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The Kayapo being expelled from their homes
From Source to Tap: Mapping Our Drinking Water
A Disappearing History On Tape
National Science Foundation Embraces Art Based Learning
Science, Technology, Engineering, & Mathematics

The blackout reminded many of us of how drastically the Internet and our myriad electronic devices have changed our lives. When the lights went out, we felt ourselves also losing power, as if we were part of the same flowing electricity that lit up the city.

Losing this power, however, also reminded my daughter and me of what we have left. Having "nothing better to do" can be a meaningful and sobering experience. While the darkness made us feel our vulnerabilities, it also illuminated the possibilities that we forgot were always within it.   ALLEN HIRSCH
http://www.nytimes.com/2012/11/03/opinion/what-i-saw-with-the-lights-out.html

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This image has to reach the rest of the world. **The Kayapo being expelled from their homes** for the construction of the Belo Monte Dam, which will flood 400.000 acres of the Amazon Rainforest in Brazil.
source: http://www.survivalinternational.org/about/belo-monte-dam
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From Source to Tap: Mapping Our Drinking Water
Mike Sweeney, Huffington Post

Do you know where your water comes from? If not, you're not alone. A study from last year showed that 77 percent of Americans don't know where their water comes from. (That doesn't include people who use private wells.) Thankfully, modern engineering lets us turn on the tap and clean, clear water comes out. We don't often think about where our water comes from because we aren't forced to. But these sources -- rivers, lakes, reservoirs, and watersheds -- provide abundant drinking water for millions of Californians and we're placing more demand on them than ever.
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Radio Tanzania: A Disappearing History On Tape

North Country Public Radio -
Radio Tanzania: A Disappearing History On Tape. Nov 3, 2012 — A group is trying to save the station's massive tape *archive*: music, poetry, drama and
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National Science Foundation Embraces Art Based Learning
Just don't call it STEAM.
At least that's what the National Science Foundation (NSF) seems to be saying last week, in their latest grant to launch incubators in San Diego, Chicago and Worcester, Mass.

But maybe it's not that important, is it?

The fact that more organizations like the NSF are finding that the arts help young people stimulate "the development of 21st Century creativity skills and innovative processes" is exceptional, and it sends the signal that this is what America's schools are most in need of. NSF funded the Art of Science Learning last year to produce three conferences -- in Washington, D.C., Chicago, Illinois and San Diego, California -- to look at what business, education, and communities across the United States were doing to merge the "two cultures" of art and science. In the process, Harvey Seifter, head of the project and founder of the Art of Science Learning firm, explored a framework for sparking creativity and innovation in our schools, our workplaces and in our nation; a proposal that the NSF might find attractive to underwrite.

NSF, in its announcement last week, made clear that it hopes that a new model for education will become apparent over the next few years. Specifically they state:
The goal of the project's development activities is to experiment with a variety of "innovation incubator" models in cities around the country. Modeled on business "incubators" or "accelerators" that are designed to foster and accelerate innovation and creativity, these STEM incubators generate collaborations of different professionals and the public around STEM education and other STEM-related topics of local interest that can be explored with the help of creative learning methodologies such as innovative methods to generate creative ideas, ideas for transforming one STEM idea to others, drawing on visual and graphical ideas, improvisation, narrative writing and the process of using innovative visual displays of information for creating visual roadmaps.

The grant totaling $2,654,895 is called "Integrating Informal STEM and Arts-Based Learning to Foster Innovation." Harvey Seifter, Art of Science Learning founder/director, is the project's director and principal investigator. Balboa Park Cultural Partnership in San Diego is the project sponsor and Paige Simpson, the Partnership's Interim Executive Director, is project administrator.

Earlier this year the National Endowment for the Arts (NEA) announced its grant agenda in art and science. Proposals that demonstrate how both subjects can be woven together in an art work, or play, demonstration or lab experiment or even an educational effort costing no more that $10,000 to $100,000 are welcomed (there is a one-to-one match required) by the deadline of Aug. 1, 2012. (An archive of the webinar has been posted in the "Podcasts, Webcasts, & Webinars" section of the NEA website.)

Bill O'Brian, senior adviser for Innovation programs at the NEA said that "creativity and innovation" clearly support U.S. economic interests and he expected this effort to continue well beyond the current request for applications. He also noted that the government community of artists and scientists are very much in agreement that these are the kinds of things they wish to fund.

