

## **Science Technology Engineering & Mathematics (STEM)**

*“Look what we take for granted in our everyday lives: the Internet and cellphones, MRI scanners and microwave ovens... cancer treatments made from bacteria we've programmed for benevolence. All these American innovations and thousands more come to us from science, mathematics, engineering, and technology—no, let's rephrase that: They came to us from people schooled in those disciplines and from people associated with them who supplied the entrepreneurial energies and capital that the scientist, engineer, and technologist may have lacked.*

*The men and women who will make America's tomorrow are in school and college today. They are the human capital at the core of any productive economy. And here's a fact about them. There are too few of these people in the scientific disciplines. America, the leader, now lags.”*

--Mortimer B. Zuckerman, editor in chief, U.S. New & World Report, September 27, 2011

### **What is STEM?**

At its simplest, STEM education is an acronym for Science, Technology, Engineering and Mathematics; at its most practical, it represents skills critical to job opportunities and economic growth.

### **Why STEM?**

#### **- Jobs**

By 2018 Alaska Department of Labor projects there will be over 8,000 job openings in STEM-related jobs in Alaska (2,700 new STEM jobs and 5,400 more openings as workers retire), and this data does not include the fastest growing occupation sector – health care. (Alaska Economic Trends, Feb. 2011)

In the health care sector, Alaska Dept. of Labor projects a 27.4% increase in health care practitioners and technical occupations -STEM intensive fields- by 2020. (Alaska Economic Trends, October 2012)

On the national level STEM professions are second only to Healthcare as the fastest growing occupational category in the U.S. economy. (Georgetown University Center on Education and the Workforce, STEM, 2011)

#### **- Pay & Opportunities**

According to the Alaska Department of Labor, STEM workers in Alaska earn an average of \$73,000 a year, \$28,000 more per year on average than non-STEM workers. (Alaska Economic Trends, Feb. 2011)

#### **- STEM skills are in demand**

STEM *skills* include critical thinking, complex problem solving, systems analysis, troubleshooting, application of math & science, design and application of technologies.

STEM *skills* are in demand across the entire U.S. job market and occupational sectors.

Individuals with STEM skills enjoy higher earnings, regardless of whether they work in STEM or non-STEM occupations. (U.S. Dept of Commerce, Economics and Statistics Admin, STEM, Oct 2011)

Nationally there are more STEM jobs than there are skilled workers: 1.7 STEM jobs for every 1 unemployed person; For non-STEM workers, there are 4.3 unemployed for every 1 job.

### **Are Alaska students prepared for STEM opportunities?**

In 2012, 52% of Alaska students taking the ACT test did not meet college-readiness benchmarks in mathematics and 70% did not meet benchmarks in science.

(ACT benchmarks represent the level of achievement required for students to have a 50% chance of obtaining a B or higher or about a 75% chance of obtaining a C or higher in corresponding credit-bearing first-year college courses, ACT 2012)

In 2012, only 13 Alaska students took the SAT AP test for computer science; juxtapose that with the many career options that exist in computer systems design, & related fields. (AK Department of Labor, Industry & Occupational Forecasts 2010-2020)

### **Is STEM Education important for all K-12 students and schools?**

STEM provides a framework for methodically analyzing and tackling problems; it offers a young person access to high-demand, lucrative jobs and future prospects - in Alaska and across the U.S. Given our changing economy, STEM skills are important for all students.

### **STEM policy and practical needs in Alaska:**

- Elevate importance of science, technology, engineering, mathematics, and STEM in the formal education system.
- Invest strategically in STEM opportunities for Alaska youth through formal and informal education systems – both during the school day as well as during out of school times.
- Increase the number of highly skilled K-12 science, technology, engineering and mathematics teachers in Alaska.
- Track success and value of informal and formal STEM education investments to Alaska students and Alaska's economy through longitudinal studies.

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*"Talent will be the oil of the 21st century."*  
Deborah Winice-Smith of the Council on Competitiveness

*"...the education level of our citizenry is inextricably tied to Alaska's economic development."*  
Alaska Legislative Task Force on College and Career Readiness, April 2011

