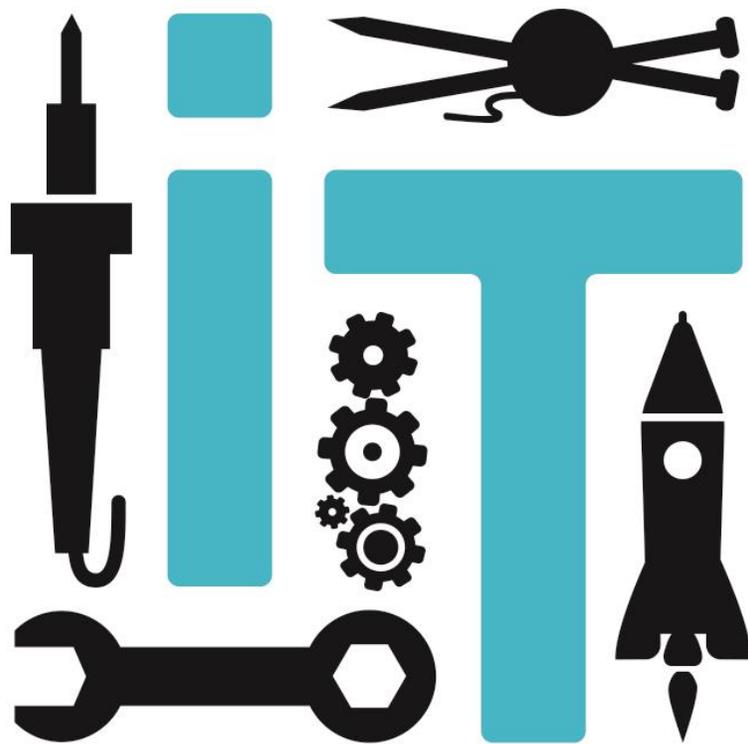


Make It at the Library

MAKE



WHERE IDAHO
MAKERS MEET

Community Partner
Training

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Goals and Learning Outcomes

Goals for the community partners training:

- The goal for the community partner training is to introduce community partners to making and to Edison Robots in a fun, challenging environment that allows time for hands on learning, introduction to the design cycle, and reflection.

Learning outcomes for the community partners training:

Participants will be able to:

- Identify what is making and gain understanding about how to facilitate making in an educational setting.
- Build confidence and expertise around using Edison Robots in their own learning environment.
- Brainstorm ideas for how to evaluate making.
- Feel comfortable acting as a facilitator for maker activities, including framing the learning, asking open-ended questions, and conducting reflection activities.

Format of Curriculum

This curriculum will be using the design cycle highlighted in *Invent to Learn* by Sylvia Martinez and Gary Stagner referred to as TMI. The authors felt that most design cycles provide ‘too much information.’ “Too much instruction, too many interruptions, and too much intervention.” So TMI stands for **THINK, MAKE, IMPROVE**. I would add one more important step for making, which is **SHARE**. This will be basic framework for activities in this workshop, and I’ll use the following symbols to highlight what part of the design cycle you are narrowing in on.



THINK



MAKE



IMPROVE



SHARE

Setup Configuration

Room setup:

- Tables and chairs for all participants, if possible have them sit in groups.
- Projector and screen
- Empty tables in the back of the room for maker supplies.
- White board or large wall sticky paper close to front of room

Supplies needed:

- Edison robots (educator kit that will be circulating)
- Make Dos and cardboard
- Circuit blocks
- Nametags either pre-made or large sticker nametags to be written on with sharpies
- Hot glue guns
- Scissors
- Tape
- Computer loaded to the page:
<http://www.adamatomic.com/canabalt/>
- [Edison lesson plans and worksheet for lesson 1, 2, 6 and 8](#)
- MaKey MaKey connected to the computer. For setup instructions see <http://makeymakey.com/how-to/classic/>
- Computers with Edware, web version or downloaded:
<https://meetedison.com/robot-programming-software/>
- A variety of conductive materials such as:
 - Tinfoil
 - Play doh
 - Bananas
 - Oranges
 - Pencils and paper
 - Bowls of water
- An assortment of small craft materials. Examples:
 - Pipe Cleaners
 - Rubber bands
 - Duct Tape
 - Buttons
 - Feathers
 - Stickers
 - Stamps

Estimated time for setup:

