

CTE MAKEOVER CHALLENGE

CTE Makeover Challenge: Teacher's Guide

A guide to help Team Leads get the most out of the CTE Makeover Bootcamp

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CTE MAKEOVER CHALLENGE

Dear Team Leads,

Welcome to the CTE Makeover Bootcamp!

Whether you have been making for years or are just getting started, the CTE Makeover Bootcamp has been designed to help turn your school's vision for a makerspace into a reality. We highly encourage you to engage your entire team—students, teachers, administrators, and other partners—throughout the Bootcamp.

This Teacher's Guide has been designed to complement the Bootcamp lessons (available on the [CTE Makeover Challenge website](#)) to help your school get the most out of this experience based on your unique needs.

All lessons are self-paced and designed to be flexible so that they can be used at your convenience. Each lesson includes recommended resources, readings, Bootcamp assignments, and one or more webinars. Please note that watching the Lesson 0: Orientation and Overview webinar—either live or recorded—will be required in order for participants to submit a Blueprint. All other activities are optional.

Starting with Lesson 2, you will have the opportunity to participate in live, virtual group office hours to ask questions regarding specific aspects of your makerspace design. The office hours schedule and logistics are included in this Teacher's Guide. If you cannot make the office hours, an audio recording will be made available throughout the life of the Bootcamp on the [Challenge website](#).

Before you begin, we recommend reviewing the second round ("Blueprint") submission form to decide where to focus your efforts during the Bootcamp. You can view this form on the Challenge website or by clicking [here](#). Note that your Blueprint will require signatures from your Principal or Assistant Principal, and your Superintendent or Assistant Superintendent, and is due on May 22, 2016 by 11:59:59 PM EDT.

Should you have any questions during the Bootcamp, feel free to contact us at hello@CTEMakeoverChallenge.com.

We look forward to receiving your Blueprint submissions and seeing all that you plan to make, break, invent, and create!

- The CTE Makeover Challenge Team



CTE MAKEOVER CHALLENGE

Lesson 0: Orientation and Overview

Kick off your Bootcamp experience by participating in orientation, which offers an overview of the Bootcamp structure, Blueprint requirements, award selection criteria, deadlines, prizes, and next steps. The associated resources and readings will provide context for the Challenge including information on makerspaces and the White House “Nation of Makers” initiative.

Webinar

- [Lesson 0: Orientation and Overview presented by Luminary Labs:](#)
An introductory webinar

Watching the orientation webinar—either live or recorded—is required in order to submit a Blueprint. The webinar will take place at 4pm EDT on April 13, 2016 and the recording will be made available on the [Ed Prizes YouTube Channel](#).

Resources

Since these resources are fairly extensive, we suggest you skim them now and refer back to them as needed throughout the Challenge.

- [Maker Ed’s Resource Library](#)
An evolving collection of resources organized by topic.
- [Maker Ed Community](#)
A Google+ community for those interested in making and education.
- [Makerspaces.com, “MakerED Resources for School Makerspaces”](#)
Contains information on equipment, tools, materials, and Maker Movement news.
- [Maker Media](#)
The organization that jumpstarted the Maker Movement. The publisher of Make: Magazine (referenced in Lesson 2) and the producer of Maker Faire (referenced in Lesson 4).
- [Edutopia, “Maker Education”](#)
Chronicles the creative ways teachers are using making in the classroom; the site includes discussion boards, videos, blog posts, and more.
- [Digital Promise, “Maker Promise”](#)
A campaign to equip more students with resources to make. If interested, you can sign up using the link above.