Like the NSF, he stopped short of endorsing STEAM per se -- maybe too political a decision -- but he seemed enthusiastic about the idea of funding art and science projects.
Whatever it's called, ArtStem, STEAM, ArtsSmarts -- and there are other versions too -- the arts are vital to changing the paradigm, and are being recognized for their uniqueness in fostering creativity... which leads to innovation.

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Science, Technology, Engineering, & Mathematics

Science, Technology, Engineering, & Mathematics (STEM) information.

Science, technology, engineering, and mathematics (STEM) education is used to identify individual subjects, a stand alone course, a sequence of courses, activities involving any of the four areas, a STEM-related course, or an interconnected or integrated program of study. A nationally agreed upon definition for STEM education is currently lacking. This page and the links on it provide information and resources for kindergarten through grade twelve STEM education.

STEM Education Is

STEM education is a sequence of courses or program of study that prepares students, including underrepresented groups:

- for successful employment, post-secondary education, or both that require different and more technically sophisticated skills including the application of mathematics and science skills and concepts, and
- to be competent, capable citizens in our technology-dependent, democratic society.

Taken separately, the four STEM subjects are defined by the National Research Council as:

1. *Science* is the study of the natural world, including the laws of nature associated with physics, chemistry, and biology and the treatment or application of facts, principles, concepts, or conventions associated with these disciplines.
2. *Technology* comprises the entire system of people and organizations, knowledge, processes, and devices that go into creating and operating technological artifacts, as well as the artifacts themselves.
3. *Engineering* is a body of knowledge about the design and creation of products and a process for solving problems. Engineering utilizes concepts in science and mathematics and technological tools.
4. *Mathematics* is the study of patterns and relationships among quantities, numbers, and shapes. Mathematics includes theoretical mathematics and applied mathematics.

STEM education can be an interdisciplinary or trans-disciplinary approach to learning where rigorous academic concepts are coupled with real-world problem-based and performance-based lessons. At this level, STEM education exemplifies the axiom "the whole is more than the sum of the parts."

In Elementary Grades

STEM education:

- Provides the introductory and foundational STEM courses that lead to success in challenging and applied courses in secondary grades.
- Introduces awareness of STEM fields and occupations.

- Provides standards-based, structured inquiry-based and real-world problem-based learning that interconnects STEM subjects.
- Stimulates student interest in "wanting to" rather than "having to" take further STEM related courses.
- Bridges and connects in-school and out-of-school learning opportunities.

In Middle Grades

STEM education:

- Introduces an interdisciplinary program of study consisting of rigorous and challenging courses.
- Continues to provide standards-based, structured inquiry-based and real world problem-based learning that interconnects STEM-related subjects.
- Bridges and connects in-school and out-of-school learning opportunities.
- Increases student awareness of STEM fields and occupations, especially for underrepresented populations.
- Increases student awareness of the academic requirements of STEM fields and occupations .
- Begins student exploration of STEM related careers, especially for underrepresented populations .

In High School

STEM education:

- Provides a challenging and rigorous program of study focusing on the application of STEM subjects .
- Offers courses and pathways for preparation in STEM fields and occupations.
- Bridges and connects in-school and out-of-school learning opportunities.
- Provides opportunities for student exploration of STEM related fields and careers, especially for underrepresented populations .
- Prepares students for successful post-secondary employment, education, or both.

Resources
General Information

[Education Technology](#)
Provides assistance to schools and districts in integrating technology with teaching and learning.

[Mathematics](#)
Resources and information for enhancing the content knowledge and teaching skills of classroom teachers and links to foundational documents which guide California's mathematics instruction.

[Science](#)
Resources and information for enhancing the content knowledge and teaching skills of classroom teachers and links to foundational documents which guide California's science instruction.

Classroom Resources

[Engineering is Elementary Project (EiE)](#) (Outside Source)
EiE is a research-based, standards-driven, and classroom-tested curriculum that integrates engineering and technology concepts and skills with elementary science topics. EiE lessons not only promote science, technology, engineering, and mathematics (STEM) learning in grades 1-5, but also connect with literacy and social studies. A list of California districts and schools using this project will be posted.

[Engineering the Future: Science, Technology, and the Design Process (EtF)](#) (Outside Source)
EtF is a full-year course designed to introduce high school students to the world of technology and engineering, towards becoming technologically literate citizens. Designed as a full year course, teachers have taught variations ranging from using one project, to teaching a half year course, to conducting a course that runs for one and a half years. A list of California districts and schools using this project will be posted.

[NASA for Educators](#) (Outside Source)
NASA for Educators provides resources for kindergarten through college teachers and students. NASA's [Education Materials Finder](#) (Outside Source) helps teachers locate resources that can be used in the classroom.

