



MAKER MOVEMENT

In an age when anything can be bought at the nearby store or online, the knowledge and skills of how to make things is fading away. In this apprenticeship, students will revive this knowledge and build skills as part of the larger Maker Movement. Students will explore not only different focus areas of Makers (clothing, musical instruments, and simple machines), but also explore different tools commonly used by Makers while learning and practicing the process of innovation. During the last four weeks of the apprenticeship, students will create a final project to address a social issue in their community using the knowledge and skills they have developed in the first six weeks of the apprenticeship. Students will leave this apprenticeship with the confidence and ability to make items they imagine and use the innovation process to explore solutions to everyday problems they may face.

Unit Standards and Objectives 21st Century Skill: Innovation

Standard #1: Citizen Schools students will generate an idea or product that suits a practical or artistic purpose.

Lesson Objectives:

- SWBAT generate a list of ideas for innovations, categorize the ideas based on feasibility, and select the best to complete based on interest.
- SWBAT use the advantages, limitations, and feasibility of the ideas as criteria for selecting the best one.
- SWBAT generate ideas for unique innovations to solve a problem or fill a specific purpose for the user.
- SWBAT select an innovation to begin building/making for his/her WOW! Project.

Standard #2: Citizen Schools students will use a design process to create ideas or products.

Lesson Objectives:

- SWBAT use an evaluative approach to successfully build a marble machine that moves a marble from point A to point B.
- SWBAT use everyday objects for alternative purposes to create unique marble machines including features such as a tunnel, a drop basket, a switch or a spring.
- SWBAT identify a list of tools and materials needed to build an innovation.
- SWBAT list tools and materials needed to begin his/her WOW! Project.
- SWBAT use an evaluative approach to test, refine and revise his/her innovation.

Standard #3: Citizen Schools students will realize a product or idea that suits a given purpose.

Lesson Objectives:

- SWBAT loosely describe the three Maker focus areas they will explore and the WOW! product each student will create.
- SWBAT use velcro dots to make a Velcro Dot Building Kit.
- SWBAT wrap a form with fabric to make a Wreath.
- SWBAT recycle t-shirts into something new: a Tote Bag, a Toy, or a Superhero Cape.
- SWBAT use wood, a measuring tape and a saw to prepare the boards to build a box.
- SWBAT use boards from Week 3, hammers, nails, and hinges to effectively build a box.
- SWBAT add pulley and/or lever machines to their marble machines.
- SWBAT work in groups to make something on their Exploration.
- SWBAT identify traits of innovators in the speakers they observe on the Exploration.
- SWBAT select a problem to focus on solving for his/her WOW! Project.
- SWBAT continue building/making his/her WOW! Project.
- SWBAT finish building/making for their WOW! Project.
- SWBAT prepare to share their innovation at the Maker's Faire or WOW! Showcase.

Standard #4: Follow precisely a multistep procedure when carrying out experiments*, taking measurements, or performing technical tasks.

Lesson Objectives:

- SWBAT explain expectations for behavior, materials use, and professionalism in this apprenticeship.
- SWBAT follow a list of instructions to create a Tote Bag, a Toy, or a Superhero Cape.
- SWBAT follow a list of instructions to saw the boards to make a box.
- SWBAT use a measuring tape to accurately measure and mark where to cut the wood.



Core Apprenticeship Library

Apprenticeship Sector: Design & Invent

Unit Guide: Maker Movement



- SWBAT use an evaluative approach to successfully build a marble machine that moves a marble from point A to point B.
- SWBAT define “precisely” and understand how it relates to following and writing multistep procedures.
- SWBAT read and follow the multistep procedure for making something they observe on their Exploration.
- SWBAT identify a multistep procedure to follow to recreate his/her WOW! Project.
- SWBAT finalize a multistep procedure to follow to recreate his/her WOW! Project.

*The maker process inherently involves experimentation. However, students will not be carrying out formal experiments or using the Scientific Method. Instead, students will carry out experiments while making, evaluating their progress, and using an iterative process to hone their work.