30 min-45 min depending on group size

Training Agenda

| Time | Topic | Notes | Slides |
|--------|--|--|---------|
| 15 min | Introduction of trainers and opening activity. | | 1 and 2 |
| 10 min | Overview of the day and ground rules | | 3 |
| 10 min | What is making | Brainstorm, talk about what is not making, come to a consensus on a group definition. | 4,5, |
| 25 Min | Make Do Challenge | Create a Chair | 6 |
| 10 min | Why Making Matters | | 7 |
| 10 min | Break | | |
| 5 min | Design Cycle | | 8 |
| 10 min | Facilitating Making | | 9,10 |
| 25 min | MaKey MaKey Challenge | What is conductive? | 11 |
| 10 min | Evaluating Making | | 12 |
| 25 min | Circuit Blocks Challenge | Become a Toy Designer | 13 |
| 10 min | Break | | |
| 45 min | Edison Robots | Three levels of lesson plans | 14 |
| 15 min | Reflection and next steps | What was your favorite thing to make? What did it feel like to share? Did anyone fail? | 15 |
| 5 min | Evaluations | | 16 |

* Two extra slides are included at the end of the deck in case you want to add extra subject matter slides in any area.

Introduction and Opening Activity- 10 min

Introduction:

When introducing yourself include some information beyond just your name and title. Maybe share a little bit about what interests you about making, or activities you like to do in your spare time. For each trainer have them do the same thing, but don't be blatant in why you are sharing the information, just tell a simple story after you introduce yourself.

Opening Activity:

| | |
|---|---|
|  | <p>Ask the participants to think about what story, or information about themselves, they would have shared, if they had to stand up in front of the group and talk. Give them a few seconds to think on it then ask them if they were to wear a nametag that represented what they would want to share with the group, what would it look like.</p> |
|  | <p>Have participants use the craft supplies and hot glue guns to add some elements to their own nametags that represent who they are. This is a short activity; only 5 min or so suggested time. Do not give many instructions other than a time restraint.</p> |
|  | <p>Ask participants if they could add other elements to the craft table, what would they have included.</p> |
|  | <p>Ask for a few participants to share about their nametag, what they made, and what about them it represents.</p> |

Reflection: Spend a moment asking participants how that process felt. Was anyone nervous to share? Proud? How did it feel to not have very many instructions? Help make the connection for them that this is making!

Overview of the Day and Ground Rules- 10 min

Participants usually want to know what their time is going to be like during training. You can have an agenda printed out for them, but it is also helpful to go over the schedule together in case there are any questions. Here are the main points to highlights:

- Participants will be working mostly in groups on collaborative projects.
- The training will allow for two breaks, let them know when those are scheduled for.
- Participants will be provided with some prompts and instructions but there will also be time for exploration and tinkering.
- Challenges will frame some of the learning activities but we are not actually competing.

Here are some simple ground rules for the day that can help set the tone for a fun and interactive training.

- Have fun
- Make something
- Share something
- Fail

Add to these or brainstorm your own as a group, just make sure they are simple and will lower inhibitions about participating.

What is Making?- 10 min

There are many different definitions of making, so it is important to start the training with a shared definition.

- 1) Ask participants to brainstorm what is making and write the answers on the white board or sticky posts.
- 2) Ask participants what the things you have brainstormed have in common.
- 3) If the following are not mentioned, add them to the discussion and elaborate on each one.
 - a. Making is:

-Participant driven, students get to make choices during the process and let their inquiry guide them.

Ex. They get to choose how to approach a problem, what mediums to use for a project, or even what they want to work on.

-Open-ended, there isn't one right way to do something, one right thing to build, or one right answer to a problem. Students are actually constructing their own answers.

Ex. The focus is on the work, not the product.

-Social and shareable, the social aspect helps keep making as a low barrier to entry and makes it fun.

Ex. Team work is encouraged, it is common to share your work with others so they can expand upon it or learn from it.

-Vital to making is also an emphasis on becoming a **creator rather than just a consumer**.