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Lesson 0: Orientation and Overview

CONTINUED

Readings

- [Artisan’s Asylum, “So You Want a Makerspace?”](#)
- [Young Makers Program, “Maker Club Playbook”](#)
- [National Association of State Directors of Career and Technical Education Consortium, “The National Career Clusters® Framework”](#)
For those new to Career and Technical Education (CTE), we recommend that you explore this framework for a comprehensive overview of career pathways and skills encompassed by CTE.
- [WhiteHouse.gov, “A Nation of Makers”](#)
Read more about President Obama’s initiative and how the White House is supporting and celebrating making.
- [Maker Ed, “Makerspaces: Highlights of Select Literature”](#)



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Lesson 1: Making and 21st Century Skills

With its emphasis on self-reliance, community building, experimentation, and play, the Maker Movement is a natural fit for the ongoing evolution of career and technical education. Discover how making can strengthen skills that will allow students to succeed in the 21st century economy.

Webinar

These two webinars will be useful for the entire team, especially those new to making.

- [Introduction to the Maker Movement presented by Maker Ed](#): overview of making and the origins of the Maker Movement
- [Making in the Classroom presented by Makerspaces.com](#): skills that making builds and how making ties into career readiness

Readings

For Students & Educators

- [Maker Ed, Makerspace Playbook, Ch. 1, “Beginnings”, Ch. 2, “Places”, Ch. 6 “Practices”](#)

The Makerspace Playbook is referenced throughout the CTE Makeover Bootcamp. For making novices and experts alike, we recommend consulting this reading to help you prepare your Blueprint.

- [TechShop, “The Maker Movement Manifesto”, Sample Chapter](#)
- [Maker Faire Africa, “The Maker Manifesto”](#)

For Educators

- [Maker Ed, Open Portfolios, “Survey of Makerspaces, Part II”](#)
- [Connected Learning, “Maker-Ed: Tinkering, Inventing, Learning with Howard Rheingold”](#)
- [Steelcase, “Making Way for Making in Education”](#)

Assignments

As a reminder, assignments will not be collected or graded at any point.

- **Vision:** After reading [The Maker Manifesto from Maker Faire Africa](#), fast forward to the day you open your new or renovated makerspace. What will the motto of your new or renovated makerspace be?



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Lesson 2: Learning through Doing

Making encourages students to take learning into their own hands. Explore the topics and skills that can be taught using makerspaces and the projects, tools, and materials needed.

Webinar

The webinars in this lesson are more targeted at educators, with information on designing projects and tips on using making to enhance learning.

- [Bringing Your Makerspace to Life Through STEM](#) presented by TIES Teaching Institute for Excellence in STEM: Sample STEM projects and associated skills, machines, and tools
- [Using Crafts-Based Making to Learn Entrepreneurship Skills and More](#) presented by Etsy Manufacturing: The art of designing maker projects to build skills and optimize learning, featuring a case study at Etsy workshop

Resources

- [Maker Ed, Maker Ed Resource Library, "Projects & Learning Approaches"](#)
Includes sample making activities and facilitation methods. Though students may find this helpful, these articles are primarily for educators.
- [Make: Magazine, "Projects"](#) (includes projects across technology, craft & design, science, and more)
Includes sample projects across a variety of subjects. Useful for both students and educators.
- [Autodesk, "Project Ignite"](#)
Free software and project content for students and educators. Includes tools to help educators use hardware and software to teach design, 3D printing, electronics, programming and more.

Readings

- [Maker Ed, Makerspace Playbook, Ch. 6, "Practices", Ch. 7, "A Year in Making", and Ch. 8, "Projects"](#)
- [The New York Times, "Wood Shop Enters the Age of High-Tech"](#)
A quick read with anecdotes from makers on the benefits of hands-on learning.
- [The Wall Street Journal, "Becoming a 21st Century Digital Tinkerer"](#)
The importance of fostering "entrepreneurial learning" through collaborating and tinkering.



CTE MAKEOVER CHALLENGE

Lesson 2: Learning through Doing

CONTINUED

Assignments

Bonus assignment: Ask a local business owner or a family member what skills are most important to succeed in their industry. How could you develop those skills through making?

