

--- **IDENTITY:** establish inclusive personal identity, inviting all students to identify as “Makers” ---

1. What is a Maker?

- a. Makers are **anyone** who makes things and share their knowledge, time and experiences with others to help them grow and make more things.
- b. Stress inclusivity of all fields, backgrounds, skill levels and medias
  - i. If one looks only to pop culture and mainstream Maker Faire/Movement media they may get the incorrect impression that “Makers” are all engineers and electronics tinkerers. In reality Makers are artists, crafters, designers, musicians, children, boat builders, chefs and so on. If you make anything, you’re a Maker!
- c. Makers tend to share and want to have a positive impact on the people and environment around them.
- d. Makers tend to thrive on a sense of community, which both informs and expands their perspective, as well as provides a vehicle for expression, validation and acceptance.
- e. Origin of term = MAKE Magazine (created by O’Reilly Media, first published in 2005), with credit generally attributed to Dale Dougherty (founder of MAKE, Maker Faire and CEO of Maker Media).
- f. The terms “Maker”, “hacker” and “tinkerer” are synonymous, though opinions do vary about particular specialities or interests.
  - i. Very important to dispel and discourage pop culture/mainstream perceptions about the term “hacker”. “Hacker” is not the same as “cracker”, which has malicious intent.
- g. Relevant resources:
  - i. [What is a Maker? What it Really Means to be a “Maker”](#) - brief introduction to history, leading into next topic

**VIDEO BREAK:** [“We are makers” talk by Dale Dougherty \(12 min\)](#)

--- **CONTEXT:** put personal identity into larger context of Maker’s Movement to encourage community-mindedness ---

2. Maker’s Movement

- a. Maker’s Movement = social trend towards informal, peer-led, shared hands-on learning experiences motivated by fun, self-fulfilment and empowerment.
  - i. Encourages exploration of intersections between traditionally separated fields and ideas through shared, and highly social, work environments.
  - ii. Reaction to effects of mass-manufacturing and consumerist culture developed over the past 100 years, which have led to an implicit devaluation of physical exploration and an increasing sense of disconnection in modern society.

- iii. Calls for a return to artisanal craftsmanship in all fields made possible by cheaper and more efficient manufacturing equipment that enables true feasibility of small-scale, democratized production. We can now reach niche, distributed markets that are not geographically localized.
- b. Major technological achievements leading to today
  - i. 1800s - steam power and early industrialization = massive increase in power and effectiveness per worker, allows more progress to be made in less time.
  - ii. Mid 1800s to early 1900s - expansion of railway, electricity and telegraph systems and development of internal combustion engine = information can now travel much faster, allowing for new ideas to be improved and spread more quickly.
  - iii. Early 1900s century - Ford's continuous-flow assembly line = first true mass-manufacturing company using automation and railway, paved way for mass production model still used today. Honorable mentions for Samuel Colt and the Winchester rifle.
  - iv. 1950s-1960s - plastics and injection molding = extremely cheap home consumer goods can now be mass-produced and consumed
  - v. 1970s - rise of hobbyist digital electronics due to microprocessor = electronics as a hobby gains popularity
  - vi. 1980s - personal computing = DIY kits and counterculture "hacker" mindset bring programming and electronics skills to the masses.
  - vii. 1990s - internet = information can now spread faster than ever. Rise of e-commerce enables feasibility of more small-scale businesses.
  - viii. 2000 to present - personal digital fabrication = personal and small-scale manufacturing becoming feasible. Mass-customization challenges mass-production, and manufacturing begins to be democratized.
- c. Pre-Movement cultural history
  - i. ~200+ years ago (pre-Industrial Revolution) = making was almost entirely artisanal, ideas spread relatively slowly
  - ii. ~200 years ago = Industrial Revolution makes early mass production possible, used by Samuel Colt and Henry Ford
  - iii. 1920s - 1940s = tough economic conditions coupled with rise of industrialization leads to clever use and re-use of materials and goods to save money. During wartime this was strongly associated with patriotism and the concept of doing one's "duty" to help the war effort. Disparity of production means between manufacturers and consumers grows at incredible pace.
  - iv. 1950s = end of World Wars leaves behind massive network of highly efficient factories optimized for mass-manufacturing who continue to supply goods even when wartime demand subsides. Modern advertising (created in early 1900s and perfected through WW2 propaganda) targets citizens and initiates age of consumerism and excess.

