PROBLEM BASED LEARNING AND STUDENT CENTERED EDUCATION
ENGAGING STUDENTS IN AUTHENTIC STEM DISCOVERY AND INNOVATION

Kelli-Marie Vallieres, Ph.D.
Director, PBL Resource Center
President/CEO, Sound Manufacturing

NSF: NEXT GENERATION STEM LEARNING FOR ALL
November 9, 2015
www.pblprojects.org

NEW ENGLAND BOARD OF HIGHER EDUCATION
PBL teaches students both content and problem solving skills through engagement with authentic real-world problems.

What is Problem Based Learning?

www.pblprojects.org
What is Problem Based Learning?

Participants collaborate in Introduction to PBL workshop at Society of Manufacturing Engineers’ conference

Collaboration
Self-directed learning
Instructor is a facilitator
Not prescriptive
Problem itself drives the learning

www.pblprojects.org
<table>
<thead>
<tr>
<th>Technical Skills Needed</th>
<th>Training Offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical Thinking &amp; Problem Solving</td>
<td>14%</td>
</tr>
<tr>
<td>Technical Writing/Comprehension</td>
<td>18%</td>
</tr>
<tr>
<td>Additive Manufacturing</td>
<td>24%</td>
</tr>
<tr>
<td>CNC Programming</td>
<td>29%</td>
</tr>
<tr>
<td>Measurement</td>
<td>40%</td>
</tr>
</tbody>
</table>

**Why PBL?**

2014 Survey of CT Manufacturing Workforce Needs, CBIA
Foundational Belief of PBL Projects

Collaboration between education and industry, in conjunction with student-centered learning, is essential to ensuring student readiness for a 21st century workforce.
Research on PBL

PBL improves:

- Critical thinking & problem solving skills
- Retention of content
- Deeper learning
- Motivation
- Transfer of problem solving skills
- Teamwork

www.pblprojects.org
Industry Collaboration

Industry collaboration is essential to ensuring that what is taught in the classroom is current and relevant.

Workers at CIRTEC during recording of PBL Challenge

www.pblprojects.org
PBL Projects Challenges

Flexible design

Problem Solving Toolbox

www.pblprojects.org
What are people saying...

...about PBL?
Student Testimonials

- "My confidence increased...because unlike the task of solving textbook problems, I had the chance to learn and apply what I learned to solve something real."
  - Williamstown Middle and High School, Honors Physics Student, VT, AM PBL

- "I felt like an actual scientist instead of just a student in high school."
  - Taft Union High School, Chemistry Student, CA, STEM PBL

www.pblprojects.org
Industry and Instructor Testimonials

• “I enjoy using PBL in my classes because I can see how it gives the students a good framework to solving any problem they encounter.”
  – Ponaganset High School, Technology Instructor, RI, STEM PBL and AM PBL

• “By following the structure of problem solving, it forces the discipline...to gather data. It’s really a powerful process that we’ve seen work exceptionally well. I wish I had it in my career thirty years ago.”
  – Core Team Member, IBM, VT, AM PBL

www.pblprojects.org
New Initiatives

PBL Resource Center

- Sharing PBL resources
- Providing professional development services
- Engaging industry partners in STEM education

Professor at Norwich University in VT displays student findings after using PBL Challenges.

www.pblprojects.org
Key Takeaways

- Critical thinking, problem solving & teamwork skills
- Changing teacher practice to prepare students for workforce
- Current and relevant technical skills

www.pblprojects.org