EDUCATION SECTION ABSTRACTS FROM THE 83rd ANNUAL MEETING MAY 19-20 JAMES MADISON UNIVERSITY HARRISONBURG, VA

DEVELOPMENT OF NEW ASTRONOMY EXHIBITS AT THE SCIENCE MUSEUM OF VIRGINIA. K. D. Wilson, Science Museum of Virginia, Richmond VA 23220. Astronomy has been a part of the Science Museum of Virginia's program since its earliest days. However it has never had any permanent astronomy exhibits other than its planetarium. A temporary, traveling exhibit, "Night Visions" opened in 1987 but left the exhibit floor several years ago. In recent years few, if any, permanent museum exhibits were devoted to this vast and interesting topic. In 2004 the museum began fast track development of Cosmic Visions, a new 3,000 square foot gallery of eight astronomy exhibits, scheduled to open in the fall of 2005. Topics of these exhibits will include: phases of the moon, reasons for seasons, meteorites, star pattern perspectives, the current night sky, current astronomical discoveries, the celestial sphere, and astronomical telescopes. These exhibits were designed to be highly interactive and support many Virginia Standards of Learning (SOLs).

SOL ENRICHMENT: RAISING SCORES IN ELEMENTARY SCIENCE. Patricia D. Fishback and David B. Hagan, Center for Science Education, Science Museum of Virginia, Richmond, VA 23220. Since 1999, the Science Museum of Virginia has collaborated with educators in Richmond Public Schools to design a program that would help solve the problem of low scores on students' 3rd and 5th grade science SOL tests. Although a direct statistical correlation to the program is not possible, the students' scores improved dramatically and the program has been renewed every year. Gains made by students who are in the program are about twice what they are for students who are not in the program. Teachers as well as students benefit from the in-class series of hands-on science lessons. The program continues to grow, and has been conducted in Petersburg and Chesterfield. A description of the program and its effects, such as changes in scores and increased teacher competency and comfort regarding science, will be presented.

LAB DEVELOPMENT FOR INTRODUCTORY BIOLOGY. Brittany P. Trant & Lynn O. Lewis, Dept. of Biological Sciences, University of Mary Washington, Fredericksburg VA 22401. According to the TIMSS study and Project 2061, Americans are falling behind other leading countries in science and math achievement. Also by valuing breadth over depth in the curriculum, we are weakening the ability of our citizens to question and make informed decisions regarding their lives. In present classrooms, science is focused on lecture and highly structured labs with little room for independent analysis or methods. Because of this students never truly learn what scientific inquiry is until they choose to enter a science field. Therefore, the goal for this study was to implement "real world" labs that can be used in conjunction with traditional teaching methods. Thus allowing students to develop critical thinking skills, learn how to apply knowledge, and still meet the standards outlined by state and federal

law. Labs were designed to integrate a variety of biological topics (scientific method and procedures, photosynthesis and respiration, protein function, data interpretation, disease, evolution, ecology, human physiology) that encouraged students to explore alternate solutions to current problems while learning how to question and support an argument.

MATHEMATICS: REASONS TO VALUE IT. Michael Gentry[1] & James McCrory[2], [1]Department of Mathematics & [2]Department of Education, Mary Baldwin College, Staunton, Virginia, 24401. Although mathematics is valuable as a tool of science to describe or model the physical world, and scientists like Stephen Hawking, Lucasian professor of mathematics at Cambridge University, live life by the numbers, for the vast majority of American citizens, mathematics is important for other reasons. It is argued that mathematics is relevant to everyday concerns at work, home, and school because it teaches important life lessons.

