

Science, Technology, Engineering, Math & Social Sciences (STEMSS)

Concepts are learned best when they are encountered in a variety of contexts and expressed in a variety of ways, for that ensures that there are more opportunities for them to become imbedded in a student's knowledge system. AAAS 1990, p. 198

In impoverished countries, wildlife conservation must be integrated with economic development to gain wide support. Tigerland p. 253

In his American Association for the Advancement of Science (AAAS) Presidential Address, John Holden (*Science* 319, 419 (2008)) expresses the connection between sustained human well-being and three interdependent societal "core responsibilities": namely, economic, sociopolitical, and environmental conditions (Holden 2008). Holden argues, as others have in the past (see referenced past AAAS presidential addresses), that progress in science and technology (S & T) is necessary to improve the human condition. The continued benefits humanity would gain of course imply the maintenance of a global work force educated in S&T disciplines. In pursuit of sustained human well-being, Holden concludes his Address with a call to action through various avenues including the use of relevant AAAS resources.

While keen eyesight and tracking expertise are helpful, diplomacy is one of the most important strengths of the conservation biologist's repertoire. Tigerland p. 252

Maintenance over time of a trained, socially conscience S&T work force requires young educated minds through the integration of science education topics with other disciplines throughout the PK-12 curriculum. PK-12 educational reform in science, technology, engineering, and mathematics (STEM) has been strongly promoted by the National Research Council (NRC, 1996), the American Association for the Advancement of Sciences (AAAS) via Project 2061 (<http://www.project2061.org/>), the National Science Teachers Association (NSTA; <http://www.nsta.org/>), and other organizations. Professional STEM societies and teaching organizations also play a critical role in connecting STEM and social science disciplines for the benefit of human society (e.g., BioSciEdNet <http://www.bioscienednet.org/portal/>). Using resources developed by these professional science organizations can help better understand the role S&T plays in improving sustained, human well being.

A social studies perspective is academically sound, multidisciplinary, and integrative. Robert Stahl (NCSS 1994, p. xvii)

While progress in STEM disciplines is necessary to improve the human condition, these disciplines are imbedded within the social fabric of society (AAAS 1990, p. 8). Thus, a strong connection between STEM and the social sciences disciplines must also exist to truly make lasting improvements in the human condition. This requires a work force educated in STEM and the social sciences with a global perspective (Baltimore, *Science* 319, 697 (2008) and Wagner's comments). One of the greatest examples of the need for a common understanding of both STEM and Social Studies (SS) to improve the human condition may be found in Garrett Hardin's 1968 essay: "The Tragedy of the Commons" (see updated version (Hardin 2006)). Educational reform efforts then should include interdisciplinary links among STEM and many disciplines (AAAS, 1998).

"Eric, what are the things we didn't teach you in graduate school that proved essential for your work in international conservation?" Without hesitation, I responded, "Diplomacy and patience." Tigerland p. 86

At the **Alice Hagar Curriculum Resources Center (AHCRC), Murphy Library, University of Wisconsin-La Crosse (UW-L)**, we have developed an extensive set of science, technology, engineering and math (STEM) K-12 outreach materials for use by pre-service teachers, in-service teachers, teacher educators, LMC directors, media specialists, public & university librarians and all others interested in STEM education. The two main outreach features linking STEM and Social Studies are the STEMSS website and Teacher Resource Day.

The STEMSS Website

(<http://www.uwlax.edu/murphylibrary/departments/curriculum/stem/index.html>), in the National Science Digital Library since 2007, connects users to a STEM framework which includes categories developed in AAAS' Science for All Americans (1990) and Resources for Science Literacy (1997) and increasingly to Social Studies topics. STEM website construction details are given in Gerber et. al. (2007). Reviewed and highly rated PK-8 science trade books provide the core grade level literacy connections in the K-12 Trade Books section along with AAAS' Netwatch website search function. This combination provides both grade level and teacher level materials on a STEM topic. A strong effort has been made to include K-12 resources from domestic and international, professional disciplinary and teaching societies. Many of these resources however are appropriate for K-16 to make our efforts more "systemic" in nature (see Malcom comments). This site also includes Science Fair, Career, and other STEM and social studies related links. Important connections to the social studies through the National Council for Social Studies' Curriculum Standards for Social Studies and SFAA's Human Society category, Chapter 7 (AAAS 1990).

