



# Partnering Science and Math

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# National Science Education Standards: An Overview

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- **Science Content Standards: K-12**
- **Unifying Concepts and Processes**
  - **Systems, order, and organization**
  - **Evidence, models, and explanation**
  - **Constancy, change, and measurement**
  - **Evolution and equilibrium**
  - **Form and function**



# DOE and Idaho **STEM** Education Colabarative

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- “**S**cience, **T**echnology, **E**ngineering and **M**athematics”
- Currently the Idaho Department of Education and the State Board of Education are developing a partnership between education, government and industry to enhance education of STEM
- Collaborative teaching: where are there proven “cross-curricular” programs?

# http://www.stemedcaucus.org

http://www.stemedcaucus.org/content/documents/state\_profiles/STEMEdIdaho06.pdf - Microsoft Internet Explorer provided by State

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## Idaho's K-12 STEM ED Report Card

### Federal Funding for K-12 STEM Education: An Urgent National Priority — *Our future depends upon it!*

**JOBS, OUR STANDARD OF LIVING, AND NATIONAL SECURITY:** Advances in science and engineering are essential for ensuring America's economic growth and national security. During the next decade, U.S. demand for scientists and engineers is expected to increase at four times the rate for all other occupations. But today's high school students overall are not performing well in math and science, and fewer of them are pursuing degrees in technical fields.

Congress has an opportunity to help close this alarming gap. We applaud the House and Senate for establishing **Math and Science Partnerships** as part of the *Elementary and Secondary Education Act* to improve teacher quality and student achievement in these subjects. These partnerships between school districts, universities, businesses, and education organizations enjoy bipartisan support and will be critical for improving K–12 science and math education across all states and school districts. We also urge Congress to support the portfolio of STEM education programs at the National Science Foundation (NSF) and the NSF *Math and Science Partnerships* whose aims are to improve teacher quality and student achievement in these areas.

**FEDERAL INVESTMENT IN K-12 SCIENCE & MATHEMATICS EDUCATION HELPS KEEP OUR ECONOMY COMPETITIVE:** Without public funds invested in K-12 science and mathematics education, there can be little or no basis for future job growth and our national security will be imperiled. Over the past 50 years, taxpayer **investment** in science and mathematics education has indirectly produced more than half of the nation's economic growth. Prominent economists agree that no other investment generates a greater long-term return to the economy than scientific R&D, and that starts with educational systems. Research, education, the technical workforce, scientific discovery, innovation and economic growth are intertwined. To remain competitive on the global stage, we must ensure that each remains vigorous and healthy. That requires sustained investments and informed policies that will strengthen our K-12 mathematics and science education system.

**HOW Idaho K-12 SCIENCE & MATHEMATICS EDUCATION COMPARES:** Idaho ranked 20th in the nation on the 2005 NAEP scores for mathematics with a score of 281 (national average was 278). In 2004, 48% of Idaho middle school math teachers were certified in math (national average was 49%) and 40% of middle school science teachers were certified in science (national average was 54%). 4% of Idaho's 12th grade students took the AP Calculus exam in 2004 (the national average was 7%). Idaho assesses students in grades 2-10 for math and in grades 5, 7 and 10 for science.

**U.S. VERSUS INTERNATIONAL STUDENT ACHIEVEMENT IN MATHEMATICS AND SCIENCE:** For the 2003 **Trends in International Mathematics and Science Study (TIMSS)** — an international student assessment conducted in 45 countries — the Mathematics score for American grade 8 students was 504, which exceeded the international average score of 466. The Science score for American 8th graders was 527, which also exceeded the international average of 473. Although there was a significant improvement

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# Idaho's Report Card

http://www.stemedcaucus.org/content/documents/state\_profiles/STEMEdIdaho06.pdf - Microsoft Internet Explorer provided by State

Address: http://www.stemedcaucus.org/content/documents/state\_profiles/STEMEdIdaho06.pdf