Essential Questions

- Can you make anything you imagine?
- Do detailed instructions help or hinder the creative making (or innovation) process?

Performance Task Assessment (WOW!)

For the Performance Task, students will individually make something to address and improve a real world problem in their community. The teacher will identify 3-5 problems in the community and challenge the students to innovate to find a solution. Students will then build a prototype to display for their WOW!. Additionally, each project will include not only the prototype, but also a multistep procedure on how to make it, a list of tools and materials, and a written explanation of how this innovation uniquely addresses the problem selected.

Goal: What are students trying to accomplish within the task? Students are trying to create and make something to address and improve a real world problem in their community. For example, if a school had a problem of bathroom passes that were getting dirty when set down in the bathroom, a student might create a new bathroom pass that could easily hang on the bathroom door or be worn like a hat. The problems will be designed by the teachers of the apprenticeship and four example problems are provided in Lesson 8.

Role: What role are students playing within the task? Students will each create a project individually. Though the student can collaborate and brainstorm with their peers, each student will be the sole designer, creator, and builder of his/her innovation.

Audience: Students will share their creations with each other, fellow students, teachers, and community members at an informal campus or city-wide Maker's Faire and/or WOW! Showcase. As audience members, they are all potentially makers who could learn from students to recreate their projects using the project itself and resources provided in the WOW! as inspiration. Determine the best venue for holding your apprenticeship Maker Faire to share student's WOW! Projects by connecting with the local Maker Community and considering scheduled campus and city-wide WOW! Events. Resources about local Maker groups can be found at <http://makerfaire.com> or by using Google to search for “Maker” or “Maker Faire” and your community name.*

Situation: All “making” will happen in the classroom with materials and tools used throughout the apprenticeship. Students will use their CTs, peers, and the internet as additional resources and thought partners while designing and building.

Product: Students will make an object called their WOW! Project to address and improve an issue in their community. Each project will include not only the project, but also a multistep procedure on how to make it, a list of tools and materials, and a written explanation of how this innovation uniquely addresses the problem selected.

Standards: Students and the process they use to make their objects will be evaluated by the teaching team using the Citizen Schools [Innovation Rubric](#).

*Note: If a WOW! Maker Faire is going to happen in the apprenticeship Lesson 10, then the exploration in Lesson 7 should be cancelled and Lessons 8-10 taught in Weeks 7-9. Modify Lesson 10 to include the Maker Faire and a celebration of all the students have accomplished.



Core Apprenticeship Library

Apprenticeship Sector: Design & Invent

Unit Guide: Maker Movement



Lesson Plans At-A-Glance

Lesson Plans can be found [here](#)