- **Assignment redesign:** What assignment could be enhanced through a maker project? For inspiration, see [Make: Magazine’s project page](#) and [Makerspace Playbook, Ch. 6 “Practices” and Ch. 8 “Projects”](#)
- **Making skills:** What real world skills could you learn through making? How could a makerspace project teach this skill either directly or through the process of making?
These skills could be hard skills such as engineering or soft skills like collaboration and communication. For example, a project like building a synthesizer could teach principles of electronics and sound, while encouraging teamwork. Curious about skills needed for jobs of the future? Check out these articles: [“The Most Important Design Jobs of the Future”](#) and [“10 Job Skills You’ll Need in 2020”](#) for inspiration.
- **Users:** What subjects, grade levels, co-curricular organizations, and extra-curricular clubs would benefit from making? Provide an example of how they could use your space.
Consider enlisting educators and students outside of the core team. Or flip the question – what groups are unlikely to think of themselves as makers? How could you engage them?

Office Hours

Use these hour-long virtual sessions with subject matter experts to get answers to your most pressing questions. Office hours will be recorded and posted on the [Challenge website](#) and the [Ed Prizes YouTube Channel](#).

- **Maker Projects in Education**
Host: [Makerspaces.com](#)

[Open this link on Tuesday, April 19th at 6pm EDT to access this live office hours session](#)



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Lesson 3: Plan It, Make It

Designing your makerspace is the heart of your Blueprint. Draft the design, identify the right tools, and plan how you will construct your makerspace.

Webinar

These webinars are appropriate for all team members, especially those interested in design.

- [Quick Tips on Designing Your Makerspace presented by Maker Ed:](#) Considerations for planning and designing your makerspace
This two-minute webinar will set you up to begin the technical design work in the Autodesk webinar below.
- [CAD Software presented by Autodesk:](#) CAD software for both beginners and more experienced users
Practice using CAD software by creating a design of your proposed makerspace. Upload this CAD design as part of your Blueprint submission.

Resources

- [Autodesk, Education Community Free Software](#)
Autodesk offers a wide variety of design tools for students and educators—we recommend getting started with AutoCAD, which is focused on 2D design and will aid in drawing out floor plans. If you're eager to build in 3D, 3ds Max is another available tool. The Autodesk office hours can help answer any questions you have along the way.
- [Tinkercad](#)
If you are new to CAD software, Autodesk recommends you start with Tinkercad. See the webinar for a demonstration.

Readings

For Students & Educators

- [Maker Ed, Makerspace Playbook, Ch. 2, "Places", Ch. 4, "Safety", Ch. 5, "Roles"](#)
- [Maker Ed, Maker Ed Resource Library, "Program & Planning Management"](#)

For Educators

- [Educause, Learning Spaces, Ch. 10, "Human-Centered Design Guidelines"](#)
- [Learning Space Toolkit](#)
- [Fast Company, "4 Lessons The Classroom Can Learn From The Design Studio"](#)



CTE MAKEOVER CHALLENGE

Lesson 3: Plan It, Make It

CONTINUED

Assignments

- **Design your makerspace:** Discuss the physical features of your space. Incorporate existing equipment and work areas, consider the flow of traffic, and ways to create a safe environment. Consider how you could make your space accessible for a person with disabilities.
- **Floor plan:** Outline your current space in computer-aided design (CAD) software to determine your constraints. Where are the doors, windows, and outlets?
Mapping out your current space is a good way to both learn CAD software and identify the boundaries of your future space. Once this is done, start filling in these bounds with your new vision.
- **Build plan:** How will you build out your makerspace? Map out your timeline and identify who will be involved in putting together key elements.

Office Hours

- **AutoCAD Software**

Host: Autodesk

[Open this link on **Wednesday, April 20th at 4pm EDT** to access this live office hours session](#)

- **Tools, Equipment, and Makerspace Safety**

Hosts: Snap-on Incorporated, U.S. Fab Lab Network, and National Coalition of Certification Centers (NC3)

[Open this link on **Tuesday, April 26th at 4pm EDT** to access this live office hours session](#)



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Lesson 4: Identifying and Engaging Your Community

Collaboration, inclusivity, and community building are core components of the Maker Movement. Explore ways to engage students, parents, educators, librarians, and members of the local business and tech communities. Consider how your community can contribute to building and sustaining your makerspace.

