Woodworking Exploration

Young children enjoy the process of hammering, screwing, sawing, and being empowered to use tools in general. Often they can even design and build something to take home. There's always a great deal of trying and experimenting with wood and how it can be attached to itself or other things using glue, nails, or screws. This trial and error is essential to a young child's process of discovery.

Try It

First, a few important points to keep in mind as you set up the space for exploration:

- It's essential to have tools that fit a child's hands.
- The area where your woodworking activity takes place should be laid out to maximize safety.
- Having tables and chairs at child height is important for these activities.
- Wood should be clamped tightly to tables.
- Use stationary and movable tables or shelves to create a safe sawing area.
- Even when hammering, the amount of room necessary for a reliable swing should be considered.

TINY TIP!

You can start an exploration of woodworking without any tools! Providing various types of scrap pieces of wood along with craft materials and glue allows for open-ended exploration and helps ease the transition to exploring with new materials in the future.

Tools and materials to use: Safety goggles/glasses, gloves, sanding blocks, sandpaper in varying grits, tools sized to fit small hands (hammers, screwdrivers, mallets, etc.), clamps placed in strategic places so children have ample room and won't hit anyone, child-safe hand saws of different types, hand drills, and hardwoods and softwoods (balsa, pine, oak, etc.) of varying lengths, thicknesses, and sizes.

1. Monitor the work area carefully when children and caregivers enter. Safety rules and equipment should be given to each participant every time they come into the space.

2. Begin with a slow introduction to the tools. You might even begin with just the sanding of various wood types, move on to putting out screwdriver sets and pegboards with mallets, and later bring out saws and drills with softwoods and hardwoods for comparison. Techniques for using each tool should be demonstrated to both caregivers and children before using it.

3. When children are sawing or hammering, there should be adult and facilitator supervision. The facilitator must circulate and monitor each child's activity.

4. New tools can be introduced depending on the children's needs.

5. Teach children that tools must be returned to where they were taken from, and they should clean their work area for the next person.

Learning Goals

Exploring with wood and tools can be very empowering for children. Through play and experimentation, children are introduced to concepts of mathematics, like measurement and angles. They also get to try their hand at being engineers, designing and building an object of their own creation. You can emphasize the rudiments of measuring and making things a particular size. Children will also practice perseverance and focus, gain hand-eye coordination and fine motor skills, become problem-solvers, and achieve personal satisfaction.

Open-Ended Questions

- How can we change wood?

- How long is it? Can you make it shorter? By how much?

- How do we construct something or take it apart?

- How can we change the texture of wood?

- What can we learn about the strength of different types of wood?

TINY TIP!

Children may be more concerned with watching what others are doing or seem so interested in another child's activity that they neglect their work, but this is all part of the exploratory process. Just let it flow naturally.

WORDS AND CONCEPTS TO EMPHASIZE

- Length

- Measurement

- Angles

- Design

- Construction

- Names and uses of differing tools

- Joining

- Sanding

- Grit

Criteria for Selecting Little Maker Books

Keene Public Library had many books on the topics we selected for our Little Makers activities. Many of these titles were gleaned from Best Of lists on the web or from print sources. When making book selections, we used typical best practices and the following as our starting point:

- Followed our policies and procedures, based on ALA guidelines

- Read through many book review resources

- Consulted librarians, preschool teachers, and blogs

- Considered patron recommendations

One of the main factors we considered when selecting books for our program was the age of the children. The span was from 2 years old to 6 years old. The National Science Teaching Association (NSTA) provides excellent suggestions for choosing science books for this age range. One essential question NSTA asks is "Is the book fun to read?" Always keep that in mind when purchasing books for preschool children!

TINY TIP!

Search and explore our extensive annotated bibliography of Little Makers books on our website.

