The Maker Movement/Culture --A Primer

The **maker culture** is a contemporary culture or subculture representing a technology-based extension of DIY culture. Typical interests enjoyed by the maker culture include engineering-oriented pursuits such as electronics, robotics, 3-D printing, and the use of CNC tools, as well as more traditional activities as such metalworking, woodworking, and traditional arts and crafts. The subculture stresses new and unique applications of technologies, and encourages invention and prototyping. There is a strong focus on using and learning practical skills and applying them creatively.


Background on the Maker Movement (and why you should care about making with young children)

**Fred Rogers Center Blog**


Excerpt:

Play, Fred Rogers said, “is often talked about as if it were a relief from serious learning. But for children play is serious learning. Play is really the work of childhood.”

Through her play, my daughter learned to experiment, explore new materials with her hands, and developed new fine motor skills. But she also had to learn to work next to her friends, express herself, and negotiate conflict.

“As the children work together or side by side,” wrote NAEYC’s Angie Dorrell, “they learn to understand someone else’s viewpoint. The children also have the opportunity to express themselves and become confident in sharing their ideas with others.”

Research shows that play builds social-emotional competence in many domains: language skills, social skills, empathy, imagination, self-control, persistence, and higher-order thinking. And many advocates argue that our focus on early learning and academic achievement has been at the expense of valuable play-based programs, particularly in kindergarten. The maker movement may be a way of bringing play back into the picture.

When kids play and make things,” responded Steve Davee with the Maker Education Initiative, “when they are put in charge of what they build and make, wonderful things happen: personalities, relationships and abilities are forged. I never get tired of seeing it.
In Melissa Butler’s kindergarten classroom at Pittsburgh Allegheny, an elementary school on the city’s north side, 5-year-olds are learning about simple circuits and electricity. The children examine the circuit parts, take them apart carefully, and notice each component. They sketch the technology from different angles. They discuss what they see with their teachers and their friends.

This classroom is part of a unique partnership called the Children’s Innovation Project, which will be expanding this school year to become the Teachers’ Innovation Project—a partnership between the Fred Rogers Center, Carnegie Mellon University, Carlow University, Clarion University, Pittsburgh Public Schools, and the Sprout Fund.

“As opposed to children just using technology to explore, we want them to be producers of technology,” Butler said, “and create their own circuits and take apart toys and re-appropriate their components for new expression.”

Butler and Boyle wanted to understand how technology could be a vehicle for innovative pedagogy. They wondered what kind of learning the exploration of technology, as raw material, could facilitate in a classroom.

Youth maker movement: creating, risk and reward--What makes the maker movement important to youth development?
http://msue.anr.msu.edu/news/youth_maker_movement_creating_risk_and_reward

According to Michigan State University Extension, youth are getting involved and for good reason: there are clear benefits to youth development:

- **Experiential learning**—By creating stuff, whether physical objects, computer programs or ideas, youth “learn by doing” and often create something multiple times, learning from each iteration.

- Healthy risk-taking—When making, something mistakes are bound to happen with things going wrong. These “making laboratories” allow youth to create errors safely and feel accomplished when the third try at a project hits it out of the park.

- Science, technology, engineering and mathematic (STEM) topics—Youth might make a robot, a video or a quilt. The open space, peer input and adult guidance available in the maker environments help lead to more in-depth conversations about the science and technology involved. Exploring these topics early allows for interest to build towards careers in STEM fields.
- **Design-based thinking**—Aspects like working on hands-on projects, sharing open space with peers and tweaking a product until it is just right are conducive to thinking skills that dominate creative fields and are becoming important overall in fast paced, ever changing job markets.

- Entrepreneurship—Maker spaces give youth that critical place to create from which can lead to products, micro-businesses and tons of associated life lessons from becoming a youth entrepreneur.

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**Design Thinking and the Critical Role Failure Plays in Innovation**

![Design Thinking Diagram](http://dschool.stanford.edu/dgift/)

Design thinking is a methodology that imbues the full spectrum of innovation activities with a human-centered design ethos. Innovation is powered by a thorough understanding, through direct observation, of what people want and need in their lives and what they like or dislike about the way particular products are made, packaged, marketed, sold, and supported.

