

"ONEOKLAHOMA"
 A STRATEGIC PLAN FOR SCIENCE
 AND TECHNOLOGY IN
 OKLAHOMA, 2012

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STEM RECOMMENDATIONS

2013 Oklahoma Economic Outlook Conference, December 5th, 2012

**HOW IMPORTANT IS S&T TO
OKLAHOMA?**

- Major industries within the state:
 - **Energy**
 - Oil & Gas, wind, biofuels, geothermal, hydro
 - **Aerospace**
 - MRO, materials, UAS
 - **Agriculture**
 - Farming and ranching, chemicals, biosciences
 - **Information Technology/Finance**
 - Computing, cyber, banking, insurance
 - **Transportation**
 - Road, air, water
 - **Defense and Security**
 - Military bases, sensors, cyber, T&E facilities, training, etc.

**HOW IMPORTANT IS S&T TO
OKLAHOMA?**

- **ALL are S&T industries**
- Average per capita wage in OK; all jobs: **\$37,277**
- Average per capita wage; S&T jobs: **\$74,958**
- Average hourly wage; non-S&T: **\$16.08/hour**
- Average hourly wage; S&T: **\$30.27/hour**
- Projection: all S&T jobs in OK: **\$14.5 billion**
 in wages by 2020

WHAT ARE THE S&T GROWTH AREAS?

- Some guesses:
 - In **Energy**:
 - Natural Gas and Renewables
 - In **Aerospace**:
 - Unmanned Aerial Systems
 - In **Agriculture**:
 - Precision Agriculture
 - In **Information Technology**:
 - Cyber Security – especially for security, defense and infrastructure
 - In **Transportation**:
 - Rail??
 - **Other**:
 - BioMedical Sciences

WHAT DOES OKLAHOMA NEED TO SUPPORT THIS GROWTH?

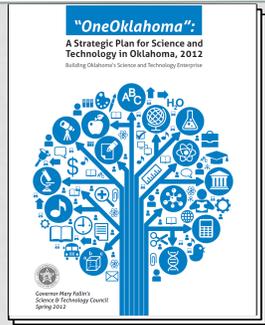
- 2012 S&T Strategic Plan for S&T in Oklahoma
 - Investment into STEM Education:
 - K-12
 - Career Tech
 - Universities
 - Investment into and Collaborations among State's Major Research Universities (especially OU, OSU, TU) – "OneOklahoma"
 - For S&T Industry – Capital, Workforce, Infrastructure, Incentives and New Markets

A STRATEGIC PLAN FOR SCIENCE & TECHNOLOGY IN OKLAHOMA

"OneOklahoma"

Governor's Science & Technology Strategic Plan:
Building Oklahoma's Science and Technology Enterprise

Spring 2012



A STATE IMPERATIVE

"Increasing the number of students versed in STEM and growing the number of graduates pursuing STEM careers or advanced studies are critical to the economic prosperity of every state and the nation."

"Building a STEM Education Agenda," National Governor's Association, 2011.

STEM RECOMMENDATIONS

GOAL:

To enhance workforce development through the strengthening of STEM education programs at K-12 and college levels

OKLAHOMA'S WORKFORCE PROBLEM IN STEM FIELDS

National Science Board's Science & Engineering Indicators, 2012, show year-on-year decline in:

- # Science & Engineering (S&E) degrees as a percentage of all degrees
- Federal R&D obligations in S&E fields
- S&E R&D as a % of GDP
- Number of scientists as a % of the workforce
- S&E occupations as a % of the workforce
- General employment in "high-tech" sector as a % of the workforce

OKLAHOMA'S WORKFORCE PROBLEM
IN STEM FIELDS

National Research Council's 2011 STEM rankings show:

- Oklahoma's 4th-grade proficiencies and performance in math and science range from 29th to 42nd in the nation.
- 8th-grade rankings vary from 32nd to 44th.

