AMSER QUARTERLY
NEWSLETTER OF THE APPLIED MATH AND SCIENCE EDUCATION REPOSITORY

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AMSER Spotlight: comPADRE

In addition to collecting individual web resources, AMSER partners with existing digital collections to bring their excellent materials to AMSER users. Recently, AMSER partnered with the comPADRE digital library to integrate their high-quality resources into our library. The comPADRE Pathway, part of the National Science Digital Library, is a growing network of educational resource collections supporting teachers and students in physics and astronomy. Formed by a partnership with the American Association of Physics Teachers, the American Astronomical Society, the American Institute of Physics/ Society of Physics Students, and the American Physical Society, comPADRE is designed to help teachers and learners find high quality physics and astronomy resources.

comPADRE
Digital Resources for Physics & Astronomy Education

The structure and content within comPADRE "combines the creation of multiple community-focused collections to meet user needs with the provision of central support and services for economy and scalability. This is analogous to the central services provided by a professional society to publish multiple journals focusing on the needs of diverse research communities." The comPADRE collections focus on the needs of specific communities for high quality materials selected and organized specifically for their members. Collections within comPADRE include:

- The Astronomy Center – Resources for introductory astronomy instructors
- Open Source Physics – Simulations, curriculum, and computational tools for upper level physics courses
- The Physics Front – Resources for pre-college teachers in physical sciences

AMSER has reviewed and selected applied physics and astronomy resources from comPADRE's collections and integrated these high quality materials into AMSER's own library. To find the comPADRE resources in AMSER click on "Advanced Search" from the home page, click on "Show Limits" (just under the Search and Clear buttons), and select "comPADRE" in the Source box. Click "Search" and you will get all the comPADRE records that AMSER contains. Be sure to check back regularly as more comPADRE resources are added each week. Some examples from this impressive collection include:

PIRA 200

http://physicslearning.colorado.edu/PiraHome/pira200/pira200.htm

PIRA, the Physics Instructional Resource Association, is an "association of professionals dedicated to the support and advancement of physics education." PIRA 200 comes from a four-year effort to create a list of the top 200 demonstrations most used by higher education to teach physics. The demonstrations cover a variety of physics topics including: Mechanics, Electricity and Magnetism, Fluid Mechanics, Optics, Waves & Oscillations, Modern Physics, Thermodynamics, and Astronomy. All demonstrations include pictures in order to make them as useful as possible, and many include "workshop" videos as well.

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The Exploration of Earth's Magnetosphere

http://www-istp.gsfc.nasa.gov/Education/Intro.html

This useful website, hosted by NASA and created by Dr. David P. Stern and

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Mauricio Peredo of the Goddard Space Center, describes Earth's magnetic field, its interaction with the stream of particles called solar wind, Earth's radiation belts, and more. The site provides short summaries for those looking for a quick and simple overview, 35 detailed sections illustrated with images and diagrams, suggestions for instructors, teaching materials, glossary, and a host of supplemental material. The material is also available in Spanish and French.

Astronomical Scales

http://school.discovery.com/lessonplans/programs/scale/

The Astronomical Scales lesson site, from Discovery Education's Lesson Plan Library, describes how scaling factors can be used to make representations of astronomical distances; how to write and solve equations that relate real distance measurements to scaled representations of the distances; and how the use of scientific notation makes calculations involving large numbers easier to manage. The lesson plan provides all the materials an instructor needs including objectives, procedures, discussion questions, and more. The lesson also provides links to further information on the topic, standards that the lesson applies to, and a list of vocabulary terms related to the lesson.

Do you know of a great collection of resources that you'd like to see integrated into AMSER? Do you have a learning object that helps students truly understand a specific concept? If so, e-mail us at resources@amser.org, *or follow the link at the bottom of the AMSER home page to submit a resource suggestion.*

New on AMSER: Key Concepts

AMSER is in the process of developing a new subject vocabulary to further support educators and students when searching for key STEM concepts within the AMSER portal. This new vocabulary, which we have named Key Concepts, draws upon the fundamental topics of math and science – from atoms to atmosphere – that are the building blocks for meaningful student understanding of more complex subjects. By connecting our Key Concept vocabulary to AMSER's resources, keyword searching will be more productive for AMSER users. Currently, this vocabulary encompasses agriculture, astronomy, biology, botany, chemistry, ecology, economics, geography, geology, health, mathematics, meteorology, oceanography, and physics. We are also working on additional Key Concept lists for computer science and the various branches of engineering, from electronic to nuclear.

Developing a Key Concept vocabulary is a process that involves not only the AMSER staff but also experts from the larger AMSER community. Initial drafts of the Key Concept vocabulary were culled by AMSER librarians from textbooks, professional associations, the NSDL, and other authoritative sources. AMSER then recruited faculty in various fields from community and technical colleges to review and edit the lists as they saw fit. Revisions were then made to the Key Concept vocabularies and adopted into AMSER. The process is ongoing as the vocabulary is periodically revised and expanded to make it as current and as useful as possible.

In addition to facilitating keyword searching, Key Concepts also provide a valuable way to browse AMSER. Users can now browse AMSER using our two original classifications (GEM and Library of Congress) as well as our Key Concept vocabulary. From the home page of AMSER, users can click on the "Resources" tab near the top right hand side of the page. This will lead directly to the "Browse Resources" section of AMSER and our Key Concept Classifications. The two-level construction of Key Concept browsing allows visitors to see the topics available in each subject area and immediately retrieve relevant resources that demonstrate a specific concept. The Key Concept vocabulary can also be useful to the digital library community as a standardized STEM controlled vocabulary, free for any other organization to use in their own collections.

