



The Creativity Lab

@ Lighthouse Community Charter School

MAKING IN SCHOOLS



Maker Education Initiative

• EVERY CHILD A MAKER •

444 Hegenberger Rd., Oakland, CA 94621

www.LighthouseCreativityLab.org

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MAKING

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WHAT IS MAKING?

making noun

: the action or process of producing or making something

: something that causes someone to become better or more successful

Source: merriam-webster.com

Making is the act of creating something. It is a hands-on process of using both familiar and unfamiliar materials, combining what we already know with new skills, thus building on that knowledge. Examples of making include:

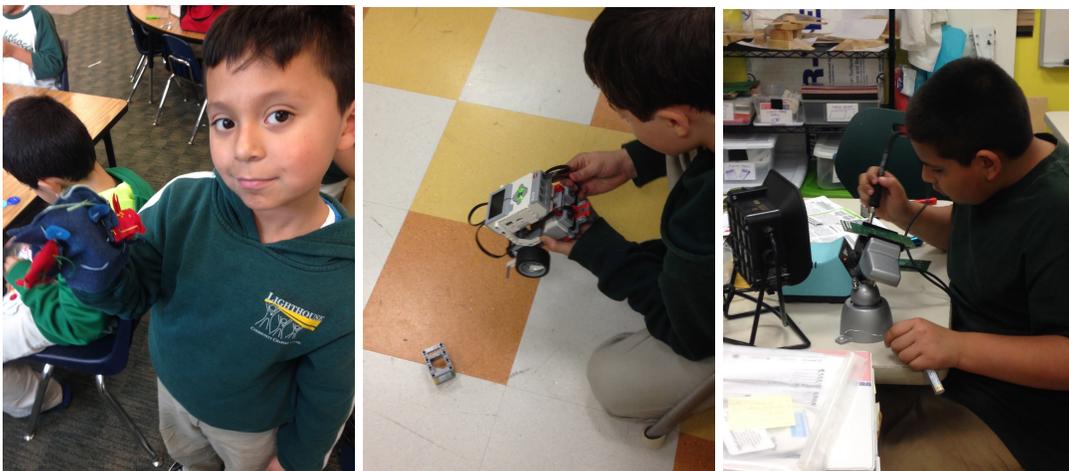
*Woodworking
Sewing*

*Programming
Designing*

*Building
Engineering*



Scribble Machines, Engineering, Tapigami



2nd Grade Puppet Sewing, 7th Grade Lego Engineering, 7th Grade Soldering

Look around you now, making is everywhere - the chair you are sitting in and the pen you are writing with were made and designed by a *maker*. “Making things and then making those things better is at the core of humanity.” (Martinez and Stager)

WHY MAKE IN SCHOOLS?

Making is a way to engage our kids with personally meaningful learning experiences that create ownership. “For those of us who want to change education, the hard work is in our own minds, bringing ourselves to enter intellectual domains we never thought existed. The deepest problem for us is not technology, nor teaching, nor school bureaucracies - it’s the limits of our own thinking.” (Martinez and Stager)

Making is about curiosity, it motivates learning by challenging what we believe we are capable of doing. Antoine de St. Exupery wisely said, “If you want to build a ship, don’t drum up people to collect wood and don’t assign them tasks and work, but rather teach them to long from the endless immensity of the sea.”

Making is not easy. It teaches us to try, fail, and then to try again, all the while instilling perseverance.

Suggested Reading: Invent to learn by Martinez and Stager (details listed under resources).

MAKING @ LIGHTHOUSE

Our vision through the Lighthouse Community Charter School Creativity Lab is to provide opportunities for a diverse group of people to participate in designing and making. At our school site, we are focused on low-income students of color from Oakland. We are building a K-12 program on site both to serve our own students, but also to help others see how design-making can be integrated into an entire school program. We believe that all students are designers and makers and we want to give our students the choice to pursue their own passion by providing them with the opportunity to make at all ages.

The design-make program at Lighthouse started in 2010, when we began to integrate making into a robotics elective that was being offered. After three years of bringing student imagined, designed, made projects to the **Maker Faire** in San Mateo, Lighthouse expanded its program to include all students (K-12) on campus as well as families and staff.

HOW WE TEACH MAKING @ LIGHTHOUSE

Currently we use three core models to integrate making into our school day. For each of these models we have provided a couple of examples of actual practice.



Fraction kits by 7th graders for rising 6th graders

1. **Open ended student driven projects** - After completing a set of skill builders, our 9-12th grade students engage in the process of choosing/developing their own project and then carrying out all the steps from ordering materials to creating a prototype to displaying their final product at the Maker Faire with minimal support from their teacher or mentor. In 9th grade science, students choose an area of study and design their own scientific experiment. This often includes using making skills to build their own apparatus.

2. **Integration with existing curriculum** - Our 2nd grade students sewed felt hand puppets based on a study of a character in a story they had read. In a unit of study about geology and earthquakes, our 5/6th graders studied the structures around them (including the Bay Bridge) to see how to make them strong and resistant to seismic activity. They used these studies to build and test small structures with popsicle sticks. Finally, they used all they had learned to construct a bridge and tested the amount of weight the bridge could hold. Our 7th graders created fraction kits for younger students to be able to use.