Webinar

This webinar is geared toward your entire team.

- [Identifying and Engaging Your Community presented by University of Michigan](#): Bringing together students, educators, businesses, and local organizations

Resources

- [Maker Faire, “Maker Faires Around the World”](#)
This directory lists opportunities to connect with makers in person and provides guidance on how to host your own Maker Faire.

Readings

- [Info Today, “Making and Community Engagement in the Library”](#)
- [DeLaMare Science & Engineering Library, “Community Engagement and Makerspace”](#)
- [Maker Ed, Youth Makerspace Playbook, “Sustainability”, p. 52](#)

Assignments

- **Make a list:** Identify community stakeholders who you can involve in your makerspace.
Stakeholders could include parents, educators, local maker clubs, public libraries, your local chamber of commerce, school board members, manufacturing businesses, tech companies, and more. Consider people in your community who could teach a skill, donate materials, help spread the word, or offer an extra set of hands during construction.
- **Attend a local event:** Find a local Maker Faire, PTA event, or other school meeting and grow the network that will help bring your makerspace to life.
For a list of events near you, check out the “Maker Faires Around the World” above. Don’t see one close by? Organize your own event using the guidance on the [Maker Faire website](#).



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Lesson 4: Identifying and Engaging Your Community

CONTINUED

Office Hours

- **Connecting with the Community**

Host: Maker Ed

*Open this link on **Thursday, April 28th at 6pm EDT** to access this live office hours session*



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Lesson 5: Budgeting and Resources

Make your plans a reality by drafting a budget and coming up with ways to gather the resources you will need to build a sustainable makerspace. Think about innovative ways you can use existing and low-cost resources to execute your vision.

Webinar

These webinars are suited for educators and administrators, though students are also welcome to join.

- [Crowdfunding Through Online Platforms](#) presented by [DonorsChoose.org](#): Tips to secure resources, including how to create an effective online fundraising campaign
- [Budgeting for Your Makerspace](#) presented by [University of Michigan](#): Cost considerations for building and maintaining your makerspace

Resources

These crowdfunding platforms can help you gather resources for your makerspace.

- [DonorsChoose.org](#)
Connects classrooms in need with donors who want to help. Teachers post classroom project requests, and donors can choose the ones they would like to support.
- [PledgeCents](#)
PledgeCents is a platform that allows educators to raise money for causes that improve educational opportunities for their students.
- [Kickstarter](#)
Kickstarter helps creators find the resources and support needed to make their ideas a reality.

Readings

For Students & Educators

- [Maker Ed, Makerspace Playbook, Ch. 3, p.11, “Tools & Materials”, Ch. 9, p.43, “Startups”, and p.61, “Sample Proposal and Budget to Submit to a Funder”](#)
- [PledgeCents, “Steps to Success”](#)



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Lesson 5: Budgeting and Resources

CONTINUED

Readings

For Educators

- [Makerspace.com, “High School Makerspace Tools & Materials”](#)
- [NYSCI, "NYSCI Maker Blueprint", “How will the Maker Program be Funded and Sustained?”, p.13 and “Budget”, p.14](#)
The University of Michigan webinar on budgeting will walk through the two readings above, which will be useful for drafting your budget.
- [MakerBot, Strategies for Funding a MakerBot Innovation Center at Your University](#)
Although this document is targeted at universities, the information provided can be adapted to high schools.

Assignments

- **Budget:** Draft a budget for your makerspace. Where will you source your equipment and materials? What are your “must have” items and your “nice to haves”? Consider both one-time and recurring expenses.
- **Funding:** How do you plan to fund the space? Consider the funding sources described in this lesson.

Office Hours

- **Creating a Budget**
Host: Maker Ed

[Open this link on Thursday, May 5th at 4pm EDT to access this live office hours session](#)