Week	Lesson Objectives	Agenda	Outcomes & Work Products
1	<ul style="list-style-type: none"> ● SWBAT loosely describe the three Maker focus areas they will explore and the WOW! product each student will create. ● SWBAT use velcro dots to make a Velcro Dot Building Kit. ● SWBAT wrap a form with fabric to make a Wreath. ● SWBAT explain expectations for behavior, materials use, and professionalism in this apprenticeship. 	<ul style="list-style-type: none"> ● Hook: Welcome to the Maker Movement! ● Introduction to New Material: What is Making? ● Activity 1: Expectations ● Activity 2: The Maker Cards ● Activity 3: Introduction to Fabric ● Assessment: Work Product 	Students will dive into working with fabric and make both a velcro dot project and wreath project. Students will practice generating ideas for innovation.
2	<ul style="list-style-type: none"> ● SWBAT generate a list of ideas for innovations, categorize the ideas based on feasibility, and select the best to complete based on interest. ● SWBAT recycle t-shirts into something new: a Tote Bag, a Toy, or a Superhero Cape. ● SWBAT follow a list of instructions to create a Tote Bag, a Toy, or a Superhero Cape. 	<ul style="list-style-type: none"> ● Hook: Sharing Wreaths ● Introduction to New Material: Following Directions ● Activity 1: T-Shirt Workshop ● Activity 2: Generating Ideas ● Activity 3: Continued Workshop Time ● Assessment: T-Shirt Work Product 	Students will follow a multistep procedure to repurpose old t-shirts and make them into something new. Students will practice generating and categorizing a list of ideas for innovation.
3	<ul style="list-style-type: none"> ● SWBAT follow a list of instructions to saw the boards to make a box. ● SWBAT use a measuring tape to accurately measure and mark where to cut their wood. ● SWBAT use wood, a measuring tape and a saw to prepare the boards to build a box. 	<ul style="list-style-type: none"> ● Hook: Showcase T-Shirt Innovations ● Introduction to New Material: Rotation Plan ● Activity 1: Henry Ford and Steve Wozniak ● Activity 2: Traits of Successful Innovators ● Activity 3: Measuring ● Activity 4: Sawing ● Assessment: Materials Prepared for Wooden Box 	Students will prepare the materials for building a wooden box. Students will practice measuring accurately as an important step of following a multistep procedure.
4	<ul style="list-style-type: none"> ● SWBAT use the advantages, limitations, and feasibility of the ideas as criteria for selecting the best one. ● SWBAT use boards from Week 3, hammers, nails, and hinges to effectively build a box. 	<ul style="list-style-type: none"> ● Hook: Highlight Four Building Projects ● Introduction to New Material: Evaluating Ideas ● Activity 1: Pick One! ● Activity 2: Constructing Our Boxes ● Activity 3: Painting (optional) ● Assessment: Wooden Box and Handout 	Students will build a wooden box. Students will evaluate project ideas for their advantages, limitations and feasibility to complete before selecting the best one.
5	<ul style="list-style-type: none"> ● SWBAT use everyday objects for alternative purposes to create unique marble machines including features such as a tunnel, a drop basket, a switch or a spring. ● SWBAT identify a list of tools and materials needed to build an innovation. ● SWBAT use an evaluative approach to successfully build a marble machine that moves a marble from point A to point B. 	<ul style="list-style-type: none"> ● Hook: Showcase Wooden Boxes ● Introduction to New Material: Intro to Marble Machines ● Activity 1: Testing as a Part of Innovation ● Activity 2: Work Time: Marble Machines ● Activity 3: Tools and Materials ● Assessment: Work Product: Marble Machines and Handout 	Students will build marble machines using everyday found and recycled objects. Students will evaluate the functionality of their machines and take an iterative approach to test and hone their machines.
6	<ul style="list-style-type: none"> ● SWBAT define "precisely" and understand how it relates to following and writing multistep procedures. ● SWBAT add pulley and/or lever machines to their marble machines. 	<ul style="list-style-type: none"> ● Hook: Showcase Marble Machines ● Introduction to New Material: Precision ● Activity 1: Levers ● Activity 2: Pulleys ● Activity 3: Marble Machine Work Time ● Assessment: Exit Ticket and Work Product: Marble Machine (Lever or Pulley) 	Students will add simple machine components (pulley and/or lever) to the marble machines. Students will explore the importance of the word precise in following and writing multistep procedures.