Teacher Resource Day

<http://www.uwlax.edu/murphylibrary/departments/curriculum/stem/teacherresourceday.html>) is an annual event sponsored by the Alice Hagar Curriculum Resources Center. This event provides local in-service teachers, per-service teachers, and others interested in STEM and social studies education, access to the latest Science Books & Films' Best List, National Science Teachers Association's Outstanding resources, and Notable Books for Social Studies books and materials. Teacher Resource Day 2008 was the first combined STEM and NCSS' Notable Books section materials event.

Other AHCRC outreach links:

[TULIP Project](http://www.uwlax.edu/faculty/gerber/index.htm) (<http://www.uwlax.edu/faculty/gerber/index.htm>), also in the National Science Digital Library since 2004, this site connects you to materials useful for integrating plant science into your K-12 classes.

Mock SB&F Prize for Excellence in Science Books

<http://www.uwlax.edu/murphylibrary/departments/curriculum/stem/mocksb&f.html>) - this site connects you to informational materials and rubrics used to run a Mock SB&F election. Currently developed for UW-L pre-service teachers, a middle school version is being developed for the 2009 SB&F finalist book list.

International connections: Scotland

<http://www.uwlax.edu/murphylibrary/departments/curriculum/stem/internationalconnections.html>) - the global STEM perspective is an ever increasingly important one. Check out our STEM links with Scotland and their Curriculum for Excellence.

Other UW-L STEM outreach links:

STEM-Professional Development School

http://www.aacte.org/Governmental_Relations/AACTE_STEM_Directory2007.pdf) - Read (p. 92 of document) a brief outline of a program which began this Spring Semester 2008 in a local school district.

Wisconsin Praxis II study modules

<http://www.uwlax.edu/Mathematics/Personal/hoar/index.html>) - this site connects you to modules designed to help with the Praxis II exam.

STEM Alliance (<http://www.uwlax.edu/stem/>) - These are outreach programs which connect UW-L's School of Education and local school districts.

References:

American Association for the Advancement of Science (AAAS) Presidential Addresses related to the topic:

John Holden (*Science* 25 January 2008 319: 424-434)

Gilbert S. Omenn (*Science* 15 December 2006 314: 1696-1704)
Shirley Ann Jackson (*Science* 9 December 2005 310: 1634-1639)
Peter H. Raven (*Science* 9 August 2002 297: 954-958)
Jane Lubchenco (*Science* 23 January 1998 279: 491-497)

AAAS. 1997. Resources for Science Literacy. Oxford University Press.

AAAS. 1990. Science for all Americans. Oxford University Press.

Dinerstein, Eric. 2005. Tigerland and Other Unintended Destinations. Island Press/Shearwater Books. Washington.

* this book was the 2007 SB&F Prize for Excellence in Science Books “Young Adult” award winner.

Gerber, T., J. Jax, K. Lange, and S. Smith. 2007. Improving PK-12 Curriculum Resource Centers. *Science Books & Films (SB&F)* 43 (3): 98.

Hardin, G. 1968. *Science* 162, 1243.

Hardin, G. 2006. Science’s Magazines State of the Planet.

<http://www.sciencemag.org/sciext/sotp/>

Malcom <http://www.aaas.org/news/releases/2007/1214capacity.shtml>

National Council for the Social Studies (NCSS). 1994. Curriculum Standards for Social Studies. Bulletin 89. <http://www.socialstudies.org/standards/>

National Science Teachers Association’s Outstanding Science Trade Books

<http://www.nsta.org/publications/ostb/>

Stahl, Robert. 1994. NCSS Curriculum Standards for Social Studies.

<http://www.udel.edu/soe/deal/NationalStandard04.htm>

Wagner http://www.aaas.org/news/releases/2008/0116stls_wagner.shtml