MakeDo Challenge- 25 min

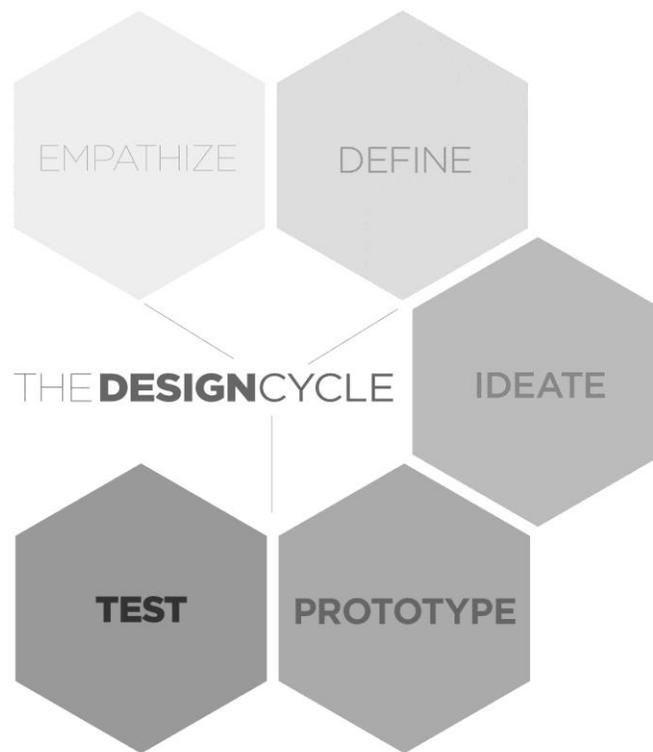
| | |
|---|---|
|  | Have participants brainstorm types of chairs and what their purpose is. (ie. A rocking chair is meant to move, stools intentionally don't have backs, etc.) |
|  | In groups, have teams use cardboard and the makedos to design the types of chairs they wish they had in their learning spaces. |
|  | Ask participants to think about what problems their chairs might have, based on the model they made, if they were created in real life. |
|  | Have participants share what they designed, and also why they wanted their chair to serve a certain purpose. |

Why Making Matters- 10 min

Making is a very powerful learning tool, and here are a few reasons why it matters.

- Making has a low barrier to entry, which means reluctant learners are more likely to join in. It looks fun and intriguing, and not intimidating.
- Making is fun and allows opportunities for deep engagement through allowing participants to follow their curiosity.
- Making also allows for learning through failure since there are not clear instructions on how to do things. Failing is actually very important to learning, and we commit things to memory more often when we struggle with the learning process.
- Maker empowerment is used to describe the confidence gained by people through making and sharing their creations with others. Making encourages peer-to-peer teaching and mentoring.
- Group projects allow for collaboration and require participants to communicate.
- Making allows for real world application, regardless of what type of career people might enter.

Design Cycle



The reason for using a design cycle is to help students be thoughtful, to remember a process, to give direction without specific directions. Human centered design (pictured above) is one option for a design cycle to utilize, but there are many others. TMI (Think, Make, Improve) is the one we are using for this training. Edisons (robotics) use Experiment, Learn, Share.

A design cycle should be short, simple, and easy to remember. As a facilitator of making, you will want to remind participants of the cycle frequently, especially at first, until they start get in the habit of proceeding through the steps. The idea is that it will not only provide guidance, but also slow the process of making down a little bit to allow intentionality and creative thinking to work along side tinkering and exploration.

How to Facilitate Making

Making is different from traditional teaching because it is not instruction based, rather participants discover their own learning process and the facilitator is there to provide info when they need it. They construct their own learning while constructing an idea or object. Here are some ways to help facilitate the making process.

Framing: Framing an activity means frontloading the information, and getting them to think about the learning before they are even making anything. Framing is different than telling them WHAT they will learn. You wouldn't say "today we are going to learn about circuits and here is how circuits work" but you would want to get them thinking about circuits through providing a scenario, posing a question, or just opening up discussion about the topic. When we asked participants to brainstorm everything they have used today that utilized electricity, we were framing the learning.

Prompts: Prompts mirror the effect of using essential questions to deepen engagement, understanding, and love of learning. Like essential questions, prompts also allow for the natural integration of math, science, technology, the fine and performing arts, social studies, and language arts. In other words, relevant and real problems look like real life. *"Good prompts are simple enough for kids to understand, vague enough to allow a diverse and open array of solutions, and immune to standardized testing"* (Martinez and Stager, Invent to Learn).

Examples of prompts:

- What would happen if you _____?
- I wonder why _____?
- What do you think is happening when it isn't working?

Ask good questions: Ask open-ended questions that can't be answered with a yes or no. Questions can help extend the making process, which then extends the learning that is happening.