Alliance for Science & Technology Research in America (ASTRA)

- Ranks Oklahoma 39th in average 2010 ACT Math score and 35th in its average ACT Science score.

The American Physical Society

- Categorizes Oklahoma's performance in STEM education as "far below average" (with a science and engineering index of 2.01 on a scale of 1 to 5, and a national average of 2.58).

OKLAHOMA'S WORKFORCE PROBLEM
IN STEM FIELDS

Oklahoma needs STEM educated workforce:

- Average STEM job growth expected to be 6,924 per year for the next 10 years.
- Over same period, Oklahoma expected to replace 42.1% of existing STEM workforce.
- 97% of STEM jobs will require some college experience
- 56% of all STEM occupations will require a bachelor's degree or higher

However:

- STEM degree graduates from Oklahoma institutions of higher education were only 4,068 in 2010-2011
- High percentage of these leave state (or country)

The state is simply not producing enough STEM-qualified workers to meet Oklahoma's workforce demands of the future

TOWARD A STEM WORKFORCE
SOLUTION

Some Principles:

- (1) Identify the **actual** problem(s).
- (2) Apply initiatives that **directly attack the problem**, not issues peripheral to it.
- (3) The focus is on STEM workforce development, **not** the whole of the education system.

S&T COUNCIL RECOMMENDATIONS

(1) Recruit more highly qualified STEM teachers in common education and provide incentives, resources and assistance to those teaching STEM subjects:

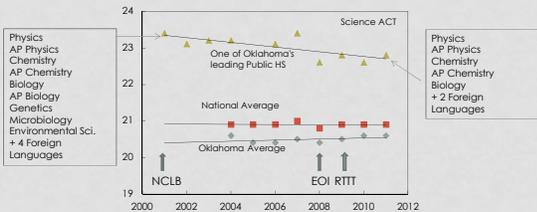
- Establish a career path for teachers
- Create a system of sign-on bonuses for STEM teachers
- Create a system of differential pay for qualified STEM graduates
- Create a system of summer academies for science teachers to learn how to conduct laboratories or practical demonstrations in the classroom

Also

- Explore *U Teach* as a model
 - Train students who have science degrees to be teachers

S&T COUNCIL RECOMMENDATIONS

(2) Establish a "STEM-ready" designation to identify those students who are ready to study for a STEM degree at College.



S&T COUNCIL RECOMMENDATIONS

(3) Create a statewide "distance learning" capability

- Provide an opportunity for every high school to have AP calculus and physics regardless of the availability of onsite calculus- and physics-qualified instructors.
- CareerTech Centers that have either an Oklahoma School of Science and Math or Project "Lead the Way" program to be host centers.

S&T COUNCIL RECOMMENDATIONS

(4) Develop a STEM strategy at the state level

- Current extra-curricula STEM activities not coordinated
- Recognize and use programs such as Project Lead the Way, the Oklahoma School of Science and Math and its regional centers, Oklahoma After-School Network
- Extend to all students throughout the state

S&T COUNCIL RECOMMENDATIONS

(5) Create a STEM Education and Industry Advisory Group

- Creation of relevance to real careers in real industries
- Develop, advocate for and execute partnerships between educators and key industry groups where

S&T COUNCIL RECOMMENDATIONS

(6) Promote STEM education in Oklahoma

- Establish a system of "STEM communities"
- Initiate a statewide marketing campaign to promote "A STEM State of Mind"

(7) Host a summit of business, government and education leaders to discuss capital investment for Science & Technology in Oklahoma.

- Explore possibilities for raising capital, including a public-private partnership to fund some of the STEM initiatives

CONCLUSION

STEM education is the foundation of a well-educated, highly trained, innovative and motivated workforce. Such a workforce enjoys a higher standard of living, more quality opportunities and will lead the growth of the Oklahoma economy. Oklahoma should identify, advocate, support, reward, invest in, and sustain STEM education and training programs and initiatives if we are to improve the quality of life for all Oklahomans and the economy of Oklahoma.