- v. 1960s - 1970s = modern [DIY ethic](#) is born from sub/counterculture, hippie and punk ideologies in response to growing culture of consumerism and excess established in 50s. Stresses personal empowerment, self-reliance and (for some) more radical political and social ideals such as anti-consumerism and criticism of capitalism, waste, planned obsolescence, industrial/corporate monopolies and maker/consumer disparity..
- vi. 1980s - present = ideals formed during radicalized hippie/punk periods permeate cultural subconscious, become tempered and more practical (as evidenced by contemporary trends of eco-consciousness and vintage/retro fashion). Technology developments increase viability of small-scale companies and artisanal goods.
- d. History of Maker's Movement
  - i. 2004 - RepRap project begins
  - ii. 2005 - MAKE Magazine first published
  - iii. 2005 - Arduino open-source electronics learning platform begins
  - iv. 2006 - First Maker Faire launched in SF
  - v. 2009 - First Mini Maker Faire in Rhode Island
- e. Current state and criticisms of Movement
  - i. Maker Faires and Mini Maker Faires continuing to pop up like wildfire
    - 1. Currently about 150 Faires worldwide
    - 2. Flagship Faire in SF had 900+ Makers and 130,000+ visitors in 2014
  - ii. Arduino (and OSHW) and 3D printing have become established and developed into independent fields
  - iii. MAKE Magazine continuing to try to appeal to as wide an audience as possible (good thing!).
  - iv. Movement has begun to experience some fracturing
    - 1. Counterculture community reacting to increasing trend in mainstream Maker culture towards entrepreneurialism, large corporate influences and overemphasis on for-profit ventures over joy of making.
    - 2. Some concerns have been raised about lack of diversity in mainstream Maker media, especially from groups who could benefit the most from Movement (women in tech, isolated small-town makers, poverty-stricken areas).
- f. Future trends
  - i. Continued fracturing of Makers, particularly between community-focused grassroots Makers and for-profit entrepreneurial Makers.

**VIDEO BREAK:** [Adam Savage's talk on "Why We Make" \(20 min\)](#)

--- **COMMUNITY:** hackerspaces connect localized identity of “Maker” to generalized Maker’s Movement through grassroots, organic community ---

3. Hackerspaces, makerspaces, FabLabs and more - community workshops where people with common interests and needs can work together in shared space to collaborate and socialize. Differences explained well [here](#).
  - a. Hackerspaces = original incarnation of concept, with earliest going back to mid 90’s in Europe. Typically stress more counterculture aspects of community
  - b. Makerspaces = functionally identical to hackerspaces (and synonymous to some), though tend to be more “mainstream” and family-friendly than hackerspaces. Some feel that the term “hacker” is exclusionary (justly or not) and conjures unfortunate associations from public and government interests.
    - i. Recently the term “makerspace” has been trademarked by Maker Media, though implications are unclear.
  - c. FabLabs = global network of 400+ small-scale shops started by professor Neil Gershenfeld of the MIT Center for Bits and Atoms, intended to enable members of local community to “make almost anything”. In contrast to hackerspaces and makerspaces, FabLabs are considerably more standardized and must adhere to certain mandates and guidelines put forth by the [Fab Charter](#).
  - d. Other community spaces - there are many other types of spaces out there where people of common interests meet to socialize and collaborate, though not all of them identify with the Maker’s Movement.
    - i. For local examples, check out the [Union for Contemporary Art](#), [Bench](#), the upcoming [DoSpace](#), [CoVis CoWorking](#) and the many various [tech meetups](#).
  - e. Find nearby Maker-oriented spaces of all kinds through <http://hackerspaces.org>

**VIDEO BREAK:** *Video walkthroughs of various makerspaces, including own of Hammerspace.*

--- **OUTREACH:** hackerspaces connect localized identity of “Maker” to generalized Maker’s Movement through grassroots, organic community ---

4. Maker Faires = the “Greatest Show (And Tell) on Earth”
  - a. Shortly after the meteoric rise of MAKE Magazine (and thus the Maker’s Movement), the magazine’s founding team wanted to create a physical venue for it’s readers and contributors to connect through a public showcase of innovation and experimentation.
  - b. First Faire launched in SF Bay Area in 2006, attracting over 100 Makers and several thousand visitors
  - c. Official flagship Maker Faires now take place annually in SF and NYC, attracting 215,000+ visitors last year.
  - d. Largest nearby Maker Faire is Maker Faire: Kansas City, which attracted 300+ exhibiting makers and 30,000+ visitors over 2 days.

- e. Smaller “Mini Maker Faires” have now been popping up worldwide and in many towns across US, including Omaha.
- f. Due to trademarks and required financial commitments and insurance liability, many more events are popping up with identical intent but different name, such as Make Lincoln.