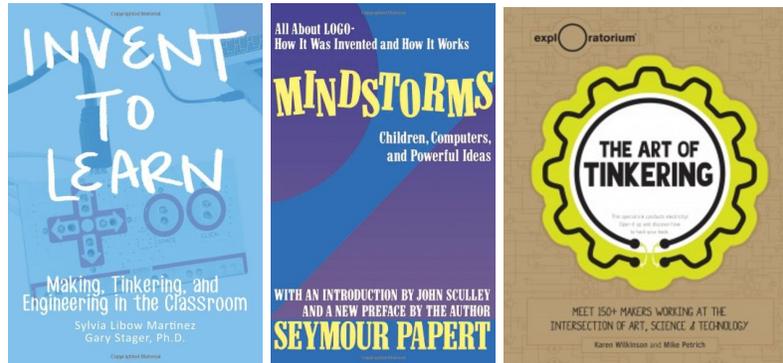
3. **Making focused curriculum** - In Kindergarten our students are studying a different medium each quarter. They are studying sand and water, sewing, wood, and paper. Each quarter students develop making and design skills, for example, in the sewing unit, they learned to thread a needle, stitch, follow a design, and create a project based on a peer's input. We are also working to integrate programming into our school's program K-12. Although our high school students have ample opportunity to try their hand at programming, we are also starting to teach our 2nd grade students to program as part of their weekly making time.

PROJECT IDEAS

| Project Name | Making Category | Possible Academic Tie-Ins | Grade Range (LCCS Grades) |
|----------------------------|----------------------------|---------------------------------------|---|
| Chair | Woodworking | Measurement, Precision | 7-12th (9-12th) |
| Soldering Kits | Electronics | Electric circuits, circuit components | 5-12th (5-12th) |
| Embroidered Pillow | Sewing | Artistic design, geometric design | 4-12th(9-12th) |
| Persistence of Vision Wand | Electronics, Programming | Electric circuits, vision/perception | 6-12th (9-12th) |
| Topographical Tapigami | Art & Craft | Geography, elevations | 4th+ (4th) |
| Engineering Paper Bridges | Engineering Design | Physics, geometry | 1-12th (1-4th can be modified with materials) |
| Making Journals | Craft | Documentation | K-8th (2nd & 7th) |
| Journals from Books | Craft | Documentation | 7-12th |
| Cardboard Mesas | Art & Craft | Ecology, Spanish | 4th+ (4th) |
| LEGO WeDo | Programming, Engineering | Programming, creative design | 2nd+ (2nd) |
| Paper Circuits | Electronics | Electric circuits | 3rd+ (3rd, 12th) |
| Character Study Puppets | Sewing | English | 2nd+ (2nd) |
| Scribbling Machines | Art & Craft | Experimental design, periodic motion | K-12th (K, 4th) |
| Circuit Boards | Electronics | Electric circuits | K-12th (3rd, 9th, 12th) |
| Burlap Embroidery | Sewing | Art | K-12th (K) |
| Burlap Plush Toys | Sewing, Design Thinking | Art | K-12th (K) |
| Toy Take Apart | Electronic, Art & Craft | Electric circuits, mechanical design | 5-12th (5-8th) |
| Clay Snow Globes | Art & Craft | Art | 2-12th (2-5th) |
| Sociogram | Art & Craft | Humanities | 9-12th (12th) |
| Stomp Rockets | Craft, Design, Engineering | Experimental design | 5-12th (5-8th) |
| Stop Motion Movies | Technology | English, Documentation | 2-12th (3rd) |
| Turtle Art | Technology, Programming | Geometry, Angles | 6-8th (6th) |

What To Read?

BOOKS WE LOVE



- Martinez, Sylvia Libow., and Gary Stager. *Invent to Learn: Making, Tinkering, and Engineering in the Classroom*. Torrance, CA: Constructing Modern Knowledge, 2013. Print.
- Papert, Seymour. *Mindstorms*. Brighton: Harvester, 1980. Print.
- Someguy. *1000 Journals Project*. San Francisco: Chronicle, 2007. Print.
- Wilkinson, Karen, and Mike Petrich. *The Art of Tinkering: Meet 150 Makers Working at the Intersection of Art, Science & Technology*. N.p.: n.p., n.d. Print.