	Significant Education, Scientific or Economic Indicator	Idaho	National Average
	<b>Latest Educational Test Scores for Science &amp; Math</b>		
	<b>NAEP Scores (Natl. Assessment of Educ. Progress) <sup>1</sup></b>		
20	2005 Grade 8 Mathematics Average Score	281	278
23	2005 Percentage "At or Above Proficiency" in Math	30%	29%
8	2000 Grade 8 Science Average Score	159	149
	<b>ACT Scores 2005 <sup>2</sup></b>		
27	Idaho's 2005 Average Science Score	21.2	20.99
30	Idaho's 2005 Average Math Score	20.9	20.93
24	Percentage of Graduates Taking ACT in 2005	58%	45.61%
	<b>SAT® Scores &amp; Advanced Placement® (AP) Percentages 2004 <sup>3</sup></b>		
23	Idaho's Average SAT Score	1,079	1,026
30	Idaho's Percentage of Graduates Taking 2004 SAT	20%	40.18%
33	AP <b>Science Exam</b> — Percentage of 12th Graders Taking	5%	8%
37	AP <b>Calculus Exam</b> — Percentage of 12th Graders Taking	4%	7%
35	AP <b>Chemistry</b> — Percentage of 12th Graders Taking	1%	1%
30	AP <b>Physics</b> — Percentage of 12th Graders Taking	1%	1%
	<b>Grade 9-12 Course Enrollments as % of All Students <sup>4</sup></b>		
21	<b>Formal Math</b> — % of High Schoolers who took (All topics & levels)	66%	78%
27	<b>Chemistry</b> — % of High Schoolers who took 1st year Chemistry	7%	13%
	<b>Teacher Quality Indicators (K-12) 2004 <sup>4</sup></b>		
20	Percentage of Middle Level Science Teachers Certified	40%	54%
16	Percentage of Middle Level Math Teachers Certified	48%	49%
19	% of HS Chemistry Teachers with Main Certification in Chemistry	35%	53%
28	% of HS Math Teachers with Main Certification in Math	34%	79%
	<b>NCES Key Educational Statistics (latest) <sup>5</sup></b>		
48	Expenditure per Pupil 2002 - 2003 School Year	\$6,132	\$8,073
22	% Change in Expenditures per Pupil 1982-2002	+ 63.26%	+ 53.5%
37	Average Annual Salary of Instructional Staff 2002	\$37,482	\$44,604
38	Enrollment in Public Elementary & Secondary Schools, 2003-2004	252,120	47,201,722
7	Percent of Students in Title I Schools	63%	49.3%
42	Public higher education current-fund expenditures, 2001 (millions of dollars)	\$1,424	\$170,024
14	Percent Change in Public School Enrollment K-12 (1982 -2002)	+ 20.5%	+ 18.3%
	<b>Public Elementary &amp; Secondary Schools Data 2003 - 2004 <sup>5</sup></b>		
37	Number of School Districts	114	14,383
41	Number of Schools	691	96,143
43	Pupil / Teacher Ratio	17.9	15.47

# Overview of Integrated Programs that Work in the State of Idaho

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## ○ **Idaho National Lab Programs:**

- JASON Project
- Project Lead the Way
- Student Action Teams
  - students work in teams that conduct research, carry out work-based projects, and solve real-world problems. A team may consist of junior and/or senior level students
- For Teachers: Teaming Teachers with INL
- INL Mini Grant.....
- Monsanto Grants: Music and Math, etc...

