researchers, faculty and their peers. The afternoon featured an insider's tour of three Center sites—the *High Speed 7 x 10 Foot Tunnel*, the *Composites and Polymers Laboratory*, and the *Aircraft Landing Dynamics Facility*.

Marc DeVincentis of University of Virginia explains his research during a poster presentation session.

Participants remarked favorably on the conference, particularly on the vast diversity of research interests that are supported with research awards administered by the Virginia Space Grant Consortium. One of the most talked about research topics was presented by Garrett Schairer, a graduate student in Fisheries and Wildlife Sciences at Virginia Tech. His research, *Mapping Bobwhite Quail Habitats Using Landsat TM Imagery*, emphasized the diversity of research possibilities using an aerospace application.

The Student Conference will be held annually to showcase the research efforts of Virginia Space Grant Scholars and Fellows. The Consortium's web site at http://www.vsgc.odu.edu can be accessed for information on next year's conference as information becomes available. Research abstracts and hand-outs from student participants are available by contacting VSGC's Heidi Davis at hbdavis@odu.edu or by phone at (757) 865-0726.

The Director's Corner

Spring is just about our favorite time of year at the Consortium because it is the time when we make our scholarship and fellowship awards. We were able to give our largest number of awards ever—$290,495 to 68 students. Our applicant pool was significantly larger this year and our resource pool for making the awards was increased thanks to additional support from the Virginia General Assembly through the State Council for Higher Education. We awarded 30 Graduate Research Fellowships (including 16 renewals); 16 Undergraduate Research Scholarships; 11 Teacher Education Scholarships; and 11 Community College Scholarships. Our summer and fall issues of *SpaceLink* will feature all of our 1999–2000 scholars and fellows.

The Consortium held its first annual Student Conference at NASA Langley Research Center on March 29. We were particularly pleased to be hosted by NASA and to have a number of NASA researchers participate. It was a very stimulating event for all involved. Details on the Student Conference are featured on pages 1 and 3.

Our *Counseling for Gender Equity* project is accepting applications from counselors throughout Virginia until April 30. We do this National Science Foundation-sponsored project in partnership with Virginia Tech. It offers an outstanding professional development opportunity for K–12 Counselors who want to play leadership roles in encouraging girls in math, science and technology fields, as well as in ensuring gender-fair learning environments. Stipends, minigrants for school-based projects, and the opportunity for graduate credit are among the perks. Call me or Brenda Neil at the VSGC for more information or check out the project's web site at http://genderequity.vsgc.odu.edu.

The VSGC recently completed a five-year self-evaluation for NASA, which is reviewing the performance of all Space Grants nationwide. This process involved an evaluation and planning retreat and follow-up meeting by the Consortium's Advisory Council and the development of a self-evaluation document. The self-reflection reinforced current directions in many of our programmatic areas and led to refocusing in other areas. New goals were set for building pre-service programs for teachers, expanding our public outreach programs through our museum members, and enhancing electronic communication and dissemination of information.

As school systems plan for SOL-related pre-service programs in Instructional Technology and encouraging girls and underrepresented minorities to excel in math, science and technology, the VSGC can assist through its training programs. We hope to hear from you on how we can meet your educational training needs.

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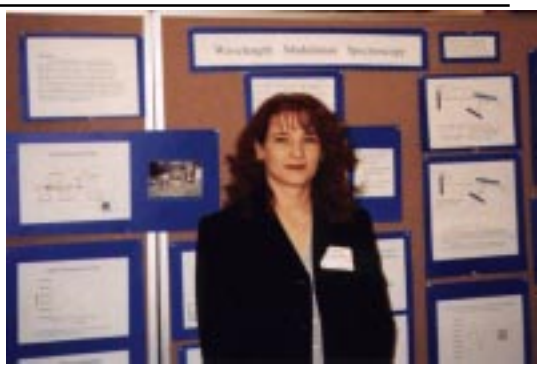
Heidi Davis, *Program Coordinator and Newsletter Editor*
Mary Alice Livingston, *Office Manager*
Brenda Neil, *Administrative Assistant*