[Space.com](#) (Outside Source)
Launched in 199, SPACE.com is a source for news of astronomy, skywatching, space exploration, commercial spaceflight, and related technologies.

[STEM Connect](#) (Outside Source)
STEM Connect provides real-world STEM curriculum and career development resources from Discovery Education highlighting the connections among science, technology, engineering and math.

[The Practical Uses of Math and Science (PUMA)](#) (Outside Source)
This is an Online Journal of Mathematics and Science, at NASA. This is a collection of examples ("lessons" or ""activities") showing how math and science topics taught in K-12 classes can be used in interesting settings, including everyday life.

[U.S. EPA Educational Resources for Teachers and Students](#) (Outside Source)
This is a collection of information, resources and publications, and links to awards, grants, workshops, conferences and other programs.

Grade Spans

[Elementary](#)
Resources for those interested in the academic achievement of kindergarten through grade six public school students; includes transition-to-school guidance.

[Middle Grades](#)
Information and resources for middle grades educators and parents. The middle grades consist of early-adolescent students, ten to fourteen years of age, generally in grades six to eight.

[High School](#)
Supports local educational agencies, grades nine through twelve, to improve student achievement and transition to postsecondary education and careers.

[Postsecondary](#)
Resources for students, parents, counselors, and educators that provide information about preparing for and gaining admission to college.

Initiatives and Networks

[California After School Network STEM in Out-of-School Time Initiative](#) (Outside Source)
Supported by the Bechtel and Noyce Foundations, this initiative advances high quality STEM opportunities for out-of-school time programs in California by providing out-of-school time practitioners, advocates, and community members with the resources and tools necessary to build high quality STEM programs.

[California STEM Learning Network](#) (Outside Source)
Through a grant funded by the Bill and Melinda Gates Foundation and the S.D. Bechtel, Jr. Foundation, a statewide planning effort is underway to create a California STEM Blueprint.

[California STEM Service-Learning Initiative](#) (Outside Source)
Secondary school and higher education student's work together to meet community needs through a STEM design process. They are supported by Regional Leads and a Regional Consortium.

[Change the Equation](#) (Outside Source)
Change the Equations (CtE) was launched on September 16, 2010, by President Obama as part of the [Educate to Innovate](#) (Outside Source) campaign. CtE is a CEO-led effort to dramatically improve STEM education. Within a year, CtE plans to replicate successful privately-funded programs in 100 high-need schools and communities.

[Digital Promise](#) (Outside Source)
Digital Promise is a national research center that will focus on developing new technologies like software and games for teaching and learning in public schools.

[Great Minds in STEM](#) (Outside Source)
The mission of Great Minds is to inspire and motivate underserved students to pursue careers in STEM and to enlighten and engage families, educators, communities and employers to assist underserved students pursuing STEM careers. Two main programs are [STEM Up](#) (Outside Source) and [Viva Technology](#) (Outside Source).

[Race to the Top](#) (Outside Source)
The Race to the Top (RttT) Fund provides competitive grants to encourage and reward States that are creating the conditions for education innovation and reform; implementing ambitious plans in the four education reform areas described in the American Recovery and Reinvestment Act of 2009 (ARRA); and achieving significant improvement in student outcomes. STEM is a component of RttT.

[The Science, Technology, Engineering, and Mathematics (STEM) Education Coalition](#) (Outside Source)
The STEM Education Coalition works aggressively to raise awareness in Congress, the Administration, and other organizations about the critical role that STEM education plays in enabling the U.S. to remain the economic and technological leader of the global marketplace of the 21st century.

Online Libraries and Centers

[Edutopia](#) (Outside Source)
Now in its 20th year, Edutopia is dedicated to transforming the learning process by helping educators implement [Integrated Studies](#) (Outside Source), [Project Learning](#) (Outside Source), [Technology Integration](#) (Outside Source), [Teacher Development](#) (Outside Source), [Social and Emotional Learning](#) (Outside Source), and [Comprehensive Assessment](#) (Outside Source).

[National Science Digital Library (NSDL)](#) (Outside Source)
Funded by the National Science Foundation, NSDL is the Nation's online library for education and research in science, technology, engineering, and mathematics.

[PBS Teachers STEM Education Resource Center](#) (Outside Source)
The PBS Teachers STEM Education Resource Center provides selected.STEM education resources. To find more, search the database of nearly 4,000 science, technology, engineering, and mathematics resources for grades preK-12. A printable [STEM Resource Round Up](#) (Outside Source; PDF; 126KB; 6pp.) is available for your use.