# Idaho National Lab Mini Grant

## www.inl.gov

The screenshot shows a Microsoft Internet Explorer browser window displaying the Idaho National Laboratory website. The address bar shows the URL <http://www.inl.gov/k-12/minigrant.shtml>. The page title is "Idaho National Laboratory - K-12 Programs". The main content area features a blue header with the INL logo and the text "Idaho National Laboratory". Below the header, the page is titled "Math, Science, and Technology Teacher Mini Grant". The text on the page states that the INL Mini Grant program is designed to recognize and support excellence in teaching by providing funds to enhance public and private elementary, middle school, and high school science, mathematics, and technology programs. It mentions that teachers can apply for up to \$2,000 dollars (per-grant) to provide for and support the enhancement of teaching math, science, and technology. The grant cycle has \$70,000 available for teachers. The intent of the grants is not to provide travel, busing, or field trips. However, if they are required please justify. The grant is also not intended to cover school/district projects. Please submit only one grant per teacher. Select from one of the three grant categories:

- Category 1 - Technology or Lab Equipment
- Category 2 - Material for Special Projects
- Category 3 - Professional Development

A grant application must include the completed application information form and the appropriate category description form. Incomplete grant application packets will not be considered for award.

**INL Math, Science and Technology Teacher Mini Grant applications MUST be received in our office by close of business on April 2, 2007.** Applications must be mailed to INL. Faxed copies will not be accepted.

**If you are selected for a grant, a one-page report of the outcomes/results of your grant is due on or before March 31, 2008.** The report must include the following: 1) Describe the overall effectiveness of the grant proceeds. 2) Explain how the activities directly related to your objective. 3) Adequately describe project assessment tools. 4) Mechanism developed to measure student learning. Failure to submit the follow-up report by March 31, 2008 will disqualify you for future INL grants.

A panel of judges will evaluate grant applications based on the following criteria:

- Goals and objectives are clearly stated and measurable.
- Project directly involves students.
- Correlation to the Idaho Standards
- Evaluation component/enhanced student learning.
- Budget is reasonable, appropriate, and specific equipment costs are identified with vendor quotes.

We encourage you to take advantage of this worthwhile program. If you have questions or need additional information, please contact:

**Mini Grants Contacts:**  
Jeff Benson, 208-526-3841, [Send E-mail](#)  
Cheryl Burgess, 208-334-1058, [Send E-mail](#)

At the bottom of the page, there is a footer with the text: "Last Updated: Tuesday, February 13, 2007. Copyright © 2007 Idaho National Laboratory. [Feedback](#), [Security/Privacy](#), [DOE Idaho](#)".

# The Relevance of Student Internships: Visit [www.d91.k12.id.us](http://www.d91.k12.id.us) for Idaho Falls Dist #91 K-12 curriculum

Home - Microsoft Internet Explorer provided by State Department of Education

Address: <http://www.d91.k12.id.us/HAWTH/WEB%20SITE/windenergyforeducators/Wind%20Energy.htm>

## Wind Energy for Educators

Teaming with Teachers

### Teaming with teachers to bring Renewable Energy into the classroom.

So far teachers within Idaho Falls School District #91 have compiled research and developed a Renewable Energy Curriculum. Currently there are three schools within the district that have websites that display current weather conditions. Two of those schools have Whisper Turbines from Southwest Wind. Teachers are now working on a plan to utilize the power that is gained from those turbines for hands-on learning experiences



In the future, INL and the team of teachers would like to expand that Educational Product to more schools and districts. A team is looking at data to find other schools in surrounding counties and states that could benefit from either Solar or Wind Energy. INL would like to develop a product that would consist of 1. a turbine and or solar cell, 2. software to monitor energy production, and 3. a curriculum that would interface. With this product teachers could use current weather conditions and have hands-on activities for students to discover renewable energy.

The Skyline Skystream page is still under construction.

Address: <http://www.d91.k12.id.us/HAWTH/WEB%20SITE/windenergyforeducators/internpage/Our%20Interns.htm>

## Our Interns

Many students and teachers have completed internships through the INL-Renewable Energy Department. Here are the backgrounds and testimonials of some of the interns that have worked with wind power.

### Student Interns

#### April Diebold



April is a high school student at Blue Springs High School in Blue Springs, Missouri. She is planning on studying biology at the University of Missouri - Columbia. She was an intern over the summer in 2007.