GRADUATE FELLOW CONFERENCE PARTICIPANTS

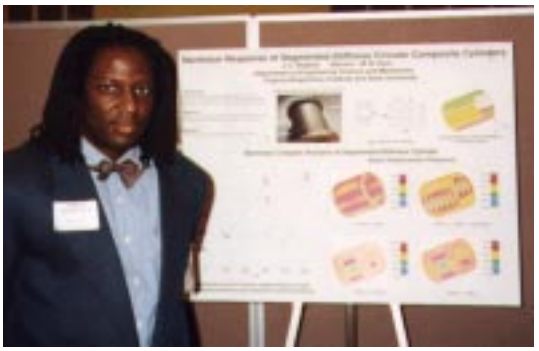
- **Karen Anewalt**, W&M, *Resource Allocation Problems in Computer and Communication Networks Using Virtual Paths*
- **Dale Bloodgood, Jr.**, ODU, *Design Optimization of Magnetic Bearings and Magnetic Suspension Systems*
- **Norman Broyles**, VT, *Sizings and Their Effects on the Mechanical Performance of Pultruded Continuously Reinforced Carbon Fiber/Vinyl-Ester Composites*
- **Todd Bullions**, VT, *Moisture Sorption Effects on Carbon Fiber-Reinforced PhenylEthynyl-Terminated Ultem™ Composites*
- **Christopher Fannin**, VT, *Some Analytical and Practical Considerations for Control of Thermoacoustic Instabilities*
- **Vincent Hammond**, UVA, *Creep Response of Alumina Tow-fibers and CMC Fibers*
- **Derek Hass**, UVA, *Electron Beam Directed Vapor Deposition of Thermal Barrier Coatings*
- **Robin Lawson**, ODU, *LS-DYNA3D Modeling and Simulation for Uncontained Engine Debris Impact on Fuselage*
- **Catherine Lebiedzik**, UVA, *Uniform Stability of a Coupled Structural Acoustic System with Thermoelastic*
- **James Masters, III**, UVA, *Exact Controllability of Solonoida Electromagnetic*
- **Bob Matthews**, W&M, *Incorporating a Fully Functional File-System into a Fault-Tolerant Distributed System*
- **Christophe McCray**, HU, *Development of an All-Solid State Raman Laser for Ozone DIAL Measurements*
- **Jennifer McMurray**, VT, *Internally Pressurized Elliptical Composite Cylinders*
- **Scott Meller**, VT, *Cross-Sensitivity Effects in Fiber Optic Strain Sensors for Aerospace Applications*
- **Andrew Miner**, W&M, *Efficient Reachability Set Generation and Storage Using Decision Diagrams*
- **Thomas Ochinero**, VT, *Manufacturing Distortions of Curved Composite Panels*
- **Sneha Patel**, VT, *Life Prediction, Durability, and Damage Tolerance of High Temperature Polymer Composite Structures in Aerospace Applications*
- **Jaret Riddick**, VT, *Nonlinear Response of Segmented-Stiffness Circular Composite Cylinders*
- **Garrett Schairer**, VT, *Mapping Bobwhite Quail Habitats Using Landsat TM Imagery*
- **Julie Stark**, ODU, *Assessing Behavioral and Subjective Indicators of Hazardous States of Awareness*
- **Beverly Thompson**, W&M, *Retinex Preprocessing for Improved Multi-Spectral Image Classification*
- **Erica Thompson**, HU, *UV Induced Ablation in Gradient Index*

UNDERGRADUATE SCHOLAR CONFERENCE PARTICIPANTS

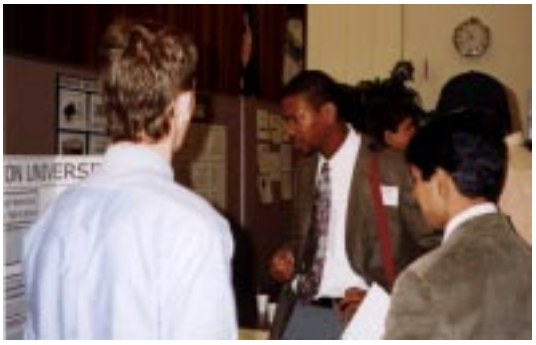
- **Chandler Amiss**, W&M, *Nondestructive Evaluation of Adhesive Bonds in Aircraft*
- **Walter Babel**, ODU, *Diamond Deposition Using a High Pressure Microdischarge Plasma*
- **Corey Barber**, UVA, *Reducing Rotor/Stator Interaction Noise in Turbofan Engines*
- **Aaron Brock**, ODU, *Silicon Nano-Tip Array Fabrication for Field Emission Pressure Sensor*
- **Shalen Cain**, ODU, *Waste Heat Rejection from Propulsion Systems at High Altitudes for Atmospheric Science Aircraft*
- **Marc DeVincentis**, UVA, *Alternative Fabrication of Terahertz Heterodyne Receiver Components for Aerospace*
- **Colleen Fitzgerald**, ODU, *Wavelength Modulation Spectroscopy*
- **Christopher Gunther**, VT, *Comparison of Channel Wing Theoretical and Experimental Performance*
- **Rebecca Horne**, UVA, *Thermally-Induced Vibrations in Solar Panels Undergoing Orbital Day/Night Transition*
- **Jonathan Watts**, VT, *Thermoelectrics for Electrical Power Generation on Micro-Air Vehicles (MAV)*