Core Apprenticeship Library

Apprenticeship Sector: Design & Invent

Unit Guide: Maker Movement



7	<ul style="list-style-type: none"> ● SWBAT work in groups to make something on their Exploration. ● SWBAT identify traits of innovators in the speakers they observe on the Exploration. ● SWBAT read and follow the multistep procedure for making something they observe on their Exploration. 	<ul style="list-style-type: none"> ● Hook: Exploration Prep ● Introduction to New Material: Taking Notes ● Activity 1: Tour and Panel/Presentation ● Activity 2: Maker Workshop ● Activity 3: Debrief ● Assessment: Exit Ticket OR Thank You Note 	Students will explore the Maker Movement in their community and identify what innovation looks like to local Makers.
8	<ul style="list-style-type: none"> ● SWBAT generate ideas for unique innovations to solve a problem or fill a specific purpose for the user. ● SWBAT select an innovation to begin building/making for his/her WOW! Project. ● SWBAT list tools and materials needed to begin his/her WOW! Project. ● SWBAT select a problem to focus on solving for his/her WOW! Project. 	<ul style="list-style-type: none"> ● Hook: Showcase Levers and Pulleys ● Introduction to New Material: Innovation for Purpose ● Activity 1: Intro to WOW! Project ● Activity 2: Select an Idea ● Activity 3: Tools and Materials ● Assessment: Work Product: WOW! Project Review 	Students will generate ideas for innovative projects addressing problems in their community. Students will categorize their ideas and select the best one. Then they will list tools and materials needed for their WOW! Project.
9	<ul style="list-style-type: none"> ● SWBAT use an evaluative approach to test, refine and revise his/her innovation. ● SWBAT continue building/making his/her WOW! Project. ● SWBAT identify a multistep procedure to follow to recreate his/her WOW! Project. 	<ul style="list-style-type: none"> ● Hook: Showcase WOW! Project Planning ● Introduction to New Material: Field Testing ● Activity 1: Work Time, Part 1 ● Activity 2: Reflection ● Activity 3: Work Time, Part 2 ● Assessment: Work Product: WOW! Project Review 	Students will begin making their WOW! Projects and supplemental materials.
10	<ul style="list-style-type: none"> ● SWBAT finish building/making for their WOW! Project. ● SWBAT prepare to share their innovation at the Maker's Faire or WOW! Showcase. ● SWBAT finalize a multistep procedure to follow to recreate his/her WOW! Project. 	<ul style="list-style-type: none"> ● Hook: Showcase WOW! Projects ● Introduction to New Material: WOW! Time ● Activity 1: Work Time, Part 1 ● Activity 2: Supporting Materials ● Activity 3: Work Time, Part 2 ● Assessment: Work Product: WOW! Project 	Students will finish making their WOW! Projects and supplemental materials. Students will prepare for sharing their WOW! Projects at a local Maker's Faire or WOW! Showcase.

Lesson Elements

Hook Opening ritual used each week to build excitement	Each week the Hook will showcase students' work from the previous week. Select 2-3 projects from the previous week to highlight. Projects should be selected that highlight skills that the teacher wants to see more of the next week. It is recommended that the teacher create a list to keep track of who's work has been showcased. This will help the teacher to plan to feature each student over the course of the apprenticeship.
Assessment How you will measure student learning (i.e., exit tickets, student writing, student presentations, etc.)	Student work will be assessed as a measure of student learning each week. Additionally, in a few weeks an Exit Ticket or an in-class handout will be used to assess students mastery for the day. For the WOW! Project, the Citizen Schools Innovation Rubric will be used to assess each student's WOW! Project and supporting materials.
Structures Learning structures, tools or student grouping strategies	Co-teachers are recommended for this apprenticeship to allow for Parallel Teaching and small group teaching. Students primarily work independently with the exception of the marble machines in Weeks 5 and 6. This means there are a lot of materials to manage and many 1:1 checkins to facilitate. Additionally, extra volunteers are recommended for Lessons 3, 4, and 8-10 to provide more adult supervision and help with building projects and tools.
Procedures Special procedures used each class (ie handing out folders, rearranging seating, etc.)	Managing Materials Plans for how to effectively manage and store materials, tools, and projects are vital for the success of this unit. Each week students will need numerous materials and distributing these items in an efficient manner will be important to ensure adequate work time. Each lesson indicates whether it is recommended to create kits before class so you can pass out one kit to each student or if you want to set up stations for materials pickup and tool use, etc. Streamline these plans to work best



Core Apprenticeship Library

Apprenticeship Sector: Design & Invent

Unit Guide: Maker Movement



for your context.