Input from the community is vital to efforts in creating digital library enhancements like Key Concepts. If you would like to be a part of this or future projects with AMSER, please contact Chanda Halderman at *chalderman@scout.wisc.edu*.

Åsa Bradley teaches physics at Spokane Falls Community College in Spokane, WA and holds a BS in Physics from Sam Houston State University and a MS in Medical Physics from the University of Colorado, Health Sciences Center. She's currently working on her MFA in creative writing at Eastern Washington University. An avid proponent for getting kids interested in science at an early age, she's active in the Science Olympiad and Expanding Your Horizon programs. She believes that all students can excel in science, as long as they encounter teachers along their academic paths who show them how much fun it is.

In each issue of the AMSER Quarterly we feature one of our users and how they utilize AMSER in their classroom. Here, Bradley shares her experiences using AMSER in a multidisciplinary physics course.

One of my favorite classes to teach is a Learning Community that I usually do once a year in the fall with a colleague from the English department. We combine her Composition I & II with my Conceptual Physics. The unique thing about teaching a fully integrated Learning Community is that there are no separate Physics and English lectures or activities. Instead both instructors are in the classroom at all times and the students work on projects and labs that hone their composition skills while they learn about physics. It incorporates a lot of group work and often the students themselves lead the class discussions. This teaching style transforms them into confident and independent learners, while it invigorates the instructors. We come away from this class recharged and full of ideas for our regular classes during the rest of the academic year. The class culminates in our student groups presenting a large final project at a Learning Community fair, which is attended by students and faculty from our whole campus.

The most engaging way to teach an integrated class is to teach to a theme. During our last two years, we've used the themes of sustainability and renewable energy. The title of the class is Fusion--The Unlikely Union of Physics and Composition. Energy is a good focus point for teaching just about all introductory physics concepts. In terms of student writing assignments, we've incorporated everything from researching political candidates' energy policies to investigative journalism about local energy usage. For the final project, each group has to solve the current energy crisis by reducing our oil dependency and moving us towards renewable energy usage instead. To discourage plagiarism, we assign each group a different renewable energy source to concentrate on, although they all incorporate a multitude of sources in their plans. We use AMSER throughout the course and here are some of my favorite links to use for lesson planning and as a research tools for my students.

The physics level of this class is conceptual, meaning there is no math pre-requisite for the class and most of the students are scared of algebra. In addition to the textbook, I've found the California Energy Commission's ***Energy Story*** (http://www.energyquest.ca.gov/story/) *a good resource for students to explore the relationship between energy and work, as well as learning about different types of energy. Once they are more comfortable with the concept or energy, or to keep more advanced students' interested, I send them off to the* ***Sustainable Energy*** *module of the MIT OpenCourseWare* (http://ocw.mit.edu/OcwWeb/Chemical-Engineering/10-391JSpring-2005/CourseHome/) *to explore the lecture notes there. I also found that the Related Resources link on this site is a great place to get the students started researching their final project.*

I often borrow from the lesson plans available at the ***Alliance to Save Energy*** *site* (http://www.ase.org/section/_audience/educators/lessons/high/). *Even though, these are geared towards high school, I find that most of them challenge and engage my students as well. These lessons are tied in with climate change and can lead to heated discussions in class. To make sure that my students have their facts right, I have them read the* ***Global Warming FAQs*** *that are developed by The University Corporation for Atmospheric Research* (http://www.ucar.edu/news/features/climatechange/faqs.jsp).

To support their final project energy plan, the students research types of renewable energy on AMSER, but they also need facts and figures about energy usage. A good site for national and international energy statistics is the ***Energy Information Administration***

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(http://www.eia.doe.gov/). *Often the students are interested in our local community's energy use, and if "green energy" is available in our state. Two good sites to use for that information are:* ***The Renewable Energy Atlas of the West*** (http://www.energyatlas.org/) *and* ***The Green Power Network's Buying Green Power*** (http://apps3.eere.energy.gov/greenpower/buying/buying_power.shtml).

In addition to figuring out how much energy we use currently, the students have to predict future global population growth to accurately assess future usage. A great way to help them do this is to teach a module using the free software MyWorld, a Geographic Information System (GIS) created by Northwestern University. Teaching materials and instructions for MyWorld software and ***Visualizing World Population*** *activity is available at* http://serc.carleton.edu/introgeo/visualizations/examples/*MyWrldPop.html.*

One last link I'd like to share with you is Bruce Mulliken's ***Green Energy News*** *site* (http://www.green-energy-news.com/). *By reading this a few times a week, I'm able to tie in current events, new technology, and just generally cool stuff in our classroom discussions.*

To see all the resources mentioned in this edition of the *AMSER Quarterly*, from both the AMSER Spotlight and User's Corner, visit *http://amser.org/amserquarterly/fall2008*.

Would you like to be featured in a future AMSER Quarterly? We'd love to hear from you and learn about your favorite AMSER resources and how you've been using them in an educational setting. Please e-mail us at amser@amser.org *for details.*

Calendar of AMSER Events

Where in the world is AMSER?

We'll be at various conferences and meetings this year and we'd love to talk to you about what you're doing with digital resources and how we can make AMSER more useful to you and your students. Here's where we'll be and when:

October

Conference on Information Technology (CIT)
October 19-22, 2008
Salt Lake City, Utah

Advanced Technological Education (ATE)
October 28-31, 2008
Washington, DC

November

Wisconsin Library Association (WLA)
November 4-7, 2008
Middleton, Wisconsin

For more AMSER events and links go to *http://www.amser.org/events*

Contact Information

Have a question? Want to share information about how you're using AMSER or other digital materials in your classroom? Please contact us!

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