Colleen Fitzgerald
Old Dominion University



Jaret Riddick
Virginia Tech



Christophe McCray (c) of Hampton University reviews the research presentation by Aaron Brock (l) with his advisor, Sacharia Albin (r), an ODU Engineering Professor.

Karen Anewalt
College of William & Mary

Opportunities for Educators

FREE Space Science Resources and Training Available for Elementary Teachers

A Multisensory Space Science Classroom Kit (MSS Kit) has been developed to help elementary educators teach space science to children with learning disabilities. The materials in the Kit use sight, sound, touch, reading, video, and kinetic exercises to reach student with learning disabilities in grades K–6. While the MSS Kit was designed with the intention of stimulating space science interest in students with learning disabilities, the Kit resources are useful for all K–6 students. Most importantly, the MSS Kit addresses most of the national and Virginia standards of learning for science.

The design and content of the MSS Kit is very flexible. The Kit allows teachers to "pick and choose" or "mix and match" materials suitable for their local school systems, curriculum requirements, individual teaching techniques, available facilities, teacher/student ratio, and ability of the students. Materials include resources for both teachers and students, activities, posters, videos, lithographs, hands-on activities, and music provided as both audio tapes and in sheet form. The MSS Kit, now in its second prototype, has been field tested and modified over the past three years.

With NASA funding and cooperation from the Office of Space Science, the Education Division, and Field Centers, Stephen Dwornik worked with a team of educators to develop the MSS Kit. Dwornik, founder of Space Science and Technology, Inc. and former NASA Geologist, recruited Cherie Harkleroad, a Garrisonville Elementary teacher, to be the MSS Kit Project Director. Joined by Gloria Toplitt, a voice teacher, Broadway performer and retired actress, as the Project Music Specialist, the three have created an interesting and informative workshop from their wealth of experience.

A series of nine MSS Kit workshops will be offered in Virginia during 1999 for approximately 275 educators across the Commonwealth. The workshops have developed out of a collaborative effort by the Virginia Space Grant Consortium (VSGC), Virginia's Training and Technical Assistance Consortium (T/TAC), Space Science and Technology, Inc. (SS&T), and the Virginia Department of Education (VDOE). A team of three Virginia educators, from the Williamsburg/James City County Schools and the Eastern Virginia T/TAC, recommended the MSS Kit after attending a training workshop last November.

Do you work with children who have special needs?

Who tend to "shut down" when asked to read or write a great deal? Who display characteristics of low self-esteem? Who tend to respond with behavioral problems when given academic challenges?

The initial training workshop will be held in April at the College of William & Mary in Williamsburg, VA. The first workshop will provide training for teams organized by the eight T/TAC Centers in Virginia. The additional eight MSS Kit workshops will be held one per T/TAC region (same as the eight superintendent's regions) during the remainder of 1999. Each T/TAC region will host a one-day workshop for 30 educators from school divisions within their region. School divisions within each of the T/TAC regions will be asked to send a team to their region's workshop. Each team will consist of two teachers responsible for teaching science representing 4th and 6th grade or both from 6th grade. One of the two teachers in the team needs to be a general education and the other a special education teacher. Both must teach or have taught students with learning disabilities. This will allow a maximum of 15 teams to attend each regional workshop.

The dates of the regional workshops have yet to be determined; however, they will be scheduled for Saturdays whenever possible. Each participant will receive a MSS Kit for use at their school. Additionally, teachers will receive a letter of participation indicating recertification points awarded. There is no fee to attend the workshop and lunch will be provided. The Kits and training for the eight workshops will be funded by the VDOE with additional funding and support from the VSGC and T/TACs.

Dates of regional workshops will be posted on the VSGC's web site at http://www.vsgc.odu.edu/html/home.htm as they are scheduled. For additional information on this training opportunity, contact Heidi Davis at the VSGC via e-mail, hbdavis@odu.edu, or at (757) 865-0726.