Our primary considerations when selecting books include:

- Developmentally appropriate for children ages 2–6

- Fun, captivating, and engaging story

- Highlights or models the Learning Dimensions of the maker mindset

- Integrates STEM disciplines and has factually correct depictions of science, technology, engineering, or mathematics content

- Features illustrations that enhance the text and provide an alternate way of telling the story and illustrating the concepts presented in the book

- Includes culturally diverse people, ethnicities, and languages

- Provides meaningful connections to children's real-world, authentic problems

- Incorporates ideas around divergent thinking, assimilation of new ideas, teamwork, exploration of multiple solutions, or acknowledgement of failure as a reality that can be mitigated or surmounted

Exploratorium Learning Dimensions

Initiative & Intentionality	Social & Emotional Engagement	Creativity & Self-Expression	Conceptual Understanding	Problem Solving & Critical Thinking
• Setting one's own goal • Taking intellectual and creative risks; working without a blueprint • Complexifying over time • Persisting through and learning from failures • Adjusting goals based on physical feedback and evidence	• Building on or remixing the ideas and projects of others • Teaching and helping one another • Collaborating and working in teams • Recognizing and being recognized for accomplishments and contributions • Developing confidence • Expressing pride and ownership	• Responding aesthetically to materials and phenomena • Connecting projects to personal interests and experiences • Playfully exploring • Expressing joy and delight • Using materials in novel ways	• Controlling for variables as projects complexify • Constructing explanations • Using analogues and metaphors to explain • Leveraging properties of materials and phenomena to achieve design goals	• Troubleshooting through iterations • Moving from trial-and-error to fine tuning through increasingly focused inquiries • Developing work-arounds • Seeking ideas, assistance and expertise from others

The Exploratorium's Learning Dimensions of Making and Tinkering one-pager is freely available in a number of languages on their site.

DIMENSIONS OF LEARNING FOR MAKING AND TINKERING

Levels of Agency	Initiative & Intentionality	Social & Emotional Engagement	Creativity & Self Expression	Conceptual Understanding	Problem Solving & Critical Thinking
Responding Initial interactions and observations	Initial Engagement	Working Side by Side	Browsing Materials	Noticing the Phenomena	Making Initial Observations
	Active Participation	Building Together	Personalizing Projects	Asking Questions	Engaging in Trial-and-Error
Exploring Probing the problems, variables, and possible solutions	Expressing Intentionality	Modeling for Others	Playfully Exploring	Observing the Variables	Learning Through Failure
	Persisting in the Problem Space	Collaborating with Others	Striving to Create a Unique Solution	Seeking Explanations	Honing in On Key Variables
	Taking Intellectual and Creative Risks	Mentoring Others	Applying Aesthetic Solutions to Achieve Design Goals	Expressing Tentative Theories	Testing more Focused Solutions
Owning Taking intellectual risks, applying understanding, and contributing to the community	Shifting Project Goals	Co-Leading Group Activities	Recognizing the Creative Work of Others	Constructing Explanations	Applying Unique Solutions
	Planning a New Idea	Creating New Activities	Re-mixing and Re-building	Expressing Conceptual Understanding	Eager to Find a new Problem to Solve

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Initiative & Intentionality:
Actively leading the learning pathway

Level of Agency	Actions / Intentions	Indicators
Responding Developing an initial idea	Active Participation	• making adjustments • seeking help • showing curiosity
	Initial Engagement	• identifying initial interest • participating in a step-by-step activity • copying an example
Exploring Complexifying over time	Taking Intellectual and Creative Risks	• trying a solution that may not work • pursuing ideas without checking with a "teacher" first
	Persisting in the Problem Space	• staying engaged when something doesn't work • valuing info from failed experiments • solving a problem and moving onto a new one
	Expressing Intentionality	• testing tentative ideas • sharing ideas and goals with others • setting one's own goal
Owning Pursuing new ideas	Planning a New Idea	• sketching or planning the next idea • pursuing project ideas between contexts (i.e. home, school, museum)
	Shifting Project Goals	• adjusting goals based on physical feedback and evidence • following pathways of personal interest

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Social & Emotional Engagement:
Collaborating with and contributing to the community

Level of Agency	Actions / Intentions	Indicators
Responding Entering the community	Working Side-by-Side	• building alongside others • noticing what others are making • sharing space, tools, and materials
	Building Together	• working individually on a collaborative project • adding to a group construction • expressing pride and ownership
Exploring Interacting with the community	Modeling for Others	• being recognized for ideas • developing / displaying confidence • giving and receiving feedback
	Collaborating with Others	• physically and intellectually connecting with another project • working with someone on a shared vision • collaboratively working in teams
	Mentoring Others	• becoming a repeat participant • teaching and helping one another • applying understanding to someone else's project
Owning Becoming central to the community	Co-Leading Group Activities	• co-facilitating activities • recruiting others to participate • planning and preparing the activity setup
	Creating New Activities	• developing / leading new activities for others • making a space for new group experiences • documenting the experiences for other learners & educators