Examples of open-ended questions for making:

- Tell me why you made that decision?
- How could you change this design?
- Where did your idea come from?

Reflection: Making is never finished! Reflecting on what they made will help participants commit the process to memory. Reflection can look like retelling about their experience ('Tell me the story of how you made that?') or it can naturally happen in the sharing and/or improve portion of the design cycle.

MaKey MaKey

| | |
|---|---|
|  | <p>Have participants think about everything they have used since waking up that uses electricity.</p> |
|  | <p>Using the MaKey MaKey with the game Canabalt test different conductive materials to use as the space bar. Next, have participants use themselves to complete the circuit. In a group, hold hands, and have the group complete the circuit when they clap hands. If time allows, demonstrate other MaKey MaKey games.</p> |
|  | <p>Have participants consider whether some conductive material worked better than others and why that might be.</p> |
|  | <p>Have a few people share how they would (or have) use MaKey Makeys in their own spaces.</p> |

How to Evaluate Making

There are many different ways that you can evaluate making, but whichever way you choose should be minimally invasive and should not disrupt the making in order to evaluate it.

Skills Ladders:

Skills ladders allow participants to evaluate themselves pre and post making to self measure their knowledge or attitude about a specific subject. They can be time intense but there are some ways to speed up the evaluation process by having a giant white board or poster board that can be marked or stickered for specific questions.

Language being used:

The language that is used during making can be evaluated in a few ways. If you are looking to introduce specific topics through making, the usage of key terms can be noted during observation. For example, if you are framing learning around circuits then you can listen for the times participants talk about polarity or switches. You can also look for specific types of language, like language associated with persistence. You can listen for participants who keep going even when they are stuck, who might say things like “I’ll try again” or “Next time ____.”

21st Century Skills:

21st century learning skills are considered the skills necessary for future generations to success in schools and the workforce. They include topics such as creativity and innovation, critical thinking and problem solving, and communication and collaboration. Any type of evaluation of maker programs should put emphasis on these types of skills over memorized learning. Things to consider, and even measure, when evaluation maker programs can include:

- How much iteration did a project take?
- Did participants work collaboratively to find a solution?
- What happened when something failed?
- Did everyone in the group speak or offer possible ideas to the project?

Circuit Block Challenge

| | |
|---|---|
|  | Have participants think about a children's electronic toy (something that makes noise, lights up, or moves). Ask participants to draw what they think the inside of the toy looks like. |
|  | Using the circuit blocks, ask participants to create a prototype of a toy that lights up, moves, or makes a noise. They can use any of the craft supplies along with the circuit blocks. They can work collaboratively or in a group. |
|  | Have everyone share what materials he or she would make their toy out of if they were taking their prototype to the next step. |
|  | Allow everyone to share their prototype, no matter how rudimentary, with the group. |

Edison Robots- 45 min

Collectively as a group complete [Lesson 1 and worksheets 1.1-1.4](#)

All participants should be able to:

- Identify the components of the Edison robot.
- Understand how to use barcodes with the Edison robot.
- Run a test program through Edware on the Edison robot.

Have participants break into groups depending on comfort level with the Edisons, or if you printed enough worksheets and lesson plans they can work independently. If everyone is beginner they can start with lesson two and then progress as time allows.

Beginner Challenge: (Never used Edison robots before)

[Complete lesson two and worksheets 2.1-2.4](#)

Intermediate Challenge: (Some experience using Edison robots)

[Complete lesson 6 and worksheets 6.1-6.3](#)

Advanced Challenge: (Comfortable Using Edison robots)

[Complete lesson 8 and worksheets 8.1-8.4](#)

Reflection for Edison robots:

- How could these robots be used without curriculum?
- How would you encourage participant led, open-ended making with the robots?
- Have groups demonstrate what they were able to get their robot to accomplish, and explain any challenges they had.

Reflection and Next Steps-15 min

Just as you are encouraging participants to add reflection into their experiences, you want to make sure to save time for reflection as well. Reflection is different from the evaluation in that it is more a time for them to process their learning experience, and less about what we could improve for next time.

Here are some easy ways to facilitate a reflection activity:

Ask the following three questions which reflect back to the ground rules for the day. Make sure to jot down the answers to save for later:

What was your favorite thing to make?

What did it feel like to share?

Did anyone fail?

An alternative reflection activity is to have participants write down answers to the following three questions:

What part of today was hard for you?

