

Science & Mathematics Education

Winter 2007

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"Fostering sustainable communities through life-long learning in science and mathematics"

"There is always one unexpected little moment in life when a door opens and lets the future in."
Graham Greene

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NEW Area of Concentration in Free-Choice Learning

A quiet revolution in education is unfolding and OSU's Science & Mathematics Education Department is one of the leaders.

Due to changes shifting societies from an Industrial focus to a Knowledge base, the world's citizens find themselves needing to be life-long learners more than ever. Interestingly though, in this new Learning Society, where learning is available 24 – 7, from cradle to grave, the centers of the revolution are not traditional educational entities such as schools and universities, but a

vast network of informal learning organizations and media including museums, libraries, television, film, and increasingly the Internet.

In 1990, Naisbitt & Aburdene confirmed that visiting museums and museum-like settings was one of the most popular leisure time activities in America, exceeding attendance at all professional sports combined and the popularity of cultural institutions, eco- and cultural tourism and value-added entertainment, has only grown in the last decade and a half.

It is in this context that the department is pleased to announce an innovative new graduate concentration in free-choice learning. This concentration is designed for individuals preparing to conduct research and evaluation in free-choice learning organizations such as museums, science centers, public broadcasting/journalism and parks, zoos and aquariums, as well as work as educators in these settings. This concentration

complements the existing K-12 and college teaching options and makes the Science & Mathematics Education Department at OSU the first in the nation to offer a graduate degree that prepares the next generation of 21st Century learning leaders to support lifelong science and mathematics learning and its role in sustainable communities.

Drs. John H. Falk, Lynn D. Dierking, and Shawn Rowe are the lead research faculty for this option. John Falk, Sea Grant Professor in Free-Choice Learning, also is President of the Institute for Learning Innovation in Annapolis, MD, a not-for-profit free-choice learning organization he founded and directed for 20 years. His research interests include investigating the long-term learning impact of free-choice educational institutions on individuals and communities, the role of situated-motivation in leisure decision-making and learning, and new business models for museums and other cultural institutions.

Lynn Dierking shares the Sea Grant Professorship in the department with Falk and is also the Vice President for Special Initiatives at the Institute. Her research interests include investigating the long-term impact of free-choice learning experiences on children and families, the development and research of community-based programs for family and youth, particularly those serving underserved communities and the role of gender and race in influencing participation in science.

Drs. Falk and Dierking define free-choice learning as the learning that individuals engage in throughout their lives when they have the opportunity to choose what, where, when and with whom, to learn. Although this form of learning is frequently referred to as informal learning, Falk and Dierking prefer to use the term free-choice learning, since rather than defining learning by what it is not (non-formal), or where it occurs (informal), free-choice learning focuses on the characteristics of such learning--non-linear, personally motivated and most importantly, involving considerable choice on the part of the learner as to when, where, with whom, and what to learn. The most common type of lifelong learning is free-choice learning which people engage in when learning a new technology, researching a drug on the Internet recommended by a doctor to deal with high blood pressure, talking to a mechanic about the care of today's more complex cars, as well as visiting museums or other cultural institutions, watching television, or joining an amateur astronomy club. We engage in this type of learning across our lifespan, as children, adolescents, young adults, and older adults.



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Key Ideas about Free-Choice Learning

People learn throughout their lifetime, but not just in schools, universities or on the job – at home, after work and on weekends.

As a society we need to recognize and support the vast, important and successful learning enterprise that takes place outside of schools and the workplace – learning from museums, libraries, the Internet, television, film, books, newspapers, radio and magazines.

Collectively, these experiences encompass what is known as the “free-choice learning” sector. As the world transitions from an industrial society to a knowledge-based one, learning across the lifespan becomes increasingly important. Unfortunately, this important type of learning is poorly understood and undervalued but can and does make a significant contribution to public understanding of science. In fact, it is so common that we have taken it for granted, despite its being as vital as learning in school and the workplace.



Free-choice learning is amazingly efficient and effective because people have control over what and how they learn, and because

they can also choose to learn in appropriate and supportive contexts. For example, if they are interested in science, they can visit a science museum or borrow a book about science from the library. If they want to learn about nature, they can go to a state, regional or national park.

Any sustainable community or public education reform effort that does not embrace the benefits of free-choice learning is incomplete. Educational reform should support lifelong science and mathematics learning, not just the learning of children and youth. This will be a major research focus of SMED as this new area of concentration is created.

Naisbitt, J. & Aburdene, P. (1990). *Megatrends 2000*. New York: Avon.