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Creativity & Self Expression:
Responding aesthetically to materials and phenomena

Level of Agency	Actions / Intentions	Indicators
Responding Noticing aesthetic possibilities	Browsing Materials	• manipulating materials or mechanisms • finding familiar and unfamiliar materials • expressing joy and delight
	Personalizing Projects	• decorating or modifying an example • expressing personal narratives • connecting projects to personal interests and experiences
Exploring Exploring aesthetic affordances	Playfully Exploring	• responding aesthetically to materials and phenomena • project focus is inspired by materials • participating with enthusiasm
	Striving to Create a Unique Solution	• testing the unique qualities of materials • identifying related project problems in other people's work • using metaphor and analogy as design input
	Applying Aesthetic Solutions to Achieve Design Goals	• using materials in novel ways • prioritizing aesthetic choices • explaining purposeful design decisions
Owning Harnessing aesthetic applications	Recognizing the Creative Work of Others	• noticing the aesthetic choices of others • engaging in critical aesthetic dialogue • acknowledging relationships between different project outcomes
	Re-mixing and Re-building	• modifying one project into another • freely expanding the palette of materials • utilizing materials from other places

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Conceptual Understanding:
Developing understanding over time

Level of Agency	Actions / Intentions	Indicators
Responding Identifying the concept(s)	Noticing the Phenomena	• observing and noticing • initial interactions
	Asking Questions	• noticing the unexpected • expressing confusion • striving to understand
Exploring Probing the concept(s)	Observing the Variables	• playing with key variables • keeping track of the results
	Seeking Explanations	• controlling for variables as projects complexify • testing new ideas for confirmation of understanding
	Expressing Tentative Theories	• testing a design solution • sharing an "aha" moment (articulating insights) • recognizing the limits of a current design
Owning Mastering the concept(s)	Constructing Explanations	• carrying out research online • creating models to further conceptual understanding • identifying related real-world ideas
	Expressing Conceptual Understanding	• applying solutions to new problems • using analogues and metaphors to explain • defending or arguing current understanding

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Problem Solving & Critical Thinking:
Troubleshooting through iteration

Level of Agency	Actions / Intentions	Indicators
Responding Identifying a problem	Making Initial Observations	• noticing affordances of materials and phenomena • becoming intrigued by the phenomena
	Engaging in Trial-and-Error	• testing and observing • evaluating initial tests • trying something more than once
Exploring Iterating solutions to a problem	Learning Through Failure	• identifying areas of surprise • seeing similar problems in others' work • noticing what's not working
	Honing in on Key Variables	• troubleshooting through iterations • dissecting problem components • describing the problem to others
	Testing More Focused Solutions	• stepping back to reflect on the problem • identifying what NOT to focus on • seeking specific ideas/tools/materials to solve the problem
Owning Resolving a problem	Applying Unique Solutions	• materials used in unexpected ways • solutions are varied • developing work-arounds
	Finding a New Problem to Solve	• ability to finish one project, take something apart, and start again • eager to engage in the process again

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Facilitator Reflection Form

Facilitator name: _____ Date: _____

Program Title: _____

Other Staff: _____

Attendance: Children _____ Caregivers _____

List the activities or stations you facilitated or supported today and approximately how many children and caregivers you engaged with at each.

_____

_____

_____

_____

While making or tinkering, children often engage in these learning dimensions:
- Initiative and intentionality
- Social and emotional engagement
- Problem solving and critical thinking
- Creativity and self-expression
- Conceptual understanding

Please describe examples you observed. Be as specific and descriptive as you can.

Dimension: _____ Description: _____

_____

_____

_____

Dimension: _____ Description: _____

_____

_____

_____

Dimension: _____ Description: _____

_____

_____

What is one thing that you felt worked well? Why?

_____

_____

_____

What is one thing that you felt didn't work well? Why? What would you do differently next time?

