

LEARNING PRACTICE

Inquire

Learners' openness and curious approach to the possibilities of the context through exploration and questioning of its material properties.



LEARNING PRACTICE

Tinker

Learners' purposeful play, testing, risk taking and evaluation of the properties of materials, tools and processes.



LEARNING PRACTICE

Seek & Share Resources

Learners' identification, pursuit, and sharing of expertise with others; includes recognition of one's own not-knowing and desire to learn.



LEARNING PRACTICE

Hack & Repurpose

Learners' harnessing and salvaging materials, tools and processes to modify, enhance or create a new product or process; includes disassociating object property from familiar use.



LEARNING PRACTICE

Express Intention

Learners' discovery, evolution, and refinement of personal identity and interest areas through determination of short and long term goals; includes learners' responsive choice, negotiation and pursuit of goals alone and with others.



LEARNING PRACTICE

Develop Fluency

Learners' development of comfort and competence with diverse tools, materials and processes; developing craft.



LEARNING PRACTICE

Simplify to Complexify

Learners' demonstration of understanding of materials and processes by connecting and combining component elements to make new meaning.



LEARNING PRACTICE Hack & Repurpose Learners that hack and repurpose while they engage in making activities demonstrate the potential of materials, tools and processes beyond their intended use. Learners' engagement in hacking and repurposing includes recognizing and using everyday materials in useful or new ways for pursuing a goal. Engagement may be seen as learners express their imaginations, like making a scuba tank from a 2-liter bottle. However, it can also be functional, like forming an electrical switch with a paperclip to connect an old toy's motor to power source.	
LEARNING PRACTICE Seek & Share Resources Seeking and sharing resources means that learners may identify and recruit the expertise of another person or source of information in order to better understand how to pursue their goal. As participants in the making activity, these learners also share their own expertise with others. A learner might say, "Hey, look at this" when they've created some sort of change in the materials with which they are engaged. Learners often offer an explanation of their process to a parent or educator, as a way to process their developing understanding and simply express their accomplishment. A learner might also seek out information, or ask another child, parent, or educator, "How did you do that?"	
LEARNING PRACTICE Tinker As a learning practice, tinkering can be seen as learners evaluate the utility and application of the various tools and materials available to them in the making experience. This evaluation might be seen as purposeful play, testing or risk taking. Engagement in tinkering includes learners testing different configurations of wires among circuit blocks and flipping switches on and off, or in a woodworking activity, tinkering can be seen as learners tighten and loosen a screw. Evidence of tinkering can often be heard through phrases like, "Let's see what happens when I try this," or "What if I do this?"	
LEARNING PRACTICE Express Intention Expressing intention involves the identification and development of the learners' areas of interest through term goals. These goals are pursued independently and negotiation of the responsive choices and negotiation of the making experience. Ultimately, this process serves to foster the learner's personal identity. Learners exhibit intentionality from the moment they decide to work on a particular activity, by articulating a goal or goal path, such as, "First, let's connect these wires together," or "I'm going to make the fan spin faster." Learners will make explicit choices and explain their rationale.	
LEARNING PRACTICE Simplify to Complexity In many cases, making enables learners to build and create using a variety of materials. When engaging in simplify to complexity, learners combine and connect materials of their making in distinctive ways to give new meaning to those elements. This serves to demonstrate a learner's understanding of the unique properties and characteristics of specific materials and to enable learners to expand and deepen their understanding. When working with circuit blocks, learners may begin by connecting a power source with an output. However, circuits can become more complex when additional components, like a switch, are used and concepts are applied to new situations.	
LEARNING PRACTICE Develop Fluency As learners engage in making, they develop ease and know-how with different components of the making process. Ultimately, fluency development may be seen as the cultivation of a learner's craft within a domain. Developing fluency through making can be observed as learners repeatedly connect and complete a circuit, demonstrating an understanding of how a circuit works. Similarly, adding elements to the circuit, such as switches or dimmers further show the development of understanding. Learners may exhibit fluency by using accurate vocabulary and by identifying and using the right tool for the job.	