Alumni Corner

Thanks to **Chris Coffin**, **Steve Baker**, and **Reitha and Russ Weeks** for their submissions to the “Name the Newsletter” contest. Although their entries were not chosen, they submitted some great suggestions that inspired the motto in the newsletter masthead.

Located right down the hall from the department office, **Chris Coffin** teaches the general physics courses (PH 201/202/203 and PH 106) here at Oregon State University. He started just 2 years ago. Chris received his M.A.T. (in advanced secondary math) in 2002 and tutored privately for a couple of years before he was invited to teach here. Chris holds a B.S. degree in Engineering-Physics--OSU '83. “It’s a tremendous challenge--particularly in light of the whole budget situation statewide--but I see that as a great opportunity to be in on a complete re-invention of the physics “experience” for OSU students over the next few years. I don’t get tired of telling this story, and I want more students (yes, the non-physics majors) to walk away intrigued and glad they had the course,” Chris remarked.

Reitha Weeks is the Resident Scientist and Program Manager at Northwest Association for Biomedical Research (NWABR), a non-profit science education organization in Seattle whose mission is to promote the understanding of biomedical research. Reitha develops curricula for middle and high school science teachers throughout the region. One curriculum combines consumer awareness, science and regulations by engaging students with an examination of their favorite lotion. Labels, claims, ingredients, regulations, emulsion chemistry, safety testing, and ethical issues are all covered in the multi-lesson curriculum which includes a lotion-making lab. Reitha leads the teacher workshops and coordinates the use of a lotion-making loaner kit available to classrooms at no charge. Reitha has assisted with other curricula focusing on ethics in the science classroom, including a stem cell curriculum that uses planaria as the animal model for regeneration. Reitha has fifteen years of biotech industry experience in molecular biology and small molecule development for various diseases, many publications, and a patent. Reitha is a native Oregonian, graduating from Newberg High School before obtaining her B.S. in Home Economics Foods and Nutrition at OSU in 1974. She went on to obtain her Ph.D. in Genetics from the University of Washington in 1987.

Russ Weeks received his B.S. in Mathematics at OSU in 1971 and an MBA from OSU in 1974. Russ was the developer of the mathematical predictive model for salmon harvest in 1972 under the NSF grant to OSU’s College of Oceanography and College of Business, entitled “Project Coho”. Russ worked in the computer software industry for 26 years as a project manager, vice-president, CEO and CFO for multiple companies in California, Oregon, Washington and New Jersey. In 2002, he completed a playwrighting certificate course at University of Washington. Over the last five years, he has had 12 productions in theatres around the country – many were plays with a science theme.

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Science and Mathematics Education in Rural Communities

Recently, Dr. Larry Enochs was selected as a Rural Studies Program Faculty Fellow. Dr. Enochs will be developing research and educational programs that will benefit rural students in the areas of mathematics and science education.

Larry's background in rural education includes serving on a panel of rural experts at the National Science Foundation, member of the NSF Rural Systemic Initiative Evaluation team, and establishment of a Center for Rural Science Education at Kansas State University.

Research on rural education can provide information for the improvement of schools in rural communities. Research on the preparation of quality rural teachers is an example of an important topic for our program. Larry will conduct research that will focus on the preparation, recruitment, and retention of quality teachers in rural communities. Additionally, Dr. Enochs will recruit doctoral students, who are interested in the rural setting.

Presently, he has one PhD advisee working on a dissertation entitled "Mathematics Enhancement in Agricultural Courses in the Rural High School." Larry is currently developing a Kellogg proposal that partners rural schools and their communities. The proposal is through a partnership with the OSU Hydroville

Curriculum Project, the Science and Mathematics Education department, and the Rural Studies Initiative. This proposal will focus on the schools, parents, seniors, and general community. The innovation is a Hydroville curriculum that assists the community by providing knowledge and methods for conducting indoor air quality assessment and will lead to the improvement of the health of their lives.

Lastly, Dr. Enochs attended the National Rural Education Association conference in October, 2006 to be appointed the Research Brief Editor of *The Rural Educator* journal. This appointment gives him the opportunity to develop reviews of research on topics and issues.

Scholarship Recipients

The faculty of Science and Mathematics Education are pleased to announce the recipients of 2007-2008 scholarships.

Receiving the **Oregon Laurels Scholarship** are Sarah Covelle, James Sowell III, Holli Stoneroad, and Marilyn Yorgey.