Amazing Astronomy Activities For Elementary Classes

By George Hastings, Astronomy Teacher
The Mathematics and Science Center

In astronomy, as in all the other sciences we study and teach, our goal is not the memorization of facts. The goal must be to teach those who will inherit the earth from us the skills of thinking. We must focus on teaching students how scientific knowledge is obtained. The emphasis should be on the process, since a real understanding of the acquisition of knowledge leads to mastery of the skill of evaluating data. Evaluation of new information is the backbone of critical thinking.

Roughly 200,000 students each year take an introductory course in astronomy! How are we doing? Consider the fact that this is just a very small percentage of the number of students who watch "The X-Files"! We have a serious challenge to provide our students with the abilities to gather data, to apply critical thinking skills to the task of separating fact from theory, and theory from hyperbole.

An emphasis on gathering data from observation and experimentation was one of the primary themes of the Astronomical Society of the Pacific workshop last summer in Albuquerque, NM for teachers of astronomy in grades 3–12. With financial assistance from the Virginia Space Grant Consortium, I was able to attend several days of sessions designed to involve teachers in the process of how knowledge is obtained.

As educators we have all embraced the phrases: *participatory learning, cooperative problem solving, hands-on activities*. During this conference I was participating actively in the process of gathering data from observation and experimentation, in cooperative problem solving, and using this information to evaluate the ways I have taught. As a result, I have begun to change the ways I lead students to build conceptual models of our place in the universe. I have developed a new workshop, *Amazing Astronomy Activities for Elementary Classes*, designed for elementary through middle school grade educators. The workshop will focus on participation and offer lots of new ways of getting students really involved in the process of scientific thinking.

I plan to present this new workshop, on behalf of the VSGC, at the Region 2 Science and Mathematics Coalition conference scheduled for June 23–24, 1999 at Heritage High School in Newport News, VA. The conference entitled, *SOS for the SOLs*, is an opportunity for area educators to share innovative strategies in the teaching and assessment of the Virginia Standards of Learning.

Contact your school division's Region 2 Science and Mathematics Coalition representative for further information on the upcoming conference. If you need to know who is your local representative, contact VSGC's Heidi Davis at (757) 865-0726 or via e-mail, hbdavis@odu.edu.

"Girls Can"

A Counseling for Gender Equity Minigrant Project

Girls Can, was the theme for College Park Elementary's equity minigrant project, which is based on the American Association of University Women's slogan. Eighteen 5th grade girls participated in four after-school seminars held weekly during January 1999. The speakers included an architect, an engineer, a physician, and university professor. The speakers, who donated their time, talked about their careers, college coursework, and provided hands-on activities for the girls.

Guidance Counselor, Evelyn Mitchell, is a participant in the VSGC's *Counseling for Gender Equity* project. A component of the project provides minigrant funding to allow participants to do projects with girls in their schools. The goals of the equity minigrant program are to develop and produce activities that will impact girls directly and thus improve the recruitment and retention of girls in science, engineering, and mathematics education and careers; and to facilitate the dissemination of information related to careers in science, mathematics, engineering, and technology disciplines to girls. Minigrant funding was provided by the National Science Foundation, Eisenhower Regional Math/Science Consortium at the Appalachian Educational Laboratory, and the Virginia Space Grant Consortium.

For more information on the Counseling for Gender Equity project, visit http://genderequity.vsgc.odu.edu or contact the project's co-director, Mary Sandy, at (757) 865-0726 or via e-mail at msandy@odu.edu.

"Girls Can" Group with leader, Evelyn Mitchell.

"Girls Can" speaker Julie Kephart, an architect.

Equity Conference 1999:
Mathematics, Science, and Technology for ALL Children

The Virginia Space Grant Consortium invites you to attend *Equity Conference 1999*, which it is co-sponsoring with the Eisenhower Regional Consortium for Math and Science Education and the Region IV Comprehensive Center at AEL. The conference will be held May 6–8, 1999 at the Sheraton Music City in Nashville, TN. *Equity Conference 1999* will focus on equity issues in education for girls, special needs populations and multiculturalism. Teachers, administrators, guidance counselors, university education faculty and students, as well as anyone interested in math, science, and technology education are encouraged to attend.