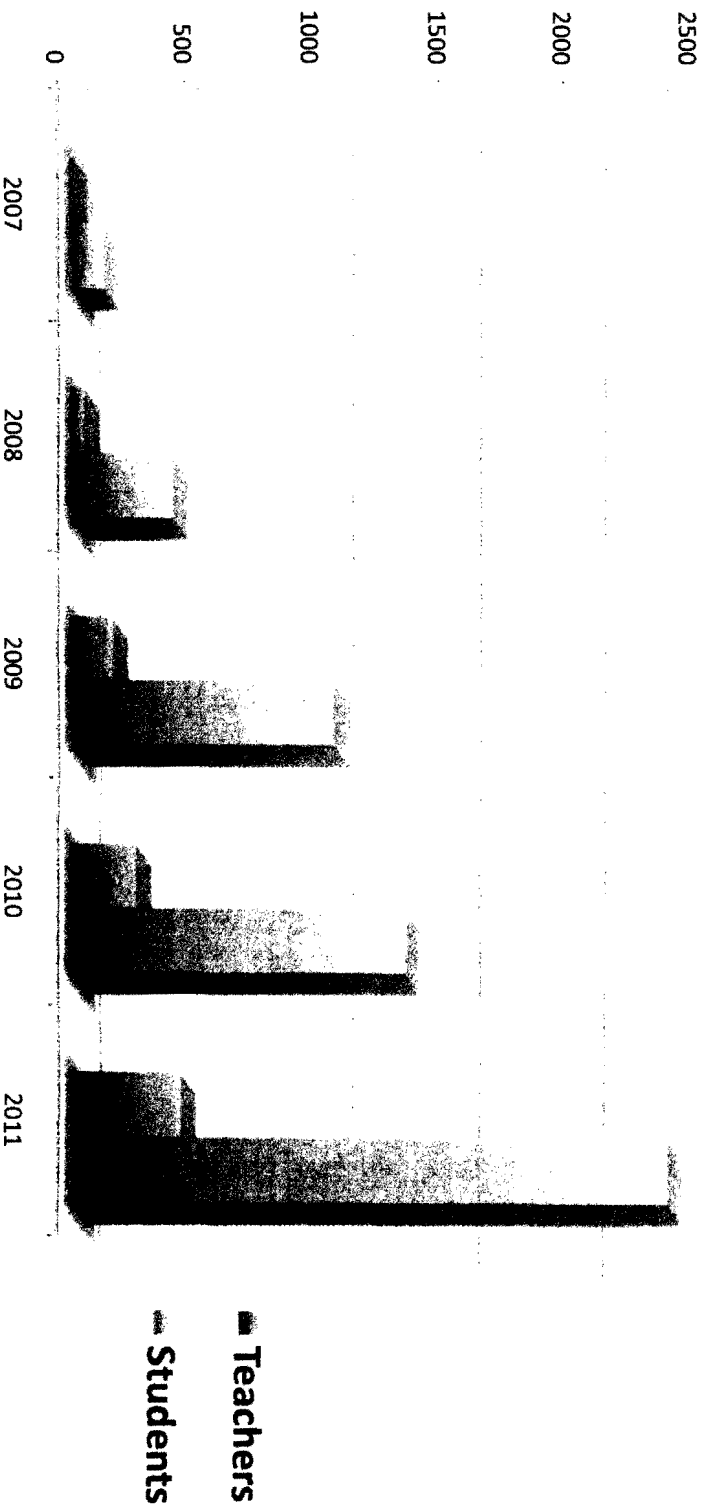
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### **Resources & References of Note:**

- Alaska Department of Labor, Alaska Economic Trends, *Science, Technology, Engineering and Math*, February 2011; Industry & Occupational Forecasts 2010-2020
- Georgetown University, Center on Education and the Workforce, *STEM, October 2011; Hard Times, College Majors, Unemployment and Earnings: Not all College Degrees are Created Equal*, Jan. 4, 2011
- New York Times, Paul Tough: *What if the Secret to Success is Failure?*, Sept. 14, 2011,
- U.S. Dept. of Commerce, Issue Brief, #03-11: *STEM: Good Jobs Now and for the Future*, July 2011
- [www.teachengineering.org/engrdesignprocess.php](http://www.teachengineering.org/engrdesignprocess.php), *Teach Engineering*

# STEM AK - Building Momentum

**Overall Impact** (all funding sources, not cumulative)



# FIRST Robotics – Geographic Reach



2007

2012





***Request: Robotic - K-12 STEM Workforce Development - \$400,000***

***A strategic investment in high quality STEM (Science, Technology, Engineering & Mathematics) education for Alaska students.***

Robotics engages students, ages 6-18 in Science, Technology, Engineering and Mathematics fields. The flagship program, *FIRST* Robotics, has propelled Alaska to national distinction:

