

Sound Manufacturing Challenge

Implementation Stories from AM PBL Field-Testing Teachers

State: Vermont

Institution: High School

Grade level: 9th, 10th, 11th, 12th Grade

Course: Material Properties and Testing

Class size/group size: 11-15

Details of Implementation:

I had previously field-tested the Hypertherm PBL Challenge in my classroom and as I had done previously, I included this Challenge as a component of my curriculum. My class spent 2 weeks working through the Challenge with only a moderate level of guidance from me.

I began the Challenge by having the students work through the problem at the same time. Each day we looked at a new sheet and broke into groups. All of the students worked at the same pace.

One of the unique things about this Challenge was the hands-on component that we were able to incorporate. I have a laser cutter and heat bender in my classroom so I selected flat acrylic without holes, and some with material cut away. The students were intrigued with how material is bent and how the material area affects the bends. Students also got to see a sheet metal brake in action and bending lexan sheet without heat. With these demonstrations and the framework of the Challenge, I was able to teach material tensile testing that involves applying math to calculate stress, strain, elongation and understanding limits of stress on materials. I have a tensile tester that breaks material for them and provides a chart. Students look at forces, material area, and modulus of elasticity of the material to understand the stability of the material due to applied forces.

At the end of the provided time in class, students presented their solutions in a discussion setting.

Assessment:

Assessment was formative with team participation being graded. I collected the papers that students worked on and discussed with them what each member did.

Instructor Comments:

“The students enjoyed the reality of this project.”

“I believe these are great projects for students, it brings relevance and professionalism to the classroom.”

Student Comments:

“I liked that we had to figure it out by ourselves without the teacher's help. I thought it was more fun because we were on our own.”

“It gave me a "real world" test to use the tools I learned in class to solve.”

“My favorite thing about the Challenge was learning about manufacturing because it's not something you see very often as a high-schooler.”