



## Educator Case Study

### FROM INVENTEAM TO INNOVATION CENTER: ONE SCHOOL'S INVENTION EDUCATION JOURNEY

In 2008, the concept of something going “viral” on the internet was still fairly new but the Saint Thomas Academy InvenTeam and the electric motorcycle they invented did just that after a flurry of media coverage. The InvenTeam, comprised of high school students, couldn't have anticipated the reaction to their invention, despite having spent a year perfecting the prototype to showcase at the Lemelson-MIT Program's EurekaFest celebration at the Massachusetts Institute of Technology (MIT) – an annual event for all InvenTeam grantees. The team and the teacher also could not have known that their community's enthusiasm for their work as inventors would serve as a catalyst for the development of an Innovation Center at their school.

The seeds for the Innovation Center were planted back in 2006 when the Saint Thomas Academy first received a mailer from the Lemelson-MIT Program. The mailer found its way onto the desk of teacher Mark Westlake who had been teaching physics at the all-boys academy for almost twenty years. He was also involved in leading the Experimental Vehicle Team, a group of students who explore engineering through building alternative-energy vehicles from the ground

up. Seeing early-on how successful the projects coming out of the team were, Mark decided to enter the students into various contests. When he saw the mailer from Lemelson-MIT that described its InvenTeam grants initiative, he was excited that it wasn't a competition focusing on winning or losing, but a year-long experience that celebrates and teaches the invention process. After applying and becoming an Excite Award Recipient, Mark attended a summer workshop for teachers at MIT in 2007. He returned home and worked with his students to complete the final application, and was ultimately awarded an InvenTeam grant for the 2007-2008 school year to create a safer electric motorcycle.

Although Saint Thomas Academy is an all-boys school, two female students from a near-by sister school were recruited to join the InvenTeam, alongside 18 male students. The team got busy working on the motorcycle, figuring out that they could improve the safety of the vehicle by using carbon fiber for the body design. With a top speed of 60 miles per hour, the motorcycle used five 12-volt, lithium-iron phosphate batteries that could be charged in three hours from a standard wall outlet.

After a successful presentation and showcase at EurekaFest in June of 2008, the InvenTeam was interviewed about their invention on CNN. The publicity from this news piece skyrocketed the team's exposure, and soon floods of inquiries about where the motorcycle could be purchased rushed in. The team had only built the one motorcycle and it was not for sale, but it did find some temporary homes where it remained on display for the public, like the Lemelson-MIT Program office at MIT and the office of the Boston Society of Architects.



2008 Saint Thomas Academy InvenTeam

Back home in Mendota Heights, Minnesota, riding high from the energy of EurekaFest and the publicity, the team scored visits with several local corporations where they presented their creative engineering ideas. After just ten minutes of listening to the students, Mark says companies would often donate funds to the academy for the students to use for their experimental vehicle projects. "Adults don't always understand how clever high school students can be," says Mark. But when they see what young people are capable of doing, they want to get involved.

**“Adults don't always understand how clever high school students can be.”**

– Mark Westlake

The students continued to pursue new projects, and Mark wondered how he might be able to get even more students interested in inventing and STEM. One idea he had was to create an Innovation Center at the school that all students

would be able to utilize. The Academy already had space to build a center and the headmaster was on board with the idea. Mark was hard-pressed to find time to organize the effort and spearhead the fundraising given his full-time assignment as a physics teacher and as the teacher-lead for the Experimental Vehicle Team. But that did not stop him from trying to carve out enough time to establish the Innovation Center. It took about five years from concept to opening, but after funds came through, in large part from the E.E. Ford Foundation, construction on the center was able to start.

The Innovation Center at Saint Thomas Academy officially opened in October of 2017. Soon after, the safer electric motorcycle from the InvenTeam project was returned to the students at Saint Thomas Academy to reside as a focal point in the new Innovation Center. The center is a 6,000-square-foot space that is equipped with state-of-the-art devices like 3D printers and scanners, a laser cutter, computer numerical control (CNC) machines, and more.



The InvenTeam's electric motorcycle prototype

Students attending the Academy span grades 6 through 12, and students of all grade levels are able to use the center. The younger students in grades 6 through 8, for example, spend at least thirty hours during their middle school years, working in the Innovation Center. These same students prepare for their time in the center by using Lemelson-MIT JV InvenTeam activity guides to engage in hands-on STEM subjects through invention-based design projects. In fact, the school incorporated the guides into their middle school

curriculum. Older students do more in-depth work in the center, like participating in a capstone elective class where they have to research, design, build and test a prototype of an invention. Mark hopes that in the future the Innovation Center can open one night a week for use by anyone in the Mendota Heights community.

Mark credits much of the center's success to the students. "I knew to ride the coattails of really smart kids," he admits. He says he is also fortunate to have the support of the Academy who trusts him with projects and ideas. In turn, Mark trusts the students with their ideas—he allows the students to do all of the work, very rarely getting in their way. "Adults have a hard time letting kids fail," he says. But he has learned that failure is a vital step in the inventive process and without it, important discoveries may not be made.

As if being the Director of the Innovation Center wasn't enough work, Mark has been volunteering his time to the Lemelson-MIT Program ever since first serving as an InvenTeam educator back in 2008. "I just kept showing up, wanting to help," he says. Because of this, he became one of the very first Lemelson-MIT Program Fellows, offering his advice and expertise to teachers and students by helping with the program's national professional development workshops and staffing events like EurekaFest.

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– Mark Westlake

Mark says his time with the Lemelson-MIT Program has shown him “how many amazing teachers are out there” and helped him build a network of educators to draw on throughout the country. “It's fun to help teachers and students, to be a resource, and a listening ear for anyone with

a creative idea,” he says. He never ceases to be inspired by these teachers and their students, and their commitment to making positive changes in the world as problem solvers. Looking back, Mark sees the InvenTeam experience as one of the first important steps to integrating invention education for his students. His tenacity to provide high quality invention education experiences for the Saint Thomas community as a whole, is evident in the creation of the Innovation Center. Not only that, but in working as an advocate for invention education, Mark has spread the good word and now four other teachers at the Academy are part of a fellowship program to integrate invention education into the school's curriculum.

Mark still proudly displays the Lemelson-MIT InvenTeam banner from 2008 in the Innovation Center, as he does the bright green electric motorcycle that the InvenTeam students created back then, serving as a reminder of the hard work that went into that experience. But perhaps most importantly, as Mark puts it: “the motorcycle makes for fun discussions about our mission to create the next generation of inventors!”



Mark Westlake (L) at the STA Innovation Center grand opening

### ABOUT LEMELSON-MIT INVENTEAMS™

Lemelson-MIT InvenTeams are teams of high school students, educators, and mentors that receive grants up to \$10,000 each to invent technological solutions to real-world problems. The InvenTeam initiative is administered by the Lemelson-MIT Program, a sponsored program under the School of Engineering at the Massachusetts Institute of Technology. The Lemelson-MIT Program is funded by The Lemelson Foundation. Learn more at [lemelson.mit.edu](http://lemelson.mit.edu).