This exciting conference will feature two keynote speakers. Dr. David Sadker, noted gender equity specialist and author of *Failing at Fairness: How Our Schools Cheat Girls*, will speak the morning of Friday, May 7. Dr. Vinetta C. Jones, Executive Director of EQUITY 2000, a national district-wide education reform initiative of the College Board that seeks to close the gap in college-going and success rates between minority and non-minority, advantaged and disadvantaged students, will speak Saturday, May 8 on multiculturalism. A variety of breakout sessions are planned throughout the conference and will include sessions led by three VSGC Gender Equity Trainers: Judy Kidd, Math Instructor at James Madison University; Beblon Parks, Director of Leadership Development and Human Relations at the Virginia Education Association; and Heidi Dickens, Technology Integration Specialist for the Pulaski County School District.

Questions to be addressed at the conference include the latest research about equity in relation to math, science and technology education; some of the best practices for addressing equity issues in the classroom; and resources available for implementing equity strategies in classrooms, schools, and districts. Register today—the cost of the conference is only $75 per person or a group registration of three participants can attend for the low rate of $130. To arrange for lodging, contact the Sheraton Music City Hotel directly at (615) 885-2200.

For more information on Equity Conference 1999, please call AEL's April Noble at 1-800-624-9120 or visit the conference's homepage at http:// www.ael.org/ eisen/equity99.htm.

1999 Industry Internship Program Now Underway

The VSGC is proud to announce the 1999 Industry Internship program has been implemented at all five Virginia Space Grant universities. The Consortium has partnered with the College of William & Mary, Hampton University, Old Dominion University, University of Virginia and Virginia Tech to provide Industry Internship opportunities for undergraduate students during 1999.

The Industry Internship program was developed in an effort to promote the participation of undergraduates in aerospace-related science and engineering industry experiences. The goals of the internship program are to provide students with *real-world* work experience, an opportunity to apply their skills to real-world problems, and interaction with other professionals in industry work settings.

Students interested in participating in the Industry Internship program can contact Heidi Davis at the VSGC via e-mail, hbdavis@odu.edu, or by phone at (757) 865-0726.

Gender Equity Training at the Science Museum of Virginia

In January, the Virginia Space Grant Consortium provided a gender equity training workshop for the Science Museum of Virginia's education staff. Judy Kidd, an instructor of Math at James Madison University in Harrisonburg, VA, conducted the training at Virginia Commonwealth University's new School of Engineering building. The workshop's content is based on the VSGC's Gender Balanced Education Training Module, and offers awareness-raising activities; tools for peer and self-assessment, small-group activities; and classroom methods for encouraging a gender balanced education for all students, with an emphasis on offering effective strategies for encouraging girls in math, science and technology.

The VSGC has a cadre of 20 trainers, informed on the issues and well-qualified to train teachers, counselors and administrators about the special issues that girls face in the classroom. A key goal is to help provide information and strategies for encouraging girls in science, math, engineering and technology. These trainers, who already have outreach roles in their professional careers, including working at women's centers, community and four-year colleges and K-12 school programs, form a statewide resource team to provide professional development programs. Since Spring 1996, over 400 teachers, administrators and other educators have been trained through the VSGC's Gender Balanced Education program. Trainings are modified to fit the particular interests of the group and range from one-hour motivational speakers to half-day and full-day workshops.

For more information or to schedule a gender balanced training workshop, contact VSGC's Amy Dawson via e-mail, acdawson@odu.edu, or by phone at (757) 865-0726.

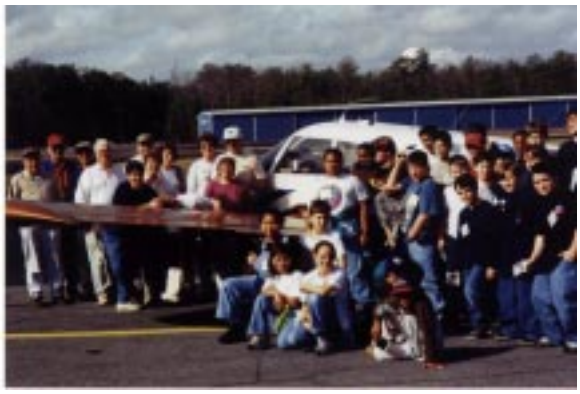
Space Quest: An Aerospace Adventure

The 1999 Space Quest weekend was held January 23–24 at the Airfield 4–H Center in Wakefield, VA. The annual weekend affords youth in the region the opportunity to participate in hands-on activities emphasizing aerospace topics. This year's program included the construction and blastoff of model rockets; an astronomy presentation by Kent Blackwell, a Chesapeake astronomer; and four aerospace workshops facilitated by Amy Hennage, Outreach Educator from the Science Museum of Virginia. Of special significance was a program hosted by the EEA Chapter #339 of the Young Eagles program whereby all participants were given the opportunity to fly in small aircraft.