RAT BASKETBALL: A SLAM DUNK FOR EDUCATION AT THE SCIENCE MUSEUM OF VIRGINIA. Leeanna T. Pletcher, Science Museum of VA, 2500 W. Broad St., Richmond VA 23220. Norway rats, *Rattus norvegicus*, were trained using operant and classical conditioning to perform a complex task. A skinner box 17.5" wide, 27" wide and around 15 inches tall was constructed. Training began March 31st, 2004 in the Science Museum of Virginia's Biolab 1, training sessions have been open to museum visitors. Feeding pellets were used as positive reinforcement for each target behavior. Training took between 4 and 7 months and consisted of 15- 30 minute sessions where one of 13 target behaviors must be performed 50 repetitions. Two rats successfully completed training and first performed the Rat Basketball Demonstration on August 17th, 2004. During this 20 minute demonstration, museum guests are introduced to the topics of operant conditioning and basic theories of learning by watching two rats play a game of basketball. Information about the natural history of rats is also shared. The Rat Basketball Demonstration has proven popular with museum visitors and is now running twice daily.

TEACHING AND LEARNING SCIENCE IN A WIRELESS CLASSROOM ENVIRONMENT USING TABLET PC'S. Mark Cline, Ed Oakes, Neil Sigmon, P. Niels Christensen, Marissa Smith, Kristy Crigger & Joe King, Radford University. The Tablet PC would seem to be a perfect fit for the classroom with wireless connectivity. When integrated into the wireless teaching and learning environment that includes appropriate instructional technologies, software applications and technical support, one could expect new problems as well as advantages. Beginning the Fall of 2004 Radford University instituted a wireless campus environment and distributed tablet pcs to many faculty. A multidisciplinary "Wireless Classroom Project" was conducted through its Honors Academy during the fall and spring semesters of the past academic year, in which students as well as faculty had access to the wireless campus environment during class time. Our panel of faculty, students and director of academic

computing discuss the advantages and limitations discovered through various implementations of this collaborative faculty and student project.

VIRGINIA'S BIODIVERSITY: A SERIES OF HANDS-ON ACTIVITIES FOR ELEMENTARY STUDENTS. Emily Betts[1,2] & Eugene G. Maurakis[2,3], [1]Virginia Commonwealth University, [2]Science Museum of Virginia, [3]University of Richmond. The Science Museum of Virginia's mission calls for the education of Virginia citizens in the concepts of science and in the study of Virginia's natural resources. Elementary teachers, especially those who have not specialized in science, need resources to improve science understanding and exposure among their students. The Virginia Biodiversity Activities were conceived to satisfy this need for affordable hands-on activities that encourage student-led learning. The objectives of the Virginia Biodiversity program are to educate students and the public about biodiversity, give needed attention to invertebrate groups and allow students to make observations, ask questions and make comparisons. The Virginia Biodiversity program consists of five activities about butterflies, insects, invertebrates from the Chesapeake Bay, fossils and rocks and minerals. Evaluations by pre-service and VAST teachers, and 3rd grade students indicate that activities meet needs for hands-on activities in elementary classrooms with appropriate group size and specimen care. Funded in part by Junior League of Richmond and Virginia Museum of Natural History.

CREATION OF A NATURE CENTER TO SUPPLEMENT ELEMENTARY SCHOOL SCIENCE INSTRUCTION. J. Orion Rogers[1] & James T. Togers[2], [1]Radford University, Radford, VA 24142, [2]Radford High School, Radford, VA 24141. Literature surveys reveal that schoolyard habitats, such as organic gardens, wetlands and wildflower meadows, provide students a context for learning science and promote opportunities for interdisciplinary teaching. This project involved creating a nature center at Belle Heth Elementary School in Radford, Virginia during May and June of 2002. A 720 square feet plot of neglected land adjacent to the school grounds was cleared, and three study areas were planned to enhance teaching and learning of selected science SOLs. The project required over 266 hours of planning and labor as well as over $632 in donations of money and materials. Objectives included providing students opportunities to conduct field identification of rocks, plants, birds and butterflies as well as experiments on plant growth and predation and bird dietary preferences. Study areas were designed for botany with 27 different plant specimens, for geology with nine different rock specimens and for birds with a birdbath, robin shelf, bluebird house and bird feeders. Data revealed that experiential learning enhanced science instruction and Virginia Science SOL Test passing scores increased from 80.6% in 2001-02, the year before the nature center was established, to 90.6% in 2003-04.