RECOMMENDED BOOKS

(See also: <http://www.inventtolearn.com/bookstore/>)

- Buechley, Leah, Kanjun Qiu, Jocelyn Goldfein, and Sonja De Boer. *Sew Electric: A Collection of DIY Projects That Combine Fabric, Electronics, and Programming*. N.p.: n.p., n.d. Print.
- Duckworth, Eleanor Ruth. *"Tell Me More": Listening to Learners Explain*. New York: Teachers College, 2001. Print.
- Frauenfelder, Mark. *Made by Hand: Searching for Meaning in a Throwaway World*. New York: Portfolio, 2010. Print.
- Larsen, Elizabeth Foy., and Joshua Glenn. *Unbored: The Essential Field Guide to Serious Fun*. New York: Bloomsbury USA, 2012. Print.
- Macaulay, David, Neil Ardley, and David Macaulay. *The New Way Things Work*. Boston: Houghton Mifflin, 1998. Print.
- Papert, Seymour. *The Children's Machine: Rethinking School in the Age of the Computer*. New York: Basic, 1993. Print.
- Scheinfeld, Daniel R., Karen M. Haigh, and Sandra J. P. Scheinfeld. *We Are All Explorers: Learning and Teaching with Reggio Principles in Urban Settings*. New York, NY: Teachers College, 2008. Print.
- Tulley, Gever, and Julie Spiegler. *Fifty Dangerous Things (you Should Let Your Children Do)*. New York: New American Library, 2011. Print.
- Kemp, Adam. *The Makerspace Workbench: Tools, Technologies, and Techniques for Making*.
- Doorley, Scott and Witthoft, Scott. *Make Space: How to Set the Stage for Creative Collaboration*.

OUTREACH

Creativity Lab staff are able to support educators (at Lighthouse and partner institutions) so that they can integrate sewing, 3D modeling, building, engineering, design, knitting, programming, etc. into their own classes and programs. In order to accomplish this, we are offering professional development in the Bay Area and at Lighthouse. Generally the professional development falls into three categories, a tour, program planning, and learn to make sessions (e.g. Arduino programming, woodworking, soft circuits). Staff are also documenting projects as they are developed so that interested educators can start programs of their own, no matter where they are and sharing these resources at LighthouseCreativityLab.org.

In order to take on this expansion and our outreach efforts, we are partnering with the [Maker Education Initiative](#), the [Tinkering Studio](#), and the [Transformative Learning Technologies Lab](#).

MAKER EDUCATION INITIATIVE

Lighthouse is collaborating with the [Maker Education Initiative](#) (Maker Ed) in their Maker VISTA project .

The mission of the Maker Education Initiative is to create more opportunities for all youth to develop confidence, creativity, and interest in science, technology, engineering, math, art, and learning as a whole through making. We achieve our mission by ensuring educators and providers have the resources and support necessary to facilitate meaningful making experiences; organizations have the capacity to engage youth in making in informal and formal educational environments; and communities are equipped to lead and advocate for youth of all backgrounds to access making opportunities.

Maker Ed is proud to partner with the Corporation for National & Community Service on the Maker VISTA project to expand our vision by focusing efforts in urban and rural communities that have little access to the Maker Movement as a STEM initiative. The Maker VISTA project will foster maker programming year round in 10 cities across the nation, using community-school outreach strategies to ensure high poverty youth have access to making opportunities.

CONNECT, COLLABORATE, DISCOVER

Connect and Collaborate with today's STEAM session facilitators to learn more about our outreach efforts by emailing us at CreativityLab@lighthousecharter.org

Aaron Vanderwerff, Creativity Lab and Science Coordinator

Jessica Schipp, Maker Ed Documentation Americorps VISTA

Anisa Bora, Maker Ed Development Americorps VISTA

RESOURCES

Visit our Blog, check out our Professional Development opportunities, project guides, and connect with the resources we love at: www.LighthouseCreativityLab.org

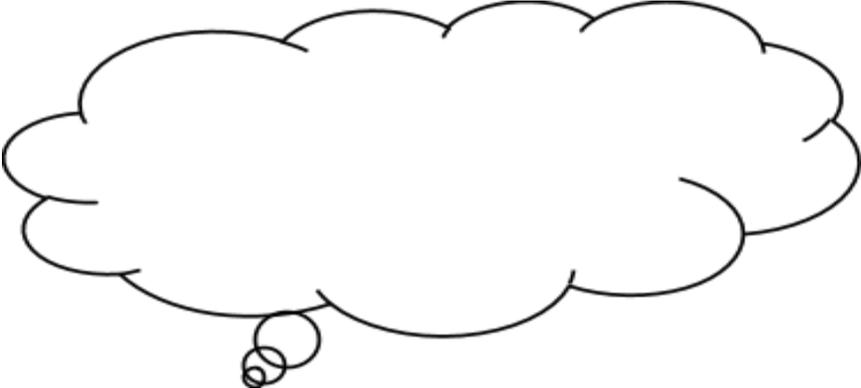
For more on LCCS and our school model, visit www.LighthouseCharter.org

Additional Websites: MakerEd.org, Make.com, MakerFaire.com, MakerSpace.com

Books: [Invent to Learn](#) is a great read for those interested in learning more about the maker movement. You can purchase it on Amazon.com.

Sylvia Libow., and Gary Stager. *Invent to Learn: Making, Tinkering, and Engineering in the Classroom*. Torrance, CA: Constructing Modern Knowledge, 2013. Print.

Scratch Pad - Doodle. Note. Make. Collect. Collaborate.



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