_____

_____

_____

Overall, how do you feel today's activities were received by the attendees? How do you know? Feel free to include any quotes from interactions/conversations/brief interviews.

_____

_____

_____

_____

_____

_____

Parent/Caregiver Interview Guide

Interviews are a great way to discover ideas and perspectives that you didn't already know, suspect, or consider. When conducting a discovery-oriented interview, your main goal is to create a welcoming conversational space for the interviewee(s) to share what they really think. The first step is always to establish trust and rapport. Consider recording the conversation (with permission) or taking detailed field notes. If you're recording the conversation, a transcription tool like Otter.ai can help save time when it comes to reviewing the interview.

This interview guide offers a starting point for formal, in-depth, systematic data collection for a specific group of participants. Quick response questions are usually the best place to start when pursuing a particular idea or topic. The digging deeper questions are useful when an interviewee demonstrates a particular interest in or experience with the topic. For easy reference, we have also pulled out the brief, quick response interview questions you might ask on the fly when the opportunity presents itself.

Brief Interview Questions

1. Which library program activities have you and your child participated in, both in the library and at home?

2. How has this program affected you personally (as a parent, teacher, facilitator, or otherwise)?

3. What is the main thing your child has learned from this program?

4. How would you summarize the value of this program for you and/or your child?

In-Depth Interview Questions

INTRODUCTION

- Thank you for participating! Your observations and opinions are invaluable.

- Our main purpose is to get the kind of rich detail that only a family member/caregiver can provide.

- I'm asking these questions on behalf or as a representative of [fill in the blank].

- The decision to participate is completely voluntary, and you can end the conversation at any time.

- Your responses will remain confidential. May I request permission to record?

- Do you have any questions or concerns?

QUESTIONS

Topic: Program Participation

Quick response: Which library program activities have you and your child participated in, both at home and in person?

Digging deeper:

- Why did you choose to participate in this program?
- What were the biggest factors in that decision?
- How new are these types of activities for you and your child?
- How regularly does your child do tinkering, making, or STEM type things on their own?
- In an average week, how much time would you estimate you and your child engage in making, tinkering, or STEM activities?

Topic: Parent/Caregiver Outcomes

Quick response: How has this program affected you personally (as a parent, teacher, facilitator, or otherwise)?

Digging deeper:

- What's one thing that you felt worked well and why? What's one thing you felt didn't work well and why?
- Do you feel more or less confident than before this program when helping your child with tinkering, making, or STEM activities and learning? What, if anything, changed?
- How often do you find yourself engaging in meaningful dialogue with your child about tinkering, making, or STEM activities? What are those conversations like? How has this program changed those conversations?
- What's your opinion about activities that are hard or about letting your child fail?

Topic: Parent/Caregiver Perceptions of Child Outcomes

Quick response: What is the main thing your child has learned from this program? (Make sure to have this graphic of the Exploratorium's Learning Dimensions printed and ready to show, if needed.)

Digging deeper:

- [Levels of Agency] Overall, would you describe your child's engagement more as "responding" (initial interactions and observations), "exploring" (probing the problems, variables, and possible solutions) , or "owning" (taking intellectual risks, applying understanding, and contributing to the community) in their making/tinkering?
- [Learning Dimensions] Which, if any, of the learning dimensions in the graphic (initiative & intentionality, social & emotional engagement, creativity & self-expression, conceptual understanding, problem solving & critical thinking) did you see examples of in your child's making and tinkering?

Topic: Parent/Caregiver Perceptions about the Program and the Library

Quick response: How would you summarize the value of this program for you and/or your child?

Digging deeper:

- How critical was the library program for instigating tinkering, making, or STEM activities/learning?
- What would be missed if the program were not available?
- Where do you intend to look for STEM activities for your child in the future?
- How could the program be improved?
- What have you or would you share with other families/caregivers about the program?
- What would cause you to participate again or not?
- If applicable, please compare the online versus in-person at the library versions of the program. Which do you prefer? Why?

Final Questions: Is there anything else you would like to share? What have we missed?

Note: Despite how inconsequential this final question might seem, it often generates the most useful data if you just give interviewees a lighthearted second or two to reflect.

Thank you!