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Chapter 1 : How to Make (Almost) Anything - Open House! | Harvard University Department of Physics

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Gershenfeld, a physicist and computer scientist who runs the Center for Bits and Atoms at MIT, envisions a time when many of us will have a "fabrication center" in our homes. At the push of a button, almost like hitting "print," the machine will spit it out. At least four other countries have shown interest in starting labs. Most said they want to work together with other users to solve problems they have in common, such as getting cheap Internet access into their communities. But the labs have the potential to become much more. The idea is that they can be empowering, especially in rural, developing communities, by giving people the ability to design and create the tools they want or need to solve local problems. In Pabal, India, a small community more than miles outside of Mumbai, lab users developed diagnostic instruments to help fix tractor engines with timing troubles. And at the lab in Norway, users are working on GPS systems for boats and de-icing machines for windmills. In , Gershenfeld started teaching a class at MIT called "How to Make Almost Anything" as a way to introduce technical students to the expensive, industrial-size machines like laser and water cutters that he and his colleagues were using in their research. At first he gave formal lectures on each machine. But the students -- many of them artists, architects, or science students without a technical background -- "responded passionately to the tools," he says. Soon they stopped asking him for help. Lab users, mostly inner city kids, learn valuable technology skills. Technology, in other words, was becoming sufficiently cheap and sophisticated to make the labs useful. Gershenfeld describes the shift from large-scale, expensive machine tools to personal fabrication as analogous to the evolution that began 40 years ago from room-sized mainframes to personal computers. As it currently exists, however, the technology imposes limits on what can be done. The milling machine, for example, is the size of a printer. The laser cutter cuts no longer than two feet. Nor can it cut very deeply: It would take a day for the laser to slice through an inch of plywood they now use a saw when necessary. The labs also face other, social challenges depending on where they are. In South Africa, whose government is considering starting a fab lab, the challenge is apathy. He believes a fab lab might get people excited about technology. And there is the question of sustainability. The labs are relatively inexpensive to create, and so far MIT pays the start-up costs. But after a year or so, the labs are on their own. The ultimate goal is for the labs to be financially self-sustaining. Gershenfeld, as always, has a novel solution: But the fab labs, Gershenfeld emphasizes, are research experiments and are still very much works in progress. So far, the reaction in the field labs has been encouraging. In Ghana, says Amy Sun, a grad student at the Center for Bits and Atoms who helped set up the fab lab there last summer, they ran an average of six classes a day for locals aged 4 to adult. She estimates that nearly 1, people came through the lab during her six-week stay. Most of the labs, for example, want to build antennas for various communications purposes. Recently, the lab in Norway -- where farmers and engineers are collaborating to build a wireless radio network to track sheep and reindeer -- built an antenna and posted photos and instructions on the Web for the others to see. Gershenfeld is impressed with how the lab users have taken the tools and made them their own.

Chapter 2 : Case study: How to Make (Almost) Anything â€“ HRW Lab, Bottrop (DE) | MAKE-IT

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And besides getting a daily dose of amazement, these students are making history in the first public school district with access to such groundbreaking, hands-on STEM education. Mahtomedi is a suburb of St. Paul, about 20 miles east of Minneapolis. The Mahtomedi Fab Lab, which opened in the fall of , is a state-of-the-art design center that allows students to electronically design objects such as chairs, lamps, or even a chocolate mold of a face. Then, they actually produce these objects using groundbreaking 3D printers, which take the virtual designs and lay down material such as liquid, powder, or metal layer by layer to build a real-life model within hours. The 3D printers have the capability to change how the world produces things, allowing for revolutionary manufacturing. Administrators sought to build an engineering lab with the remodel. Excitement grew in the community, and the Fab Lab came to fruition with the remodel and outside funding from local businesses. In the Mahtomedi Fab Lab today, high school students choose an object to make, write a proposal, design it with computer software, and finally use the equipment to create a real-life version. At Mahtomedi High School, all ninth graders take a science class that combines physics, chemistry, and engineering, and then have the option to take How to Make Almost Anything, aerospace engineering, or a college-level introduction to engineering course taught by a professor from Century College, all of which use the Fab Lab. The Fab Lab is an expansive open space, and is connected to a design studio full of computers, which was a new addition this school year, and a more traditional shop lab with a table saw and drill press. A significant number of Mahtomedi students pursue STEM studies and careers after high school, Nickleby says, and the school has started to track the numbers. George hopes to eventually pursue worldwide project collaboration at Mahtomedi High. Laser cutters and milling machines tools with rotating cutters that can shape metal use subtractive technology, in which a block of material gets chiseled into a model by a laser or spinning drill respectively, and are much quicker and more flexible in terms of what can be made, Lassiter says. For example, students can use Adobe Illustrator to design a chair in 2D on the computer, which Illustrator will position into a 3D model. Students can then use a laser cutter to cut the materialâ€”say, blocks of woodâ€”into 2D pieces, and fit them together to make the 3D chair. The number of How to Make Almost Anything classes doubled this school year, from three to six, with about 25 students in each section, and female student enrollment rose from 16 to The school was intent on preparing students for college and careers in STEM fields and a 21st century global economy. The demand for high school Fab Labs nationwide has increased, Lassiter says, and with it, the interest in STEM careers that the country will need. Alison DeNisco is staff writer for District Administration.

Chapter 3 : MIT - How to Make (Almost) Anything - student reviews | CourseTalk

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How to Make (Almost) Anything is a community as much as it is a class. From the title of the course, I knew that I'd be stretching my brain and limits as I attempted to master a variety of fabrication skills.

Chapter 6 : Fab Labs: Using Technology to Make (Almost) Anything! | District Administration Magazine

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Chapter 7 : How to make (almost) anything - The Boston Globe

How to make (almost) anything MIT's 'Fab Labs' project aims to give ordinary people around the world the technology to design and make their own stuff.

Chapter 8 : Syllabus | How to Make (Almost) Anything | Media Arts and Sciences | MIT OpenCourseWare

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Neil Gershenfeld, pioneer of the Fab Labs movement and a professor at MIT, spoke at the Museum of Science on March 10,