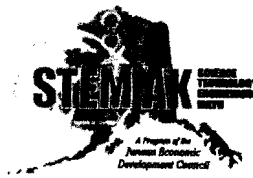
- **Alaska has the highest per capita participation in the nation for *FIRST* LEGO League** (ages 9-14) and ***FIRST* Tech Challenge** (introductory high school level)
- The gender gap is being closed with **45% of Alaska's *FIRST* LEGO League participants girls**, as compared with national average of 25-30% female
- There are ***FIRST* teams in 50 Alaska communities**, in 25 School Districts
- Over **2,000 students** are involved in this after school, competitive program
- ***FIRST*** has successfully tapped local volunteerism, with **over 4,000 volunteer hours** invested in hosting tournaments alone

A *FIRST* robotics motto is "the hardest fun you'll ever have." Like a team sport, it rewards excellence, perseverance, skill and hard work. Tournaments are designed to be memorable and exciting, and all the while students gain computer programming skills, researching real world problems, working together as a team, and presenting their findings to panels of adults; All this is done on a student's own time, after school.

Alaska's success with robotics relies on the commitment of coaches, mentors, and school districts, as well as a system of statewide coordination that makes the program accessible and possible. Since 2009 this infrastructure has been provided by STEM AK, a statewide program of the Juneau Economic Development Council, with funding from the U.S. Department of Defense, and state funding in 2011. With declining federal dollars, an ongoing commitment of state funds is needed.

There is more to robotics than *FIRST* Robotics ---

**Underwater robotics** is extensively used in offshore oil and gas exploration development as well as research operations. Two underwater robotics programs are offered for middle school students -- SeaPerch ROV (Remote Operated Vehicle), and SeaGlide, an underwater glider being developed in partnership with the U.S. Navy. **Since 2009 the SeaPerch ROV project led by STEM AK has impacted 4500 students, with 1500 kits distributed, 170 teachers trained, and 2 regional competitions held.**



### **Background – STEM Education Imperative for Alaska:**

At its simplest STEM is an acronym for Science, Technology, Engineering and Mathematics. At its most practical it represents skills critical to job opportunities and economic growth. On the individual level, it is about skills needed to gain access to living wage jobs and an array of career opportunities – whether a student’s postsecondary path is college, technical school, apprenticeship programs or directly into the workforce.

By 2018, the Alaska Department of Labor projects over 8,000 job openings in STEM related jobs in Alaska, not including the fastest growing occupational sector – health care – a STEM intensive field. All told, the future is bright for Alaska students who graduate from high school with a solid base of STEM skills.

However, many students are ill prepared for the training required for STEM career paths.

- Of Alaska students taking the ACT test, 52% did not meet college-readiness benchmarks in mathematics, and 70% did not meet college-readiness benchmarks in science.
- In 2012 only 13 Alaska students took the AP subject test in computer science, despite the ubiquitous nature of computer technology and commensurate importance of computer science skills.

***Increasingly, STEM skills are gatekeepers to economic opportunity and living wage jobs.*** This operating budget request reflects a strategic investment in workforce development to offer students access to engaging and effective STEM education programs.

***“Talent will be the oil of the 21st century.”***

**Deborah Wince-Smith of the Council on Competitiveness**

Point Hope

Good morning Chairman Kelly, my name is Eva Kinneeveauk and with me today is Arnold Brower. We are both members of the North Slope Borough School Board.

Chairman Kelly and members of the committee, I want to thank you for this opportunity to speak to you about the Department of Education's budget. I would also like to thank Senator Dunleavy and his subcommittee for their hard work on the Education budget.

There are two areas we would like to focus on today.

First is the Pre-K funding. We support the funding level included in the senate version of the Education budget. It is our hope that during the conference committee process that the Senate fights hard for the funding level that Senator Dunleavy and his sub-committee have recommended.

1st yr.  
158,407  
This year we received from EED a \$158,407 grant for a Pre-K program at two of our schools. This is the first year grant, of a two-year commitment from the Department of Education. By supporting the funding level recommended by the Education subcommittee you will be honoring the commitment made to our school district next year by the Department of Education.

Second is the funding for Digital Learning. Within this area Department of Education requested \$1.1 million for the Alaska Learning Network of AKLN. This program is very important to the children of the North Slope Borough School District. This program allows our children to take on-line course that assist them in qualifying for the Alaska Performance Scholarship, APS.

This is a matter of simple equity, of fairness, of equal opportunity for all students, no matter where they live. There are barriers to native students, and it is evident in the data about who is accessing the scholarship. In the 2012 report published by the Alaska Commission on Postsecondary Education, in the Far North region of our state about 12% of graduates qualified for APS and almost 50% of those students used the APS. But it is important to point out, in the same report only 8.3% of the Alaska Native graduates qualified for the APS.