Receiving the **Oregon Laurels Supplemental Scholarship** are Stephanie Killen, Marla Ranelletti, Sage Robertson, Jessica Todd, and Laura Toro.

Receiving the **Mario Pastega Scholarship** is Angela Bice.

Receiving the **Denabille Linville Scholarship** are Sally Ernest, Andrea Meadows, Marla Ranelletti, Holli Stoneroad, Haley van Weemen van Noord, and Marilyn Yorgey.

Receiving the **Clayton Dart Scholarship** is Laura Toro.

Receiving the **Chaplin Reike Scholarship** is James Sowell III.

and, receiving the **College of Education Scholarship** are Sunghwan Byun, Garth Hallyburton, and Stephanie Killen

Total Amount of Scholarships Awarded: \$77,234.00.

Conference News

The Association of Mathematics Teacher Educators (AMTE) held its eleventh annual conference in January in Irvine, California. **Maggie Niess** (professor emeritus), **Tina Johnston** (post-doctorate), and **Gulden Karakok** (doctoral candidate) were among the presenters. Maggie also held a pre-conference technology workshop, entitled "Preparing Teachers to Teach Mathematics with Technology."

The Association for Science Teacher Education (ASTE) also held its annual conference in January in Clearwater, Florida. Many of our faculty attended and were presenters – **Larry Flick**, **Emily van Zee**, **Nam Hwa Kang**, and **Janice Rosenberg**. Larry also presided over one of the sessions.

Newcastle University's International Centre for Cultural & Heritage Studies hosted a **U.K. Economic and Social Research Council (ESRC)**-supported seminar "Questions of Access: Research and Practice" in January. **John Falk** and **Lynn Dierking** made keynote presentations at the seminar.

The International Symposium on Advanced Technologies in Education "Designing the School of Tomorrow" symposium was held in Athens, Greece in January. **Lynn Dierking** gave the keynote address.

The Oregon Academy of Science held its 65th Annual Meeting on February 24th at Western Oregon University in Monmouth. One of our doctoral students, **Karen Bledsoe**, was Section Chair for presentations in Science Education. Presenters included members of our faculty – **Dr. Larry Flick** and **Dr. Larry Enochs**. Doctoral students also presented, including **Tim Collins**, **Dan Jansen**, **Leonard Cerny**, and **Karen Bledsoe**.

The Canadian Museum's Association's annual meeting was held in Toronto in January. **John Falk** gave the keynote address.

The Irish Museums Association's annual meeting was held in Dublin in March. **John Falk** gave the keynote address.

For information on how to make contributions to the programs and students in the Department of Science and Mathematics Education, please contact:

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You can also find information on giving at the OSU Foundation website: <http://osufoundation.org/>



Meet Our Mascot

Meet Max, the Science and Mathematics Education department Mascot. Max's owner is Dr. Rebekah Elliott. Like his owner, Max likes Math. Here he is pictured working a slide rule! Good dog, Max!!!

Max has a riddle for you, as told to him by Albert Einstein. There are 5 houses in 5 different colors. In each house lives a person with a different nationality. The 5 owners drink a certain type of beverage, smoke a certain brand of cigar, and keep a certain pet. No owners have the same pet, smoke the same brand of cigar, or drink the same beverage. The question is: Who owns the fish?

Hints:

- The Brit lives in the red house.
- The Swede keeps dogs as pets.
- The Dane drinks tea.
- The green house is on the left of the white house.
- The green homeowner drinks coffee.
- The person who smokes Pall Mall rears birds.
- The owner of the yellow house smokes Dunhill.
- The man living in the center house drinks milk.
- The Norwegian lives in the first house.
- The man who smokes Blend lives next to the one who keeps cats.
- The man who keeps the horse lives next to the man who smokes Dunhill.
- The owner who smokes Blue Master drinks beer.
- The German smokes prince.
- The Norwegian lives next to the blue house.
- The man who smokes Blend has a neighbor who drinks water.

Einstein wrote this riddle early during the 19th century.
 (Yes, Max has been around the block a few times).
 Einstein said 98% of the world could not solve it.
 It's not hard, you just need to pay attention and be patient.
 See the answer below.

house	1	2	3	4	5
color	yellow	blue	red	green	white
nationality	Norwegian	Dane	Brit	German	Swede
drink	water	tea	milk	coffee	beer
smoke	Dun Hill	blend	Pall Mall	Prince	Blue Master
pet	cats	horse	birds	fish	dogs

**"Do, or do not.
 There is no 'try'."**
 - Yoda
 ('The Empire Strikes Back')

Answer to Max's Riddle