Creating the “STEM Pipeline”

South Dakota EPSCoR
in partnership with
SD Department of Education

Mark Wilson – Director, Office of Learning and Instruction
Mark.Wilson@state.sd.us
SD EPSCoR

• SD EPSCOR funds rigorous programming to engage students in the problem-solving and research-focused courses, camps and competitions which spark or enhance students desire to pursue post-secondary education in STEM fields.
• How does South Dakota know what fields students are interested in?
  – SDMyLife
SDMyLife.com

- Career & academic planning
- 7th – 12th graders (and their educators/parents)
- All SD schools – Public, Private and BIE
- 61,000+ students
SD My Life

• Provides grounds to:
  – Explore careers, postsecondary options and scholarships
  – View current employment listings
  – Prepare for the ACT
  – Log academic, extracurricular, service and work experiences
  – Create resumes
  – Design Personal Learning Plans
### SDMyLife data:
#### Student Interest in STEM

<table>
<thead>
<tr>
<th>Total Students with Interests per Cluster/Pathway</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,555</td>
<td>Agriculture, Food &amp; Natural Resources</td>
</tr>
<tr>
<td>1,814</td>
<td>Architecture &amp; Construction</td>
</tr>
<tr>
<td>4,055</td>
<td>Health Science</td>
</tr>
<tr>
<td>203</td>
<td>Information Technology</td>
</tr>
<tr>
<td>164</td>
<td>Manufacturing</td>
</tr>
<tr>
<td>2,279</td>
<td>Science, Engineering, Technology &amp; Math</td>
</tr>
<tr>
<td>10,070</td>
<td>Total students that have started a PLP with STEM as their main focus (as of 5/12/11)</td>
</tr>
<tr>
<td>16.43%</td>
<td>Percentage of 7th - 12th grade students who have started a PLP that list a STEM Pathway as their main area of interest (as of 5/12/11)</td>
</tr>
<tr>
<td>61,304</td>
<td>Total Students 7th - 12th grade in SY 2010-11</td>
</tr>
</tbody>
</table>
Students with STEM Interests by Pathway

- Animal Systems: 10%
- Construction: 10%
- Engineering and Technology: 14%
- Design/Pre-Construction: 6%
- Health Informatics: 14%
- Diagnostic Services: 10%
- Therapeutic Services: 11%
- Support Services (Health): 3%
- Manufacturing Production Process Development: 2%
- Programming and Software Development: 2%
- Science and Math: 8%
- Natural Resources Systems: 1%
- Power, Structural & Technical Systems: 1%
- Biotechnology Research and Development: 2%
- Environmental Service Systems: 1%
- Food Products and Processing Systems: 2%
- Plant Systems: 1%

South Dakota EPSCoR
South Dakota Department of Education
Interest in STEM

• SD EPSCOR in partnership with SD DOE sparks or enhances interest to pursue post-secondary education in STEM fields by providing rigorous programs.
  – To “fill and maintain the STEM Pipeline”

• SD EPSCoR funds STEM programs including but not limited to:
  • Project Lead The Way
  • Gateway Camps
  • LEGO Robotics and VEX Robotics
  • Innovation Lab Schools
Project Lead The Way

- Project Lead The Way (PLTW) is the leading provider of rigorous and innovative Science, Technology, Engineering, Mathematics (STEM) education curricular programs used in middle and high schools across the U.S.
- Engineering courses for high school and middle school
- Biomedical courses for high school only
PLTW advertisements

- Biomedical Science
- Engineering

*Videos were created by students at CTE Academy in Sioux Falls, SD*
PLTW Post-Secondary Connection

PLTW middle and high school programs provide students a foundation and proven pathway to college and career success in STEM-related fields.

- 80% of PLTW seniors say they will study engineering, technology, or computer science in college, whereas the national average is 32%. (pltw.org)
PLTW in South Dakota

Students can earn:

- **Dual credit** - South Dakota State University will provide 3 credits in General Engineering
- **$5,000 Opportunity Scholarship** - to entice students to attend South Dakota public universities

Highly Qualified Teachers:

- PLTW holds intensive 2-week certification trainings
- Teacher must also pass PLTW content knowledge test AND praxis test for particular subject area

PLTW Summative assessments:

- held for national comparison and for Dual Credit opportunities
- SD outscored national average by 5% on Principles of Engineering exam
PLTW Impact

**2010-2011**
- 228 students took PLTW courses
- 5 districts participated
- 2 of 5 districts are rural
- 12 PLTW courses offered

**2011-2012**
- 19 PLTW courses offered & added 2 districts
South Dakota Project Lead the Way: High School Engineering and High School Biomedical Programs

2011-2012 School Year

South Dakota
Middle School “Gateway Camps”

• Utilize Project Lead The Way approach to STEM education

• Involve middle school students in engineering design process and create pipeline for PLTW high school courses

• Students solve problems in engineering and health science through activities involving:
  – Robotics, Shelter Survival Challenges, 3-D Modeling, Dissection, and Bridge Building
Gateway Camps cont’d

- 2010 – 3 camps, 54 students
- 2011 – 5 camps, 80 students
- 2012 – a total of 8 camps will be offered

New Research connection*

– The upcoming 2012 camps held in Sioux Falls will expose students to research at Sanford through the PROMISE program (next slide)
Sanford PROMISE program

Program for the Midwest Initiative in Science Exploration

• Connects the communities in our region with new frontiers in science and research

Innovation Lab Schools Program - EPSCoR funded distance technology and training for educators to allow rural schools to connect to real life research opportunities provided by PROMISE

***4 rural schools w/ approx. 1000 students
Sanford PROMISE program

Student Research Examples:

– Isolating plant protein thought to have chemopreventative properties
– Diagnosing Diabetes
– Genetic Screening for married couple worried about transmission of rare genetic disease
– DNA analysis to identify and isolate potential vaccine targets and test for vaccine efficiency (ELISA)
– Blood toxicology research to determine physiological effects of alcohol abuse
Robotics

In 2010

• LEGO robotics kits were provided to all Sioux Falls middle schools

• 475 male and 475 female students participated

• Students involved also had opportunity to participate in SD First LEGO League
  – Existing statewide competition for robotics with annual scrimmages held at Augustana College in Sioux Falls
Robotics

2011-2012

• This school year, the VEX robotics program is starting in 3 districts as part of PLTW engineering program

VEX will:

  – Engage students in engineering design process
  – Introduce the element of competition in the STEM fields through robotics challenges in the classroom
Please direct questions to the Office of Learning and Instruction (OLI)

PLTW Team - [http://doe.sd.gov/octe/sdpltw.asp](http://doe.sd.gov/octe/sdpltw.asp)

Ray.Tracy@state.sd.us – STEM Cluster Specialist

Brian.Groote@state.sd.us – Health Science Cluster Specialist

OLI Staff

Sam.Shaw@state.sd.us – Science Specialist

Tiffany.Sanderson@state.sd.us – SDMyLife Team Leader