The Virginia Space Grant Consortium provided financial support for the 1999 Space Quest weekend in which thirty-three youths, ages 9–16 from across the Tidewater and eastern Virginia areas, participated. This annual event is sponsored by the Virginia Cooperative Extension, which is a joint program of Virginia Tech, Virginia State University, the U.S. Department of Agriculture, and state and local governments.

It is wonderful that this type of partnership exists with the VSGC allowing interested youth to participate in aerospace workshops and perhaps furthering the desires for these youth to investigate potential careers in the aerospace industry.

Marvin Heimbach
Extension Agent & Program Director
Virginia Cooperative Extension



1999 Space Quest Participants at the Airfield 4–H Center in Wakefield, VA.

Participants constructing model rockets.

PBS to Re-Broadcast VSGC Gender Equity Programs

The PBS Adult Learning Service will re-broadcast two VSGC–developed programs on *Leadership Strategies for Gender Fair Counseling and Learning* on April 28, 1999, 3–4 p.m. ET. The programs were developed in part with funding from a National Science Foundation grant and are part of a VSGC project on *Counseling for Gender Equity*.

One 30–minute video program features Dr. Sue Rosser, Director of the Center for Women's Studies and Gender Research at the University of Florida. Dr. Rosser is author of more than 70 journal articles and six books, including *Re-engineering Female Friendly Science*. A second 30–minute video program features Dr. David Sadker, an American University professor, who has been involved in training programs in over forty states and overseas to combat sexism and sexual harassment. Dr. Sadker has authored six books, including *Failing at Fairness: How Our Schools Cheat Girls*, as well as more than 75 journal articles.

Both of the PBS professional development programs provide practical information and strategies for K–12 school counselors who play a critical role in the choices girls make. The programs discuss how gender equity research impacts counseling and education; the societal and cultural dimensions that affect how counselors and teachers treat girls; models of classroom equity; a five-stage model for transforming curricula to attract and retain women; information on how to sustain girls interest in science; and the use of role models, mentors, and enrichment programs.

Adult Learning Service

Complete information on this satellite broadcast can be obtained by calling PBS Adult Learning Service at (800) 257-2578 or by accessing their web site at http://www.pbs.org.

Additional gender equity resources for counselors and other information regarding educational equity can be found at http://genderequity.vsgc.odu.edu.

Happenings

⇒ ***Counseling for Gender Equity* 1999 Summer Institute, August 10–13, in Roanoke, VA. Applications will be accepted through April 30, 1999. Visit http://genderequity.vsgc.odu.edu.**

Science Museum of Virginia *Richmond—(804) 367-0000, (800) 659-1727, http://www.smv.mus.va.us*

⇒ It's back and better than ever. What's back? The Science Museum of Virginia's newly renovated IMAX® theater. It has a brand new state-of-the-art five-story dome screen, new digital sound system, upgraded projector, new carpets, better aisle lighting — and a new name — the **Ethyl Corporation IMAX®DOME & Planetarium.** Now showing—***Whales***, ***Grand Canyon: The Hidden Secrets***, and ***Rolling Stones "At the Max"***.

⇒ Admire the stars of spring at **Sky Watch** on May 21 at 9 p.m. (weather permitting). Members of the Richmond Astronomical Society share their telescopes. This event is free and open to the public.

Virginia Air & Space Center *Hampton—(757) 727-0900, (800) 296-0800, http://www.vasc.org*

⇒ Have you ever wondered what it would be like to live in space? Well, your chance to find out is now showing in the IMAX® theater! Take a sneak preview of how humans may live and work in space in the near future. Join a young girl, 100 years in the future, as she gives viewers an in-depth look at her home, ***L5: First City in Space***. VSGC staff enjoyed the movie's premiere featuring former NASA astronaut, Kenneth Reightler, and a VSGC-sponsored reception. Also showing in the IMAX® theater—***Mysteries of Egypt*** and ***Special Effects***.

⇒ Don't miss the ***What Makes Music?*** traveling exhibit showing through May 9. From Slinkies that show sound waves to motion synthesizers that digitally record and change sound, *What Makes Music?* examines the relationship between music and science through hands-on exhibits. The exhibit is presented using five themes: *Sound Waves: Shapes and Sounds, Harmonics—Color of Sound, Pattern—Musical Math, Acoustic Sounds* and *Electronic Sounds.*

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