**Maker Movement Reinvents Education**


Excerpt:

In his most recent book, Creating Innovators: The Making of Young People Who Will Change the World, Wagner profiles some of America’s great innovators and observes a pattern in their youths: A childhood of creative play led to their development of deep-seated interests and curiosities, and these passions fueled their intrinsic motivation to set and achieve career and life goals. Another trend Wagner found was that the adults in these innovators’ young lives nurtured their imaginations and taught them to persevere and learn from failure. “**What we’re learning about innovation,**” says Wagner, “**is the importance of failing early and failing often...failing forward, failing fast and cheap. The whole idea of trial and error is something that is antithetical to our formal systems of education.... In fact, we penalize failure.... So there’s a complete contradiction between the world of schooling and the world of innovation.**”
Excerpt:

“Hard Fun” and the Process of Design

The tools and ethos of the Maker revolution offer insight and hope for schools. The breadth of options and the “can-do” attitude espoused by the movement is exactly what students need, especially girls who tend to opt out of science and math in middle and high school.

However, hands-on Making is not just a good idea for young women. All students need challenge and “hard fun” that inspires them to dig deeper and construct big ideas. Making science hands-on and interesting is not pandering to young sensibilities; it honors the learning drive and spirit that is all too often crushed by endless worksheets and vocabulary drills. Making is a way of bringing engineering to young learners. Such concrete experiences provide a meaningful context for understanding the abstract science and math concepts traditionally taught by schools while expanding the world of knowledge now accessible to students for the first time.

Activities, Project Ideas, Products, and More!


Make Magazine http://makezine.com/kids/

DIY Maker Club
Created by a Lower School Technology Coordinator for PreK-2nd Grade students.
http://mpowerstech.edublogs.org/diy-maker-clubs/
http://margaret-powers.com/tag/maker-movement/

We Are Teachers
Includes Project Ideas for Maker Classrooms

Sylvia’s Super Awesome Maker Show--Videos and more all created by a 13-year old maker!
(A great episode on Squishy Circuits)

LEGO Education http://education.lego.com/en-us/
Search by age, grade, and more for great products and projects.
Makedo – Tools for Creative Play
http://mymakedo.com/

STEM’s newest darling: Robotics
http://www.bostonglobe.com/magazine/2014/10/02/stem-newest-darling-robotics/FrQEOiILbWXL5GI6UE8WP/story.html

Young Programmers Working with Bee-Bots -- http://www.bee-bot.us/

Bee Bots – A video introduction -- https://www.youtube.com/watch?v=52ZuenJlFyE

Get some great ideas from these wonderful organizations:

**Fayetteville Free Library—Little Makers**
- http://fflib.org/make/little-makers
- http://scprato.com/tag/little-makers/

**New York Hall of Science – Little Makers**
- http://nysci.org/little-makers/

**Make Anything – Resources for projects** http://www.projectmakeanything.org/resources.html
Non-Fiction STEM Booklist
Pre-K – Kindergarten


Non-Fiction STEM Booklist
Pre-K – Kindergarten

Herrington, Lisa. (2014) *How Do You Know It’s Fall?* Children’s Pres

Kerley, Barbara (2013) *The World is Waiting For You*. National Geographic Society


Non-Fiction STEM Booklist
Pre-K – Kindergarten


Resources for 2014 Tools and Materials

Reports, Articles and Information regarding STEM for Young Children:


http://students.egfi-k12.org/category/k-12-outreach-programs/grades-k-5-outreach-programs/page/3/


http://successfulstemeducation.org/resources/nurturing-stem-skills-young-learners-prek%E2%80%933


Squishy Circuits

Explore electricity with play dough, LEDs, and other simple materials.

http://squishycircuits.store.com/kits.html

http://makezine.com/projects/squishy-circuits/

http://tinkering.exploratorium.edu/squishy-circuits

http://courseweb.stthomas.edu/apthomas/SquishyCircuits/ - Awesome videos from the Playful Learning Lab at the U of St. Thomas School of Engineering.

http://sylviashow.com/episodes/s2/e7mini/squishycircuits - Sylvia’s Super Awesome Maker Show
**Kids K’NEX Kit**

