Fab Lab FAQs

Outfitted with 3D printers, a laser cutter, power tools, robotics equipment, and more, the Fab Lab at Louisville’s Kentucky Country Day School is a place for students to tinker, build, and create. Fab Labs—short for fabrication laboratories—like ours have grown from the Maker Movement, a nationwide push to turn learners into creators rather than consumers. Our Fab Lab bolsters our STEAM curriculum, and allows us to provide students with interdisciplinary, hands-on, project-based learning that boosts their creativity and problem-solving skills.

What is the Maker Movement?
The Maker Movement evolved out of the Do It Yourself (DIY) or Do It With Others (DIWO) philosophy of fixing, creating, or repurposing objects in and around one’s environment. It also relies heavily on the skills used in woodworking, sewing, metalworking, and general tinkering with electronics, arts and crafts, and household items for new and creative purposes.

In schools, this translates to allowing students to create physical projects using traditional and modern tools and materials. Students research, design, and create products, which may illustrate their understanding of learning or model a problem-solving solution. “Making” allows students to integrate their creativity with their knowledge of traditional school subjects, not the least of which are science, technology, engineering, art, and mathematics.

How did we create our Fab Lab?
At Kentucky Country Day School (KCD), which serves students in pre-K through grade 12, we wanted to create a space for all this to happen. We have a strong STEAM initiative at our school. Two of our faculty members are founding members of a hacker space in Louisville, Kentucky, called LVLI, and they noticed that students loved making projects there. They thought having such a space on our campus would be an asset to our students and our program.

Our school raised funds for the initial investment in the lab through an annual school fundraiser. Since the lab opened in 2013, we have been able to augment it with money from subsequent fundraisers, as well as some of the school’s technology budget.

The lab is furnished with 3D printers, a laser cutter, a vinyl cutter, a CNC mill, power woodworking tools, soldering irons, and desktop workstations employing online computer-aided drafting software, along with other more complex software and tool-specific software. The lab also contains simple hand tools, as well as robotics equipment.

How do students and teachers use the Fab Lab?
Some classes use the space for specific projects, while others meet in it regularly. For instance, our sixth- and seventh-grade students take a year-long course in the lab during which some time is spent on explicit instruction in using the equipment and some time is devoted to free design and creation.

Elementary students can use the space in the same ways as older students, provided teachers guide them to safely use the materials and tools. At KCD, largely due to scheduling constraints, elementary teachers tend to use the space as needed for specific projects, starting with the most basic components of using the equipment in the lab. For example, they use it to search online open-source designs at sites such as thingiverse.com and then print items on the 3D printer. These projects might include, for instance, creating models of habitats for different geographical regions or using knowledge of sound to build instruments.

What are the benefits of having a Fab Lab?
A Fab Lab allows students to create actual products to illustrate their ideas and demonstrate problem-solving skills. It presents unique opportunities for them to use their creativity, innovation, and design abilities in conjunction with their knowledge for real-world application of learning.

For instance, sixth-graders learn programming with the Scratch environment. They build and program robots to perform a variety of tasks such as how to follow a line or solve a simple maze. Meanwhile, seventh graders learn programming through Khan Academy tutorials. They learn how to solder and build their own blinking circuit and a robot. Then, they program their robots, using line and sonic sensors, to “battle” other robots by pushing them out of a ring. Students can also program their robots to follow lines, avoid objects, or follow a predetermined set of instructions.

Students are posed with real-world problems and asked to create solutions in the lab. For example, students in a combination art, design, and science course were tasked with creating an optimal supermarket produce carrier. The class spoke to engineers at General Electric, as well as artists and designers; then, they created mockup drawings and provided a written justification for their product. Students designed their ideas using computer-aided drafting software and printed them using the 3D printer. Finally, the concepts were tested and retooled until students had a working product.

In between structured lessons, students are permitted time for free design and making. As students design and create their own products, they build confidence in themselves, their abilities, and their knowledge. Students who have typically struggled in traditional math and science courses have found a new identity as makers and experts in the Fab Lab. It’s boosted their interest in subject areas they previously didn’t see as
relevant, and it’s made them eager to come to school.

The projects students create in the lab give teachers a non-traditional means of assessing student understanding. This allows students to showcase their creative gifts that do not always shine in traditional classes or on tests. It allows students to have choice in the design and presentation of their assessments.

How can other schools create a Fab Lab?
First, if you can, visit a maker space in your community. See what kids or adults are doing there and think about how it applies to your students. Remember, your space doesn’t have to start out with all the highest tech and most expensive gadgets. The most basic Fab Lab can begin with simple hand tools, recycled materials such as cardboard and fabric, and a sewing machine. Many of these items can be easily collected through donations.

If you are interested in more high-tech equipment, make sure to put thought and planning into the space you will be using before you buy. Some equipment, such as laser cutters, requires specialized exhaust systems for safety and longevity of the machine. Start with what you can, do what you can, and keep building your space.

Our Fab Lab has allowed students to showcase their creativity by making exciting projects, tapping into skills not always assessed at school, and pulling students deeper into their learning. One of the most valuable lessons learned in the lab is how to fail. By creating products and designs, often after several attempts, students learn the important life lessons of risk-taking, learning from mistakes, and persevering.

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