Without this program it is extremely difficult for our school district to deliver the upper level courses our students need to qualify for Alaska Performance Scholarship in remote villages such as Anaktuvuk Pass, Nuiqsut, Point Hope and Wainwright. These schools have small student populations so we need programs like AKLN to help our teachers and students.

Again we ask that the Senate to fight hard during the conference committee process and support the departments funding request for the AKLN program.

We want to thank the Senate Finance Committee for their efforts to build an Education budget that supports the needs of all Alaska's children. We would be happy to answer any questions that you may have.

## Testimony in Support of Parents As Teachers/Best Beginnings Funding in HB65

Good morning, Chairmen, members of the committee.

My name is Aurah Landau, and I live at 626 W. 11<sup>th</sup> St here in Juneau.

I'm here testifying as a parent in the Parents As Teachers program. My son is one and half, and we've been doing Parents As Teachers for about a year.

While Parents As Teachers has been shown to help children be better prepared for school and do better in language, social development, problem solving and other cognitive abilities, this is my very personal story about what Parents As Teachers has meant to my family beyond all that.

My son didn't sleep for more than 45 minutes at a time for nearly a year. That meant that I didn't get a stretch of sleep longer than 30 minutes for months at a time. I was so exhausted that I lived in a total fog.

I thought I knew how to be a good parent and could handle that. I had taught kindergarten, knew quite a bit about early childhood development, run weekend programs for youth during religious services, and taken care of lots of younger siblings.

But, I also grew up with really bad modeling on how to parent. I had a surprising lack of parenting skills that, combined with my exhaustion, made for a dangerous mix.

I was, in effect, a special needs parent. My husband didn't know how to help, our pediatrician didn't have any resources for our specific needs, and I couldn't help myself. My family and I didn't fit into any other programs, and we had no one to turn to.

Our Parents As Teachers coordinator helped me learn healthier ways to deal with my son. What specifically helped me was that she guided us in developing problem-solving strategies tailored to our unique needs, and she suggested that we look at tools used with autistic children to help my son sleep. We did, I got better at coping and my son began to sleep better.

Slowly, we got back to a healthier place as a family, and it wouldn't have happened without the parenting support we got from Parents As Teachers.



I can tell you with 100% certainty that Parents As Teachers helped make my parenting and our home safe for my little boy. Things were so bad, that I do think Parents As Teachers support kept us from needing dramatic and costly interventions for child abuse and neglect.

Please fund Parents As Teachers and Best Beginnings. There is nothing else available for many of us who need to learn how to parent in healthy ways. For a very small price tag, you can continue to support Alaskan families in ways that will boost our social and economic wellbeing for decades to come.

I would be happy to answer any questions, from a parent perspective, on how Parents As Teachers is structured, how it's felt to have an educator come to my home, what the interactions with educators are like, or anything else you might be curious about.

Thank you for the opportunity to testify.

Aurah Landau  
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## **Doniece Gott**

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**From:** Jo Ann Lockwood <joann\_lockwood@hotmail.com>  
**Sent:** Friday, March 22, 2013 6:20 PM  
**To:** Doniece Gott; Sen. Kevin Meyer; Sen. Pete Kelly  
**Subject:** DUI Therapeutic Court Program Funding

To All Legislative Members and Staff:

My name is Jo Ann Lockwood. I am a graduate of the Juneau Therapeutic Court Program.

I have been involved over the past 6-years either participating in, advocating for and most of all enjoying the benefits of the healthy choices and changes that I continue to make in my life today.

The very core of the Therapeutic Court structure is modeled for success in all areas of our human behavior.

With daily check-ins, including urinalysis and breathalyzer; weekly Court appearances, counseling classes, mandatory AA meetings and a 32-hour work week, we are encouraged to build on three basic human values...Honesty, Integrity and Complete Accountability, which eventually become habitual to our thoughts and actions.

We are supported by the "Team", which consists of our Honorable Judge; the Therapeutic Court Coordinator; Therapeutic Court Counselor; Liaisons at Gastineau Human Services; the Defense and Prosecuting Attorneys and upon completion, our Juneau Adult Probation Office.

We, as Juneau Therapeutic Court Participants and Graduates, extend our warmest gratitude to all Legislative Members and Staff for financially supporting such a tremendous Program. May it continue throughout the years.

Sincerely,

Jo Ann Lockwood