LEARNER TYPE

The Hesitator

The Hesitator is interested in the making process, but might be uncomfortable with the possibility of failing, shy away from experiences that seem difficult, and may need reassurance along the way.



LEARNER TYPE

The Observer

The Observer is more comfortable sitting back and watching what is going on around them, and thinking through the process on their own, before engaging in the process directly.



LEARNER TYPE

The Lone Wolf

A Lone Wolf is confident in their ability, values trying new things and enjoys the unexpected of the making process, but prefers to work independently.



LEARNER TYPE

The Window Shopper

The Window Shopper loves to try new things and is drawn to activities that have a fast result, but may not have the patience to engage deeply or over time.



LEARNER TYPE

The Template Bound

The Template-Bound learner is engaged and motivated to try new things, but prefers to have directions, clear goals and expectations set in advance.



LEARNER TYPE

The Lifeguard

Lifeguard learners are eager to take part in the experience, but their anxiety of failure and fixed notions of how to engage with certain materials, tools and processes can make it difficult for them to fully embrace the making process.



LEARNER TYPE

The Novice

The Novice learner has never been to a makerspace or engaged with the materials, tools and processes of making before, may approach the learning experience with assumptions or not know what to expect or how to proceed.



LEARNER TYPE

The Scout

The Scout is open, fully engaged and comfortable in the making process; they enjoy messing around with materials, trying new things and sharing their explorations with others.



LEARNER TYPE The Window Shopper QUESTIONS TO CONSIDER: How can you encourage these learners to stay engaged in the making process? How can you diversify the design of experiences in a makerspace to accommodate this learning style? What role in the making process might these learners take on that leverages their strengths?	LEARNER TYPE The Lone Wolf QUESTIONS TO CONSIDER: How can you help these learners see the value of working with others? How might you encourage these learners to share their expertise with others? Consider the affordances of working alone. What can others learn by working independently?	LEARNER TYPE The Observer QUESTIONS TO CONSIDER: How might you enable these learners to engage more directly in the making process? How can a making experience be designed to support these learners' strengths? What might it look like to scaffold this learner's active engagement in making?	LEARNER TYPE The Hesitator QUESTIONS TO CONSIDER: How might you enable these learners to take risks through their making process? How might you enable these learners to express creative confidence? How might you enable these learners to feel comfortable with elements of the makerspace, including tools, materials, and other learners in the space?
LEARNER TYPE The Scout QUESTIONS TO CONSIDER: How can you position and leverage these learners to help others? How might these learners be meaningfully challenged? Consider how you might expand or deepen these learners' areas of interest.	LEARNER TYPE The Novice QUESTIONS TO CONSIDER: How can you design to enable the learning environment to feel more accessible and less overwhelming to these learners? How can you clarify assumptions these learners might bring with them into the makerspace, such as sewing is "only for girls?" How can you leverage family members or friends to ease these learners' introduction to the space and activities?	LEARNER TYPE The Lifeguard QUESTIONS TO CONSIDER: How can you help these learners try something new? These learners are often anxious about others being wrong or using a tool or material inappropriately. How can you enable them to take risks? How might you leverage these learners as helpers or experts in an aspect of the making process?	LEARNER TYPE The Template Bound QUESTIONS TO CONSIDER: How do you help these learners discover that there is more than one "right" way to engage in the making process? What might it look like to scaffold this learner's experience towards greater improvisation and innovation? Consider the kinds of learning environments in which these learners excel, and which learning environments might be more of a challenge for them?