- [http://www.knexusergroup.org.uk/acatalog/knex-primary-schools.html](http://www.knexusergroup.org.uk/acatalog/knex-primary-schools.html) - Users group with ideas and guides
- [http://www.knexusergroup.org.uk/acatalog/kid-knex-models.html](http://www.knexusergroup.org.uk/acatalog/kid-knex-models.html) - models for kids to build
- [http://www.knex.com/shop/358/Early-Childhood/](http://www.knex.com/shop/358/Early-Childhood/) - where you can find more
Balances/Scales

http://www.preschoolexpress.com/discovery_station07/measuring_fun_mar07.shtml - a site with many different activities on measuring/weighing

http://www.education.com/activity/preschool/measurement/ - Preschool Measurement Activities


http://www.preschoolrainbow.org/activity-plan.htm - Preschool Activities for Small Groups

http://www.teachpreschoolscience.com/weightsandbalances.html - Teach Science - Science Discovery

http://www.parentingscience.com/preschool-science-activities.html - Various science activities for preschool

http://kidsactivitiesblog.com/17228/science-for-kids-hanger-balance - how to make a balance with kids

Magnifying Glasses

http://www.thestay-at-home-momsurvivalguide.com/p/preschool-activities.html - stay at home mom survival guide

http://www.pbs.org/parents/sid/activities/magnification-observation/ - Sid the Science Guy activities

http://www.kellyskindergarten.com/science/science_center_activities.htm - Science Center Activities


http://livelovelaughkindergarten.blogspot.com/2012/07/i-spy-differentiated-instruction-and.html using I spy coupled with a magnifying glass equals fun


http://www.teachpreschoolscience.com/magnify.html idea for preschooler activity with magnifiers
Viewscopes


http://playfullearning.net/young-scientists-using-a-microscope/ - Playful Learning


http://www.everythingpreschool.com/themes/winter/science.htm - Preschool Winter Science

http://www.sciencekids.co.nz/experiments/microscopiccreatures.html - Science Kids

http://www.perfectlypreschool.com/Preschool-Lesson-Plans/Snowmen/ - Perfectly Preschool


Turn and Learn Gears

http://preschooler.thebump.com/preschool-activities-gears-levers-wheels-6749.html - background and ideas

http://www.ehow.com/info_10024749_preschool-activities-machines-motion.html - Preschool Activities for Machines in Motion

http://fun-a-day.com/preschool-art-projects-painting-gears/ - Preschool Art Projects


http://teachingmama.org/quiet-time-box-ideas/ - 75 Quiet Time Box Ideas for Preschoolers – like stealth programs!
Measuring Cups

- Pinterest Math/Measuring
- Prekinders Science Pages
- BrainPop Educators

Measuring Capacity

- Learn with Play at Home
- Math is Fun
- Math is Fun
- Learning to measure with nutrition education

Straws and Connectors

- Blueprints/instructions of designs easy, intermediate, hard.
- if you can’t afford straws and connectors make your own!
- Build a playhouse and other cool designs
- Make a dome with your little engineer A.K.A geodesic model
- straw and connectors demonstration
- blog that features ideas of what to do with connectors

benefits of children designing with physical materials.
Other Tip Sheets

- Fun at Home with Preschoolers: Getting Ready to Read!
  - English
  - Spanish
  - Polish
  - Chinese
  - Korean
- Fun at Home with Preschoolers: Play with Light & Shadow
  - English
  - Spanish
  - Polish

Other Tip Sheets

- Time for Preschoolers: Duration
  - English
  - Spanish
  - Polish

More Ideas for Making with Young Children

Websites to visit:

www.Youngmakers.org
http://www.pinterest.com/pragmaticmom/fun-stuff-for-kids/
http://www.redtedart.com/
http://www.thecraftycrow.net/
http://www.livebinders.com/play/play?id=179785

And here are 7 of the Top Picks lists of apps, websites, and games to help your young makers thrive:

1) **Best Tech Creation Tools**
   Students love to make their own creations — no matter what the topic. These terrific tools give them the right tools to narrate, animate, and dictate. Experiment with different formats to address a variety of subjects and topics.

2) **Websites and Apps for Making Videos and Animation**
   Teachers know that video making is a tried and true way to get kids engaged in building, demonstrating, and sharing knowledge. These apps and sites have user-friendly tools and features that make it fun to get kids’ productions edited and polished.

3) **Mind Mapping and Brainstorming Apps and Websites**
   These picks give teachers and students ways — both alone or in groups – to generate
and organize ideas that refine and reinvent the traditional graphic organizer. These tools are particularly good for students who have challenges organizing their thoughts.

4) **STEAM Apps, Games, and Websites**
When their forces combine, science, technology, engineering, art, and mathematics (STEAM) are a super group of essential subjects that lead to long-lasting learning. Mix and match these picks to help students cultivate design sense and inventiveness.