Student Projects

At the end of class, you will have a large volume of projects to collect. Identify a way to transport the projects (as needed each week) and a place to store them between classes. This will provide you with ample time to assess the work products and select 2-3 to showcase in the Hook in the upcoming week. Alternatively, plan to send the projects home with students if you are able to evaluate them in class. If you send work home with students immediately, you will need to assess it in class and select 2-3 to showcase the following week. You will need to keep those 2-3 projects. Additionally, you will need to store all the projects between Lessons 3 and 4, Lessons 5 and 6, and Lessons 8-10.

Workstations

Consider how and where you can best provide workstations for your students for each lesson. Recommendations are included with parameters for each week's projects but typically each student will need a space to work independently each week with easy access to tools and materials required for the project plus frequent interaction and mentorship with a teacher. On some weeks, tools will determine the workstation space (such as lessons 3 and 4 with the wooden boxes) and on other weeks, type of project will determine the workstation space (such as lessons 8-10 with the WOW! Projects).

Implementation Notes

Supplies

Materials, tools, technology

Numerous supplies are needed for this apprenticeship. In fact, materials management is absolutely the key to success of this apprenticeship. Below is a brief list of the materials needed. Please refer to [Maker Materials](#) for a detailed list and budget.

- Pitch- lacquer, paint brush, ring blanks, bottle caps, super glue, sharpie, samples
- Lesson 1- velcro dots, popsicle sticks, fabric, ziplock bags, foam tube, duct tape, fabric cutter
- Lesson 2- t-shirts, tennis balls, (fabric) scissors, misc decoration items
- Lesson 3- wood, saw, tape measure, eye protection, grocery bags, scrap paper, pencils
- Lesson 4- wood glue, hammers, nails, sand paper, scrap wood, paint (optional)
- Lesson 5- marbles, masking tape, everyday found or recycled objects, boxes
- Lesson 6- popsicle sticks, masking tape, binder clips, rubber bands, yarn, empty spools or oatmeal container cut into rounds, rulers, pennies and quarters
- Lesson 7- exploration, materials tbd
- Lesson 8- WOW! Project materials
- Lesson 9- WOW! Project materials
- Lesson 10- WOW! Project materials

Budget

Work with your campus leadership to secure more funds for this apprenticeship if/when possible. Materials are, for the most part, used in the apprenticeship and will need to be purchased each time. A significant number of tools and materials can be borrowed or you can get them donated. Allow extra time to coordinate borrowing and securing donations. Below is a brief list of the cost per lesson, assuming you are able to maximize borrowing and donations. Please refer to [Maker Materials](#) for a detailed list and budget.

- Pitch- \$3
- Lesson 1- \$23
- Lesson 2- \$40
- Lesson 3- \$20
- Lesson 4- \$62
- Lesson 5- \$14
- Lesson 5- \$0
- Lesson 6- \$0
- Lesson 7- exploration
- Lesson 8-10- tbd based on WOW! Projects, \$5/student
- Total Cost Estimate: \$266

In Lessons 5 and 6, the marble machines will work best if pegboards are available. Work with