FACILITATION STRATEGY

Dare Them



FACILITATION STRATEGY

Make Them
Feel
Dangerous



FACILITATION STRATEGY

Ask Them
Why Twenty
Times



FACILITATION STRATEGY

Show Them
Their
Progress



FACILITATION STRATEGY

Show Off
Others' Work



FACILITATION STRATEGY

Give Real
World
Examples



FACILITATION STRATEGY

Ask Them to
Ask Another



FACILITATION STRATEGY

Ask Them to
Teach
Another



FACILITATION STRATEGY

Make Them
the Model



FACILITATION STRATEGY

Ask Them to
Teach You



FACILITATION STRATEGY

Let Them
Sound Smart



FACILITATION STRATEGY

Encourage
Planning



FACILITATION STRATEGY

Tell Them
Why You
Love It



FACILITATION STRATEGY

Inquire
About Their
Process



FACILITATION STRATEGY

Think About
Thinking



FACILITATION STRATEGY

Grant
Permission
to be Silly



FACILITATION STRATEGY

Simplify



FACILITATION STRATEGY

Suggest
a Starting
Point



FACILITATION STRATEGY

Expect
Greatness



FACILITATION STRATEGY

Congratulate
Curiosity



FACILITATION STRATEGY

Be
Impressed
by
Everything



FACILITATION STRATEGY

Take Away
the Finish
Line



FACILITATION STRATEGY

Celebrate
Small
Victories



FACILITATION STRATEGY

Work in
Parallel on
Something
Else



FACILITATION STRATEGY

Think Out
Loud



FACILITATION STRATEGY

Feign
Ignorance



FACILITATION STRATEGY

Tell Them
What to
Expect
Before They
Arrive



FACILITATION STRATEGY

Abandon
Them Once
They Are
Safe



FACILITATION STRATEGY

Have Them
Describe the
Project to
You



FACILITATION STRATEGY

Provide a
Soundtrack



FACILITATION STRATEGY

Be a Quiet
Sounding
Board



FACILITATION STRATEGY

Be the
Devil's
Advocate



FACILITATION STRATEGY

Reassure
Them
of Their
Progress



FACILITATION STRATEGY

Expose Your
Own
Thinking



FACILITATION STRATEGY

Introduce a
New Variable



FACILITATION STRATEGY

Step Off the
Podium



FACILITATION STRATEGY

Level the
Playing Field



FACILITATION STRATEGY

Scale Up



FACILITATION STRATEGY

Be Patient



FACILITATION STRATEGY

Create a
Real Life
Comparison



FACILITATION STRATEGY

Provide a
Reference



FACILITATION STRATEGY

Suggest a
Sketch



MAKING CONNECTIONS

Facilitating Learning
Through Making

A PROJECT OF



WHAT'S IN THE GAME?

This game is designed to encourage discussion about three factors related to the facilitation of maker-based learning experiences:

- the learners
- the learning objectives
- the strategies educators use to facilitate learners' engagement towards a particular learning objective.



HOW TO PLAY THE GAME

This game can be played in groups of two, or with up to six players.



1. To begin, distribute 5-10 Facilitation

Strategy cards to each player randomly.

2. Place one Learner Type card and one

Learning Practice card face up on the

table as a pair.

3. Each player then chooses one Facilitation

Strategy from their hand that they feel

could be used to best facilitate the

selected Learner Type's engagement

in the selected Learning Practice, and

places this card on the table beside or

between the other cards.

4. After each player has played their card,

the group discusses the reasoning and

approach of each presented strategy.

5. Repeat this progression, using different

combinations of Learner Types and

Learning Practices.

The game is made up of three kinds of cards:

Learner Types: Learners approach a making

experience with many different motivations,

interests, questions and ways of being. These

cards identify a range of archetypes, or examples

of the kinds of learners who may engage in

making. The types identified on the cards

represent the common types of learners—children

and adults—who visit MAKESHOP, a makerspace at

Children's Museum of Pittsburgh.

Learning Practices: The Learning Practices of

Making is an empirically identified framework

that describes observable behaviors of learners

in MAKESHOP. These practices represent the

learning objectives that we value and design to

support in MAKESHOP.

Facilitation Strategies: Maker educators use an

assortment of techniques to facilitate engagement

in maker-based learning experiences, towards a

particular learning objective. These cards include

a variety of these strategies.

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children's
museum
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