"Working at the INL has given me a look into the 'real world' that I will be entering after school. I also learned a lot about wind turbines, anemometers, and renewable energy in general. This job has taught me numerous skills for whatever future job I may acquire."

#### Brent Cummings



Brent is an undergraduate student at Brigham Young University - Idaho. He is studying Biology Education and is planning on becoming a high school biology teacher. He was an intern at the INL for the summer of 2007.

"Working at the INL has been a great experience. It has helped me to gain real world experience that will help me in my career. I have really liked working with the people here, and I have made a lot of new friends."

#### Robin Diebold



Robin is a Mechanical Engineering Student at University of Missouri - Rolla. She was an intern for the summer of 2006 -2007.

"Working at INL was an experience that let me see what the 'real world' was like. I learned new techniques for researching and almost everything there is to know about wind turbines. The best part was the friends I made during my stay in Idaho!"

#### Isaac West

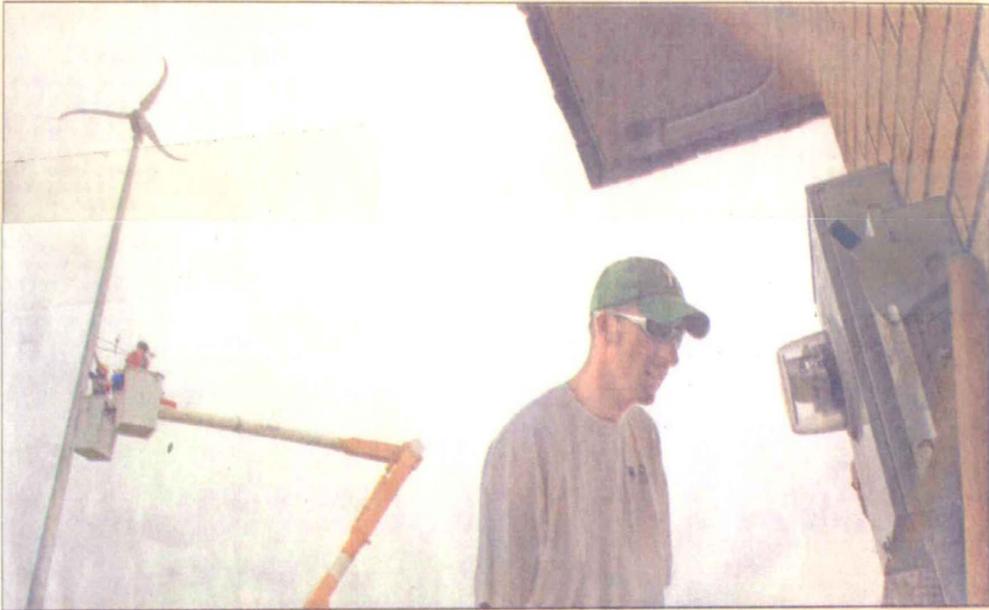


Isaac is an undergraduate student at Montana Tech studying Electrical Engineering and playing football. He was an intern at the INL for the summers 2006-2007.

# Wind Energy For Education

- ...Stay posted for a grant to receive and install a donated turbine for educational purposes at your school!
- Skyline High School in Idaho Falls just installed the first utility connected wind turbine

POWERFUL POTENTIAL



Robert Bower / Post-Register  
Justin Taylor checks for movement on the power meter connected to the new wind turbine at Skyline High School. Energy and education will be combined at the school as a new 45-foot-tall wind turbine with 6-foot blades turns above the school grounds. On Thursday, installers wrestled a 170-pound turbine assembly onto the top of a steel mast that will stand between the high school and day-care center. The first electrical power began at 2:20 p.m. Thursday.

## Hoping for a windy Skyline

Students receive firsthand education about renewable energy

■ The power generated by the wind turbine will be used by Skyline

**Turbine stats**

duces. Taylor said the turbine would save the school \$10 to \$20 a month.  
Taylor said he hopes students visiting the tur-





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