Core Apprenticeship Library

Apprenticeship Sector: Design & Invent

Unit Guide: Maker Movement



	campus and regional Citizen Schools leadership to determine if peg boards for marble machines exist already or could be purchased for this apprenticeship. Pegboard runs about \$20/board and is prohibitively expensive as a material for one apprenticeship. However, this is one of the few materials that is a one time cost and could be used for many future Maker Movement apprenticeships. Lessons 5 and 6 are not written to use pegboards, the same activities can be facilitated more easily using the pegboard style marble machines. See additional information and pictures of how pegboard marble machines work here .
Supporting Materials & Resources handouts, books, materials	Extra volunteers are recommended for Lessons 3, 4, and 8-10 to provide more adult supervision and help with building projects and tools.
Location Tables/desks, or classroom, gym, kitchen, outside, etc.	Tables are recommended for all of the making lessons. During lessons 3 and 4, alternative space to use a saw, hammers and nails may be necessary.
Choice and Voice Key decisions students make	Students have significant opportunities for choice and voice in this apprenticeship. Each week the students will complete a project and have the opportunity to create unique or innovative components of the project. Then, each student will have voice in selecting a problem to focus his/her WOW! Project on and design/make his/her WOW! Project independently.
Modifications for Student Needs Supports and changes to help meet the needs of all learners	This apprenticeship involves reading directions and completing projects and could be a great fit for a student with learning disabilities. Consider modifying the Maker Cards to provide a larger print, more simple language, or other supports for vocabulary to modify for all reading abilities. Additionally, provide extra, targeted support to students who need it during projects in which extra adult supervision is already recommended (Lessons 3, 4, 8-10). Consider assigning an extra adult to support specific students when needed.
Student Background Knowledge and Skills Needed Academic skills, social emotional skills or developmental milestones needed	Students are likely to struggle if they cannot read basic directions but, this apprenticeship will help develop the skill to follow a multistep procedure carefully. Students do not need previous experience using the tools or materials used in this apprenticeship, but previous exposure will help.
College and Career Readiness Connections to college and career	College Connection: Making things is a real part of many professional fields. From technical studies to engineering, students will be able to consider how making is actually a part of everyday life in many ways. Career Connections: Students will meet people from the Maker Community who are artists or professional and recreational makers. They will be exposed to a world outside the one in which they live and consider lifestyles and life pursuits that are unique and unusual to them.
Co-Teaching Roles Recommendations for co-teaching and planning	Two or more co-teachers are recommended for this apprenticeship to allow for Parallel Teaching and small group teaching. Students primarily work independently with the exception of the marble machines in Weeks 5 and 6. This means there are a lot of materials to manage and many 1:1 checkins to facilitate. During the WOW! Project work time in Lessons 8-10, it is recommended that each co-teacher be assigned a certain number of students to work with to provide targeted support. Additionally, extra volunteers are recommended for Lessons 3, 4, and 8-10 to provide more adult supervision and help with building projects and tools.
Special Resources Field trips, excursions, guest speakers	An Exploration is recommended in Lesson 7. The decision of where to take your students should be finalized by Week 4 at the latest. Consider what Maker connections are available in your community that connect to the ideas of this unit. Some ideas: a Maker Faire, a Maker center with work rooms, an artist that considers him or herself to be a part of the Maker community, Home Depot, etc. Identify a location that will best provide your students exposure to people in the community who are making things and exposure to innovation and innovative thinking. <ul style="list-style-type: none"> ● Use Google to find people and places in your community that support the Maker Movement. Learn if your city hosts a Maker Faire and when it is here. ● Home Depot regularly holds workshops for students for free or very low cost at their stores. If no obvious Maker connection exists, contact Home Depot to see if they would hold a building workshop for your apprenticeship. Learn more about Home Depot's Kids Workshops here. ● Note: If you have time, solicit student ideas for where they would like to go. Either present 3 ideas and have the students vote, or alternatively, take into account their interests as expressed in the apprenticeship and use them to guide your choices.






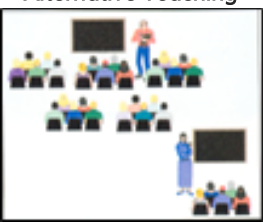

Core Apprenticeship Library
Apprenticeship Sector: Design & Invent
Unit Guide: Maker Movement



<p>Road Map to WOW!</p> <p>Visual overview for students of their 10 week apprenticeship</p>	<p>Note to CT/TL: Create a poster-sized visual of the information listed below to display and reference weekly in your classroom.</p> <p>Visual overview for students of their 10 week apprenticeship:</p> <p>Week 1: Fabric Wreaths</p> <p>Week 2: T-shirt Innovations</p> <p>Week 3: Wooden Boxes, Part 1</p> <p>Week 4: Wooden Boxes, Part 2</p> <p>Week 5: Marble Machines</p> <p>Week 6: Levers and Pulleys</p> <p>Week 7: Exploration</p> <p>Week 8: Design WOW! Projects</p> <p>Week 9: Build WOW! Projects</p> <p>Week 10: Finish WOW! Projects</p> <p>WOW!</p>
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Co-Teaching Structures Guide