[Siemens STEM Academy Teacher Resources](#) (Outside Source)
Siemens, in partnership with Discovery Education, established the Siemens STEM Academy. The Resources section allows educators to share lesson plans, ideas, presentations, Web sites, videos and other STEM related resources that may prove useful for others who want to expand their classroom materials.

[STEM Center for Teaching and Learning](#) (Outside Source)
The STEM Center for Teaching and Learning was established in 1998 to strengthen professional development and advance technological literacy. Center initiatives are directed toward four goals: development of standards-based curricula; teacher enhancement; research concerning teaching and learning; and curriculum implementation and diffusion.

[STEM Inventory](#) (Outside Source)
Maintained by the California Space Education and Workforce Institute, this is an inventory of STEM programs in California and nationwide

[STEMReports.com](#) (Outside Source)
STEMReports.com brings you the latest research for science, technology, engineering, and mathematics (STEM) education from groups including the National Science Teachers Association (NSTA), the National Science Education Leadership Association (NSELA) and the Council of State Science Supervisors (CSSS).

Career Preparation/Readiness

[CalCRN](#)
California Career Resource Network (CalCRN): an interagency, state-level network created to support career guidance and academic counseling programs to promote improved career and education decisions.

[Career Counseling](#)
Resources for career counseling to assist students and adults in acquiring the knowledge, skills, and attitudes that enable a successful transition from school to work.

[Career One Stop](#) (Outside Source)
Sponsored by the U.S. Department of Labor, this site offers students, parents, and career advisors/counselors resources on identifying interest, exploring careers, educational options, writing resumes, and seeking work experience.

[Engineer Girl](#) (Outside Source)
Engineer Girl is part of a National Academy of Engineering project to bring national attention to the opportunity that engineering represents to all people at any age, but particularly to women and girls.

[Occupational Outlook Handbook](#) (Outside Source)
A career guidance publication from the Bureau of Labor Statistics for adults and upper-level high school students that describes the job duties, working conditions, training requirements, earnings levels, and employment prospects of hundreds of occupations.

[States' STEM Career Cluster](#) (Outside Source)
The STEM career cluster identifies pathways from secondary school to two- and four-year colleges, graduate school, and the workplace.

[STEM Equity Pipeline](#) (Outside Source)
This National Science Foundation funded project is part of the National Alliance for Partnerships in Equity. The purpose of the project is to expand options for women and girls in STEM.

[What Do You Like](#) (Outside Source)
The Bureau of Labor Statistics' Web site provides introductory career information for students in Grades 4-8. Most of the material on the site has been adapted from the Bureau's [Occupational Outlook Handbook](#) (Outside Source).

[Who Do You Want to Be?](#) (Outside Source)
This site includes Information on California high school and community college courses, career options, and financial assistance. It will help you make decisions about the right courses to take in high school and community college so that you have the opportunity to turn that passion of yours into a great job and a great future.

College Readiness

[Academic Literacy: A Statement of Competencies Expected of Students Entering California's Public Colleges and Universities](#) (Outside Source)
This is a joint document of the Intersegmental Committee of the Academic Senates of the University of California, California State University, and California Community College systems. This document provides a clear statement of expectations faculty have for the critical reading, writing, and thinking abilities of their entering students.

[College Planning](#)
College planning assists students and their families on the different levels of educational opportunities available in California.

[Mathematics Competencies for Entering College Students](#) (Outside Source)
This is a joint document of the Intersegmental Committee of the Academic Senates of the University of California, California State University, and California Community College systems.

[Minimum High School Graduation Requirements](#)
Minimum course requirements for graduating from a California high school.

[Preparation in Natural Science for Entering College Students](#) (Outside Source)
This is a joint document of the Intersegmental Committee of the Academic Senates of the University of California, California State University, and California Community College systems. The report recommends that high school students take at least one year of Biology, one year of Chemistry, and one year of Physics.

[University of California and California State University Admission Requirements](#)
The uniform minimum set of courses required for freshman admission to the California State University and the University of California.

Professional Organizations

[California Association of Mathematics Teacher Educators](#) (Outside Source)

[California Industrial and Technology Education Association](#) (Outside Source)

[California Mathematics Council](#) (Outside Source)

[California Science Teachers Association](#) (Outside Source)

[Computer Science Teachers Association](#) (Outside Source) [California Chapters](#) (Outside Source)

[Computer Using Educators](#) (Outside Source)

Programs of Study

[California Partnership Academies](#)
Academies incorporate integrated academic and career technical education, viable business partnerships, mentoring and internships.

