

Engineering for Everyone: A District Embraces A K-12 Curriculum

Mahtomedi Public Schools
Mahtomedi, Minnesota



TRANSCRIPT

Mark Larson, Superintendent of Mahtomedi Public Schools: The community had a real strong desire to do engineering. There was interest in it from the community members and also a great deal of interest from the staff. One of the leaders of the staff, the now principal, Kathe Nickleby—she was one of the science teachers at that time, and also led the charge in terms of making things happen here.

Kathe Nickleby, Principal, Mahtomedi High School: We began the program as a 6-12, grades 6 through 12 engineering program. We quickly found out that that's way too late to begin talking to children about engineering. Most children in our district at that time thought that an engineer drove a train and that was it. So now—all of our students are exposed to engineering. And that's—with the state engineering standards are embedded into the science curriculum.

Courtney McCormick, K-12 Engineering Coordinator: Kindergarten through 5th grade we use the Engineering is Elementary curriculum, and each grade level has at least one, many introduce others, but the minimum is one unit that addresses a specific engineering standard.

Sound: This is a half cup and this is a quarter cup. What made you decide not to add that?

Lynne Viker, Director of K-12 Teaching and Learning: For example, there's a science standard in the second grade that's for physical properties and physical change, and the students create and make different shapes, different kinds of PlayDoh. And so they're able to experiment and have that hands-on opportunity of creating and making all kinds of playdoh and they decide, Okay, this didn't quite work out well, I'm going to add this so it really is a consistent playdoh that they want to work with.

Mark Larson: Think of how empowering it can be for a student to all of a sudden create and invent something that's actually usable. They can play with it at home, they use it in the classroom. They've created and invented and improved something. And that's what engineering's all about.

Courtney McCormick: Then as they move to 6th grade our students get Design and Make I, which is 2-D design and fabrication, all—it's a required course for all 6th graders, and then 7th grade again, a required course of 3D design and fabrication, called Design and Make II. When we get to 8th grade, it's elective. Their choices are Middle School Fab Lab which is an introduction to our high school How to Make Almost Anything curriculum and then also a CSI Mahtomedi, which is a more lab based, bioengineering type crossover, so to speak, that the kids get very excited about solving a crime and using the equipment in the middle school Fab Lab to model the crime scene.

Lynne Viker: Within the capstone projects we have an opportunity for students in the high school level they can have mentors, out in the community, the mentors will work with them a few days out of the week, and then they'll come in and create and make their projects within the Fab Lab here. And at the

very end of the capstone class, they have their final project and they're able to share that with the community.

Cedar Lewis, Senior: So, in my capstone class this year, I have first researched the basis of aerospace engineering and taught myself those principles and then using those principles I have designed my own remote controlled airplane and then I am in the process of building it completely out of balsa wood right now. using a laser is more precise. It's also quite a bit faster. I already have it all designed online and so I can just move the design over to that computer and use those to print it out.

Sound: You can test it...that's weird, it didn't light up.

Lynne Viker: When students go through more of an engineering process, they end up failing different times, which is a great experience for them, because in life you're going to be failing at different projects, different things that you're trying, but you just have to know, how do you pick yourself up and try again? And this gives the kids that opportunity from the very beginning, so they know that there doesn't have to be one right answer, that I can keep trying and persisting on what I want to accomplish and what I want to achieve.

Mark Larson: A lot of other districts have come to Mahtomedi to see what we're doing. The first Tuesday of the month, for example, we have tours of the Fab Lab and other engineering programs. During the summer we have teachers from all over come in and be students and we have our students actually be some of the teachers. Through our partnership with MIT we're able to provide these teachers with the certification to go back into their other districts and create Fab Labs.

Courtney McCormick: The purpose of the program is teaching kids how to think a little differently and it's understanding this engineering design process or any design process that is not just one answer. It's not just about creating engineers. It's looking at your thinking, thinking about your thinking, looking at what you've done and how can you improve it. so it's not just about creating engineers. It's about creating kids who think about what they're doing, what they're thinking, they think about their learning, and they become independent thinkers in this manner.