Teaching Model	Description	Why should we use it?	When should we use it?
Parallel Teaching 	Class is split into two (or more) small teams. <u>Same</u> content is taught to each team.	<ul style="list-style-type: none"> ·Low student-teacher ratio ·Greater proximity to high-risk students ·Co-teachers have equal presence and responsibility in the classroom 	<ul style="list-style-type: none"> ·When we can plan effectively together to ensure we teach the same content to each group well. ·Classroom's physical structure permits it. ·For lessons with heavy independent work ·Need to provide a lot of individual attention
Station Teaching 	Class is split into two (or more) small teams. <u>Different</u> material taught to each group simultaneously and then teams switch or teachers switch.	<ul style="list-style-type: none"> ·Low student-teacher ratio ·Co-teachers have equal presence and responsibility in the classroom. ·More variety in teaching methods for teachers and students 	<ul style="list-style-type: none"> ·When a lesson can be split into two mutually exclusive and equally timed parts (e.g. using a camera/critiquing a photo, chopping vegetables/measuring ingredients) ·When the classroom's physical structure permits it ·For lessons with a lot of knowledge or skill-building
Team Teaching 	Both teachers actively teach the material taking turns during the lesson to lead teach. While one teacher is lead teaching the other goes around to groups or individual students.	<ul style="list-style-type: none"> ·One teacher can pay attention to high-risk students while one teacher leads the full class. ·Co-teachers have equal presence and responsibility in the classroom. 	<ul style="list-style-type: none"> ·When it's difficult to effectively split a lesson into two stations ·When a lesson has lectures and independent practice time ·If most SPED students can follow whole-group instruction ·Best used with well-developed co-teaching relationship ·For lessons with a lot of group work
Alternative Teaching 	One teacher remediates a small group of students (pre-teach, re-teach, supplement, or enrich) and catches them up for the main lesson being taught by the other teacher.	<ul style="list-style-type: none"> ·Low student-teacher ratio. ·To remediate in class for a small group of students. ·To catch students up who may not have understood/missed previous lessons 	<ul style="list-style-type: none"> ·When the benefits from a few minutes of remediation/pre-teaching will pre-empt greater misunderstandings for the lesson. ·When the classroom's physical structure permits small group in one part of the room. (CTs should not be left alone in the classroom with students.)
One Teach, One Assist 	One teacher lead teaches the whole lesson and the other teacher works with individual students.	<ul style="list-style-type: none"> ·To redirect behavior from an especially low functioning student. ·To pay greater attention to a student who needs one-on-one interaction in order to keep up 	<ul style="list-style-type: none"> ·If there is a particularly high-needs student(s) in the classroom that need specific support. ·During direct-teach sections of the lesson



Core Apprenticeship Library

Apprenticeship Sector: Design & Invent

Unit Guide: Maker Movement



The Pitch

Preparation:

- Gather work samples of your own making work. If the objects are too large or fragile, take photos. If you want to show photos on a projector, coordinate the necessary technology with your campus.
- Gather samples of the projects taught in this apprenticeship. If you don't have any from a previous apprenticeship, consider making them yourself. You will use them later on as samples in the apprenticeship lessons too.
- Premake 10-15 bottle cap rings. (Note: Materials and directions below)
- (Optional) Premake rings to handout to all students. (1 per student)

Pitch:

- **Introduce yourself and say:** This apprenticeship is an introduction to making! In this apprenticeship we will make all kinds of things and use tools and materials that you may have never used before!
- **Say:** I got into making when... <introduce your personal story and involvement in making. Explain not only how you got into making but also your favorite things to make.>
 - **Show** making project you've completed. Either pass around photos or show photos on a projector or pass around the items themselves.
- **Say:** We won't be able to make all of these things in this apprenticeship, but we will be making a bunch of different types of things!
 - **Share** overview of the types of projects that students will make. Pass around samples if possible or show pictures.
 - Fabric Wreaths
 - Wooden Boxes
 - Marble Machines (Note these are likely better to show rather than pass around.)
- **Say:** For your WOW!, each Maker Movement apprentice will design and make his/her own WOW! Project! We will look at problems in our school and community and make things to solve them. You might build recycling bins for the school or benches or maybe make wreaths to decorate for an upcoming holiday. Whatever you choose, you'll design and make it yourself, with our team of teacher's help.
- **Say:** Making is about taking materials and creating something new for a specific purpose. Today, I am going to show you how to make a smiley face ring out of an old bottle cap and some paint!
 - **Model** taking a bottle cap and painting it with the lacquer.
 - Then, take an already dry bottle cap and **model** glueing the ring blank to the back.
 - Finally, **use** a sharpie to draw a pirate or smiley face on the face of the ring.
- **Ask** for a teachback about the WOW! Project: What is the WOW! Project?
 - **Give** the ring to the student with the correct answer.
- **Say:** In this apprenticeship we will get to make all sorts of stuff like this that you will be able to keep! Though we won't make more rings, we will make wreaths, boxes, and marble machines! Come join us!

Materials for the Rings: (Assumes 7 groups of 20 students to hear Pitch)

- Lacquer (use a school color)
- Small paint brush
- Sharpie (black or a school color)
- 10 bottle caps with lacquer already painted and dried.
- 7 blank bottle caps
- 10 ring blanks
- Hot glue gun or superglue (to attach the ring blank to the bottle cap)

Directions and Source for Rings:

- <http://www.quietlioncreations.com/2011/12/asos-bottlecap-ring-diy.html>
- Note: These directions use black lacquer for the smiley face -- replace this with sharpie for simplification.



Materials Needed for Pitch Day

1. Lacquer (use a school color)
2. Small paint brush
3. Sharpie (black or a school color)
4. 10 bottle caps with lacquer already painted and dried
5. 7 blank bottle caps
6. 10 ring blanks
7. Hot glue gun or superglue (to attach the ring blank to the bottle cap)
8. Samples of apprenticeship Projects
 - a. Wreath
 - b. Wooden box
 - c. Marble machine
 - d. WOW! Projects
9. Samples of personal Projects (or photos)

Apprenticeship in Action



A student demonstrates his "Rube Goldberg" marble machine at the WOW! as part of his apprenticeship with EMC2 in Durham.



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Apprenticeship Sector: Design & Invent

Unit Guide: Maker Movement



Ajah and Naomi from the Carter School of Excellence proudly stand beside “earit,” the winning design for the Chicago Maker’s challenge! In 2016, students participated with their Motorola Mobility Citizen Schools Teachers in the annual Chicago Maker Challenge, a citywide contest in which middle and high school students develop a hardware, or software, solution that solves a community problem or makes the world more accessible to people with disabilities. And, our students pulled in the top prize! To learn more check out this story from the Chicago Sun Times.

Making in the News:

Building a Nation of Makers, John King in U.S. News and World Report

<http://www.usnews.com/opinion/articles/2016-06-20/its-time-to-invest-in-stem-education-and-build-a-nation-of-makers>

Middle-school students win Chicago Maker Challenge

<http://chicago.suntimes.com/news/middle-school-students-win-chicago-maker-challenge/>

Apprenticeship Description for WOW! Communications

In an age when anything can be bought at the nearby store or online, the knowledge and skills of how to make things is fading away. In this apprenticeship, students revive this knowledge and build skills as part of the larger Maker Movement. Students explore different focus areas of Making: fabric, building and simple machines and also explore different tools commonly used by Makers while learning and practicing the process of innovation. Each student creates a final WOW! Project to address a problem in his/her community using the knowledge and skills he/she develops in the first 6 weeks of the apprenticeship. Students leave this apprenticeship with the confidence and ability to make items they imagine and use the innovation process to explore solutions to everyday problems they may face.

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Unit Guide: *Maker Movement*