5) **Game Making Tools for Schools**
By making games, students can show what they know. Game development is fun and challenging, energizing classrooms and getting students thinking in new, exciting ways. These picks are great options for entry-level creators and they ease kids into building.

6) **Great Apps, Games, and Sites for Music and Composing**
Students can listen to music, make it, or both as they experiment with rhythm, pitch, and lyrics. Watch them turn tunes from major to minor, hear songs arranged for a range of instruments, and make themed playlists.

7) **Top Tools for Remix**
Remix – or combing different media to make or say something new – is an essential 21st century skill. It gets kids making things, thinking in new ways, and digging into the essence of meaning. These picks run the gamut and get kids tinkering.
Building Young Makers

Erica Compton, Idaho Commission for Libraries
erica.compton@libraries.idaho.gov
Desired Outcomes:

1. To inform participants about the importance of 'making' with young children.
2. To introduce participants to a variety of making activities with new tools and materials.
3. To discuss ways to implement making in early learning settings.
What’s Your Experience?

ZERO, ZILCH, NADA

I Am a Maker

the MAKER MOVEMENT

Maker Faire
What is making and why is it important?
Design Thinking

The DESIGN THINKING PROCESS

- Imagine
- Deferring judgment
- Frame
- Develop empathy

- Make
- Learn from failure
- Protoype
- Refine
Design Thinking...

deeppdesignthinking.com/why-deepdt-as-a-design-thinking-process
What does making look like?
The Making Environment

It might be messy...

...and a bit noisier...

...but it sure is fun!

Possibility Walls!
MaKey MaKey Mayhem

Whack-a-Mole with Potatoes
http://bluntbody.com/whack-a-potato/
Squishy Circuits Fun

Teaching Basic Circuits
http://courseweb.stthomas.edu/apthomas/SquishyCircuits/PDFs/Circuit%20Basics.pdf
Catapults!!

http://kidsactivitiesblog.com/28664/building-a-catapult

http://www.pinterest.com/explore/catapult-craft/
Snap Circuits & Little Bits!
Robotics

ThinkFun

ROBOT Turtles
The Game for Little Programmers!

The most backed board game in Kickstarter history!

Ages 4 and up
2-3 players

WARNING: Not suitable for children under 3 years old.

Introduces basic coding concepts to preschoolers.

The most backed board game in Kickstarter history!
Circuit Stickers... Crafting with Electricity

http://chibitronics.com
Roominate

A building toy for girls...

http://www.roominatetoy.com/
More Stations...
Let’s Play!

What will you make?

intel
Discussion Time

What did you think?

How do you see this working in your classroom or learning environment?

Any concerns about making with young children?

Any Questions?
Integrating Making into the Classroom

weareteachers.com/blogs/stem
sdpk.stvrain.k12.co.us/stem.html
weareteachers.com/hot-topics/special-reports/stem-for-elementary-school
Global Cardboard Challenge

http://cainesarcade.com
Resources


http://www.pbs.org/wholechild/providers/play.html

http://ecrp.uiuc.edu/beyond/seed/katz.html

http://makeymakey.com/guides/

http://www.makerkids.ca/
Online Resources

- DayByDayID.org
  STORYTIMES ONLINE
- Virtual Storytimes!
- Online Gameboard!
- Click here for TumbleBooks™
- Online Books!
Other Resources Available
If you only remember a few things...

You are a designer.

Become more intentional about your design process.
Be confident in your creative abilities.
Be strategic about what needs attention first.
Listen to your stakeholders and be inspired to design for them.

It’s your opportunity, and your responsibility, to have an impact on the lives of your students and be part of changing and growing the system.

Embrace your beginner’s mind.

Approach problems as a novice even if you already know a lot about them.
Let yourself learn.
Be willing to experiment.
Be ok with not having the “right” answer.
Trust that you’ll find one.

Stepping out of your zone of comfort = learning.

Get unstuck.
Break your routine.
Use the world outside your classroom to invigorate your work.
Analogous inspiration is your best friend.
Leave your classroom.
Collaborate with others.

Problems are just opportunities for design in disguise.

Have an abundance mentality.
Be optimistic.
Believe the future will be better.
Start with, “What if?” instead of “What’s wrong?”
WHAT WILL YOU MAKE?