***VIDEO/PHOTO BREAK:** Share photos and videos from Maker Faires, explore web for cool stuff from recent nearby faires*

--- **EDUCATION:** popularity of grassroots communities have begun to catch the eye of traditional educators and influence the way things are taught ---

#### 5. Maker Education Initiative

- a. Encouraged by the overwhelmingly positive response to Maker Faires and MAKE Magazine, especially from kids and families, the Maker Education Initiative was created to “support and empower educators and communities — particularly, those in underserved areas — to facilitate meaningful making and learning experiences with youth”.
- b. Maker Corps program

#### 6. STEM and STEAM

- a. **STEM** = Science, Technology, Engineering and Mathematics
  - i. Coined by government group (NSF - National Science Foundation) after interagency meeting
  - ii. Criticized for being driven by needs and wants of government and military, not those of individuals and communities.
  - iii. Criticized for leading to increasing unemployment rates among STEM graduates due to inaccurate information about true market demand. Currently only ¼ of STEM graduates obtain jobs in STEM fields.
  - iv. Criticized for imbalance of gender and race, though causes are still unclear
  - v. **Side note:** currently the national job market has a much higher (and growing) demand for skilled labor (such as welding, plumbing, etc), though this is still being researched and is somewhat controversial.
- b. **STEAM** = Science, Technology, Engineering, Art and Mathematics
  - i. Largely attributed to current president of Rhode Island School of Design (RISD), John Maeda.
  - ii. Argues that STEM is incomplete, and does not account for the creativity needed to come up with innovative, human-centric work.
  - iii. Art/design are not opposites of science/math/technology, but rather organic counterparts. They were not considered separate fields up until the rise of Industrial Age <200 years ago. All are essentially about problem solving.

## VIDEO BREAK: "Do schools kill creativity?" by Ken Robinson

--- **INDUSTRY + BUSINESS:** implications and hot topics within traditional industry and business sectors stemming from rise of Maker's Movement and OSHW ---

One of the pillars of capitalism is the privatization of knowledge and control of the means of production for the purposes of maximizing profits.

To encourage capitalism, the government created several mechanisms that business owners and inventors can use to control their intellectual property:

### 7. Trademarks, copyrights, licenses and patents

- a. *Trademark* = a word, phrase, symbol or design that identifies a company's product.
  - i. Made possible by Trademark Act of 1870.
- b. *Copyright* = an exclusive right given to the creator of a piece of creative work (like a book or piece of music) to produce copies of their work.
  - i. Made possible by Copyright Act of 1790, and by several smaller resolutions and clauses over previous decade.
- c. *Patent* = government-issued right given to an inventor of a new idea that allows them exclusive privilege to produce and use their invention how they want.
  - i. Made possible by Patent Act of 1790, and by smaller resolutions and clauses before
- d. *License* = special permission granted by the owner of a trademark, patent or copyright to someone else, allowing them to produce their work without repercussions..

### 8. Prior art and the public domain

- a. *Prior art* = information that has been released publicly. Can be used to refute a patent's claim to originality.
- b. *Public domain* = work whose intellectual property rights have expired, been given up or do not apply to a given situation.

### 9. Open-source licenses

- a. *Creative Commons* = free license created and granted by a non-profit organization, intended to provide protection to creators of original work while still allowing various degrees of flexibility for other people to use.
  - i. Attribution = mandatory. Anyone who uses your work must attribute you in some way (a link, a shoutout, etc).
  - ii. NoDerivatives = optional. Allows others to adapt and share work (or not).
  - iii. ShareAlike = optional. If someone does adapt and share your work, they must use the exact same license you released the original work under.
  - iv. NonCommercial = optional. Allows others to profit from the use of your work. Somewhat controversial to some.

**IMPORTANT:** If you have serious for-profit commercial intentions for your work you are highly encouraged to consult with an intellectual property lawyer with questions you may have. The real world is complicated and influenced by many competing parties with differing opinions. At the end of the day the government decides what is and isn't legal, regardless of the ideals and experiences of individuals, hobbyists, intellectual property critics and professors. If this topic is important to you, you are responsible for arming yourself with the knowledge you need!

**CONTENT BREAK:** Share personal work and derivatives, along with notable examples of work made possible by open source

## **Suggested reading list**

- [The Maker Movement Manifesto: Rules for Innovation in the New World of Crafters, Hackers, and Tinkerers](#) by Mark Hatch (CEO and co-founder of TechShop)
- [Makers: The New Industrial Revolution](#) by Chris Anderson (former editor-in-chief of WIRED, co-founder of 3D Robotics and founder of GeekDad)
- [Make: The Maker's Manual: A Practical Guide to the New Industrial Revolution](#) by Paolo Aliverti, Andrea Maietta and Patrick Di Justo
- [Zero to Maker: Learn \(Just Enough\) to Make \(Just About\) Anything](#) by David Lang (co-founder of OpenROV)
- [Maker Pro](#) by John Baichtal
- [Making Makers: Kids, Tools, and the Future of Innovation](#) by AnnMarie Thomas (Associate Professor at University of St. Thomas, creator of Squishy Circuits and Founding Executive Director of Maker Education Initiative)
- [The Art of Tinkering](#) by Karen Wilkinson (Director of the Exploratorium's Tinkering Studio)
- [MAKE Magazine](#) - pick up used copies of back issues on Amazon for pennies on the dollar!