What part of the day felt fun?

What motivates you to keep learning?

Let participants know what is next. How do they check out the robots? What else can your library offer them?

Evaluation- 5 min

Download and print copies of the evaluation [here](#).



Making Outreach with Community Organizations

Please circle the number that most accurately describes your opinion.



BEFORE the course, where were you on the skills and knowledge ladder? (1 is low and 5 is high)

1. My understanding of the maker culture and philosophy in general:
(low) 1 - 2 - 3 - 4 - 5 (high)

2. My understanding of how the design cycle supports learning through making:
(low) 1 - 2 - 3 - 4 - 5 (high)

3. My ability to successfully complete a making activity:
(low) 1 - 2 - 3 - 4 - 5 (high)

4. My understanding of how making could engage my clientele in learning:
(low) 1 - 2 - 3 - 4 - 5 (high)

5. My ability to develop and implement a making project for my clientele:
(low) 1 - 2 - 3 - 4 - 5 (high)

6. My ability to identify outcomes and evaluation indicators in making programs:
(low) 1 - 2 - 3 - 4 - 5 (high)

AFTER the course, where are you on the skills and knowledge ladder? (1 is low and 5 is high)

1. My understanding of the maker culture and philosophy in general:
(low) 1 - 2 - 3 - 4 - 5 (high)

2. My understanding of how the design cycle supports learning through making:
(low) 1 - 2 - 3 - 4 - 5 (high)

3. My ability to successfully complete a making activity:
(low) 1 - 2 - 3 - 4 - 5 (high)

4. My understanding of how making could engage my clientele in learning:
(low) 1 - 2 - 3 - 4 - 5 (high)

5. My ability to develop and implement a making project for my clientele:
(low) 1 - 2 - 3 - 4 - 5 (high)

6. My ability to identify outcomes and evaluation indicators in making programs:
(low) 1 - 2 - 3 - 4 - 5 (high)

Make It Overview
Workshop Evaluation, Page 2

| Course Methods and Instruction | Disagree - - - - - - - - - - Agree |
|--|---|
| 7. Instructor was knowledgeable and communicated effectively. | 1 - 2 - 3 - 4 - 5 |
| 8. Instructor responded effectively to questions and comments. | 1 - 2 - 3 - 4 - 5 |
| 9. Instruction improved my overall knowledge of making. | 1 - 2 - 3 - 4 - 5 |
| 10. I am likely to apply what I learned. | 1 - 2 - 3 - 4 - 5 |
| 11. This course will improve my ability to provide services to my clientele. | 1 - 2 - 3 - 4 - 5 |
| 12. Time allowed for the course was: (circle one) | Too short – About right – Too long |

13. In order to make this course better, I suggest:

14. Was there content missing or is there something you wanted to learn and didn't?

15. Other comments:

Resources

Online Books:

Meaningful Making: Projects and Inspiration for Fab Labs + Makerspaces
http://fablearn.stanford.edu/fellows/sites/default/files/Blikstein_Martinez_Pang-Meaningful_Making_book.pdf

Youth Makerspace Playbook
http://makered.org/wp-content/uploads/2015/09/Youth-Makerspace-Playbook_FINAL.pdf

Videos:

Jay Silver, Hack a Banana, Make a Keyboard
https://www.ted.com/talks/jay_silver_hack_a_banana_make_a_keyboard?language=en

Kids Can Teach Themselves, Sugata Mitra
https://www.ted.com/talks/sugata_mitra_shows_how_kids_teach_themselves?language=en

Caine's Arcade
<http://cainesarcade.com/>

Start with Why, Ted Talk
<https://www.youtube.com/watch?v=sioZd3AxmNE>

Papers or websites:

Eight Big Ideas Behind the Constructionist Learning Lab
<http://stager.org/articles/8bigideas.pdf>

Making is Connecting
<http://makingisconnecting.org/>

Seven Stages in Moving from Creating to Consuming
<http://www.spencerauthor.com/2015/06/seven-stages-in-moving-from-consuming.html/>

Agency By Design (Investigating the promises, practices, and pedagogies of maker-centered learning)
<http://www.agencybydesign.org/>

Don't Leave Learning Up to Chance: Framing and Reflecting:
<https://ww2.kqed.org/mindshift/2016/09/14/dont-leave-learning-up-to-chance-framing-and-reflection/>