[California Project Lead the Way](#) (Outside Source)
Project Lead the Way is a not-for-profit organization that promotes engineering, technology and biomedical science courses for middle school and high school students.

[Industrial & Technology Education](#)
Programs that provide students with insight into and an understanding of the technological nature of our culture.

[Regional Occupational Centers and Programs](#)
Information on career and workforce preparation for high school students and adults, preparation for advanced training, and the upgrading of existing skills.

Publications

[Creating a Well-prepared Science, Technology, Engineering and Mathematics (STEM) Workforce: How Do We Get from Here to There?](#) (Outside Source; PDF; 824KB; 40pp.)
A compilation of presentations given at the February 2, 2009, symposium of the same name.

[Engineering in K-12 Education: Understanding the Status and Improving the Prospects](#) (Outside Source)
This document reviews the scope and impact of engineering education today and makes several recommendations to address curriculum, policy, and funding issues. It also analyzes a number of K-12 engineering curricula in depth and discusses what is known from the cognitive sciences about how children learn engineering-related concepts and skills.

[Expanding Underrepresented Minority Participation: America's Science and Technology Talent at the Crossroads](#) (Outside Source; PDF; 3MB; 286pp.)
The components for success in STEM–focused on preparation, access and motivation, financial aid, academic support, and social integration–require attention in some measure for all students at every stage along the educational continuum. The focus of this report is on the issues that are specific to underrepresented minorities, in general and in STEM.

[Foundation for the Future: Strengthening STEM Education in the Early Years](#) (Outside Source; PDF; 1MB; 31pp.)
Although written for the Boston school system, the recommendations of this report apply to other areas. A central strategy proposed in this report is for area teacher education programs, state agencies, school districts, early childhood education providers, out-of-school-time providers and business and community partners to collaborate closely.

[Multiple Pathways to Student Success: Full Report](#) (Outside Source; PDF; 8MB; 224pp.)
Required by [Assembly Bill 2648](#) (Outside Source), this report explores the feasibility of establishing and expanding additional career multiple pathway programs in California.

- [Multiple Pathways to Student Success: Executive Summary](#) (Outside Source; PDF; 259KB; 42pp.)

[Prepare and Inspire: K-12 Education in Science, Technology, Engineering, and Math (STEM) for America's Future](#) (Outside Source; PDF; 1MB; 130pp).

This report, prepared by the President's Council of Advisors on Science and Technology, makes specific recommendations to better prepare America's K-12 students in STEM subjects and also to inspire those students to challenge themselves with STEM classes, engage in STEM activities outside the school classroom, and consider pursuing careers in those fields.

- [Prepare and Inspire: Executive Report](#) (Outside Source; PDF; 2MB; 18pp.)

[Recommendation for STEM Education in California](#) (Outside Source; 3MB; 60pp.)
This is a collaborative action plan to increase the number and support the development of STEM students, graduates, teachers, professors and mentors within California.

[Science, Technology, Engineering, and Mathematics (STEM) Education: Background, Federal Policy, and Legislative Action](#) (Outside Source; 378KB; 34pp.)
This report presents data on the state of STEM education in the United States, then examines the federal role in promoting STEM education, and concludes with a discussion of the legislative actions recently taken to address federal STEM education policy.

[Slow of the Mark: Elementary School Teachers and the Crisis in Science, Technology, Engineering, and Math Education](#) (Outside Source; PDF; 436KB; 30pp.)
The focus of this report is on the selection and preparation of elementary school teachers, most of whom will be required to teach mathematics and science when they enter the classroom. It is elementary school mathematics and science that lay the foundation for future STEM learning, but it is elementary school teachers who are often unprepared to set students on the path to higher-level success in STEM fields.

[STEM Teachers in Professional Learning Communities: From Good Teachers to Great Teaching](#) (Outside Source; PDF; 557KB; 32pp.)
This executive summary report is based on an NSF-funded project, *STEM Teachers in Professional Learning Communities: A Knowledge Synthesis,* that assessed the impacts of learning teams, particularly in science, technology, engineering, and mathematics (STEM) content areas, on teacher practice.

[Successful K-12 STEM Education: Identifying Effective Approaches in Science, Technology, Engineering and Mathematics](#) (Outside Source; PDF; 18MB; 48pp.)
The focus of this report is on the science and mathematics parts of STEM and on criteria for identifying effective STEM schools and practices. This report provides an overview of the landscape of K-12 STEM education by considering different school models, highlighting research on effective STEM education practices, and identifying some conditions that promote and limit school- and student-level success in STEM.

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