



THE ROLE OF YOUNG MAKERS MENTORS

Think back to your childhood: Are there individuals who helped positively shape your potential, ways of thinking, and sense of self? This is your chance to do the same! Mentors are a significant part of our Young Makers program. They take on multiple roles and responsibilities, regularly shifting between them, to help create memorable and empowering learning experiences for youth.

A mentor is, at various times, a facilitator, a mediator, a sounding board, a fellow maker, a timekeeper, an expectation setter, a subject or skill expert, a motivator, a teacher, a documenter, a listener. Mentors set the stage and bring together the elements that make up a positive community and culture. In such a supportive space, Young Makers become excited to explore and experiment, locate the resources and help they desire, and build the confidence to discover new ideas and skills, tackle big projects, and share their experiences with one another.

Mentors don't have to have expertise in a specific area; rather, they help to outreach, network with others, and seek out answers. Mentors also help address supply issues, pass on their knowledge of tool usage and safety,

and assist in managing realistic project-build schedules. Along the way, mentors might exploit “teachable moments” to explain underlying math, science, and engineering concepts. Finally, mentors demonstrate to Young Makers the importance of failure as a means to success, to expect and embrace failure as a normal part of the making process.

No matter what our age, we appreciate mentors whose facilitation is welcoming and intended to spark interest, provide focus for our attention as needed, strengthen our individual understanding, and clarify our intentions through reflective conversation. While there is no simple recipe for how to mentor, you’ll be most effective if you think like a maker: stay curious, interested, respectful. Focus on their interests, not yours, but share what you love to do so that they can see that you are passionate about making too. Be ready to learn from the Young Makers.

WHAT DO MENTORS DO?

Being a mentor isn’t always easy. There’s an art (and lots of practice!) to asking good questions, guiding without telling, and allowing for a little frustration in order to come out successful on the other side. At the core, mentors provide support, motivation and encouragement while helping Young Makers stay focused and on track within a realistic timeline.

Among the pivotal roles that they play, they help to:

- Organize
- Brainstorm projects
- Manage time
- Focus on process
- Capture and document
- Teach Tools, skills, and safety
- Celebrate each person’s role

HELP ORGANIZE

As important as it is to provide Young Makers with freedom and time to explore and discover on their own, it’s also crucial to organize, set expectations, and put together a general plan. We ultimately want Young Makers to be and feel successful, and some semblance of organization—whether of a space and materials, a project timeline, or how to work together—will help achieve that success.

BRAINSTORM AND FIND A PROJECT VISION

Brainstorming is a sacred time in which quantity is key. No ideas are bad ones, and the crazier the ideas, the more you know the creative juices are flowing. You can always start with a fun idea to kick-start the process, such as brainstorming a group name, club identity, motto, mascot, or theme.

During brainstorming, accessibility to simple materials, such as paper and craft materials, construction sets, and interesting small objects can also help with conceptual incubation. It's often useful to think with objects, so having items that invite play and prototyping promotes planning and brainstorming.

REALIZE THE PROJECT VISION

Not all Young Makers will recognize how big of a project their favorite idea really is. Some groups won't work together perfectly or right away, while others will be determined to tackle everything all at once, and even more may not be able to take the first concrete step. Helping Young Makers realize their project vision is really an overarching mission for mentors and an area where they can make a big impact. Mentors can help by breaking a big project into small goals and stages. They think about the order of operations and prompt the Young Makers to do the same.

A Young Makers mentor imparts wisdom on this topic:

If the Young Makers said they wanted to build a spaceship, I'd definitely encourage them (and agree how cool that would be) but then ask some probing questions about what part of the experience they're most interested in so we could adapt the project accordingly.

If they wanted to physically crawl into a box and perhaps feel a sensation of weightlessness, then maybe we'd start a discussion about constructing an isolation/flotation tank. If they were more interested in propulsion, then maybe a scale model rocket might be an appropriate starter project. Interested in the view looking back down onto the Earth? Start an exploration about the possibility of a remote camera attached to a balloon.

Encourage the kids' wild ideas, but then engage them in thinking about where they might find the construction parts and whether they would need to be purchased or could be salvaged or recycled.

This kind of discussion will lead the Young Makers to their own realizations about what might be practical but still allow them to fully define their project goals.

MANAGE TIME

Once the project is parsed out into doable chunks, the mentor helps create a realistic, low-stress timeline. This timeline will likely change, and the lesson in being flexible and adaptable comes with the process of making. Setting a preliminary timeline is also akin to setting expectations and goals.

Unrealistic expectations about time-budgeting for projects happens with makers young and old. Follow that original schedule, and adjust accordingly with each work session, meeting time, or milestone. Mentors can help youth think about time management, too, by providing another perspective into project progress. Are they spending too much effort on one tiny detail? Or is it okay to dwell on it because it's critical for the next step? Ask them!

As a mentor, it helps to keep track of the process, knowing and recognizing that there may be hiccups, periods of frustration, or slow-to-no progress. It's okay! Take that as it comes, and help youth keep the momentum going.

The last few weeks before the showcase event are almost always full of frenzied action, late nights, and high emotions. Build in energy and time for those periods. Ultimately, time management is a responsibility of the Young Makers, but encourage them as you can.

FOCUS ON PROCESS NOT PRODUCT

A vital role for mentors is to emphasize the importance of the process. The pathways to success naturally include prototypes to mourn, mistakes to be celebrated as learning experiences, and frustrations to overcome. As a mentor, when encountering hiccups, you can model the best approaches for how to learn from challenges, take feedback, and move forward positively. It's important to expect and embrace struggle as an essential part of the process. Dead ends are often just as valuable to scientists and engineers as experiments that work perfectly.

Perhaps a project, despite support and encouragement, doesn't get finished or doesn't yet work by the time of the creative exhibition. It's not the end of the world! Rather, this is a fantastic

chance to show the work in progress and to learn at the event of ways it might be finished or fixed. It's common at Maker Faires, for example, for makers of all ages to be building right up to—and even throughout—the actual event. That's part of the magic and a valuable chance to show actual process in addition to sharing stories and documentation about the project.

CAPTURE AND DOCUMENT

Mentors can play a big role in helping to capture what happens during the process of making. Even more importantly, mentors can facilitate youth to document their learning themselves!

Writing down notes, taking snapshots, recording short video clips, sketching ideas, even crafting short blog posts for an online portfolio: These are all tangible ways of capturing thoughts and learning over time. Documentation allows youth to come back to their work and reflect on what they've accomplished. Just having those artifacts and content available is significant in enabling Young Makers to create meaning and find success.

A Young Makers mentor shares the benefit of notebooks:

Encourage your Young Makers to keep a notebook for jotting down their ideas. It's low-tech and affordable by all. Graph paper is a useful tool for discussions of physical scale: "Okay, you want to build that. Say one square represents six inches. Draw how big you imagine it." (Or "One square represents one decimeter. Let's talk about the potential benefits of metric units.")

Ideally, the notebook would have rings or a pocket for inserts, pages printed from a computer, etc. A notebook is also a useful tool for keeping track of tangential ideas that can't be explored right away during the current project but may be good fodder for next year.

TEACH TOOLS, SKILLS, AND SAFETY

Mentors are also expected to pass on their knowledge of proper tool usage and safety, as well as to introduce new concepts, ideas, and materials. Mentors should help establish agreements for tool use in conjunction with Young Makers. Given the chance to discuss the potential dangers and proper use of tools, youth will come up with ways to use them safely. In this way, they can help own the expectations of safety and are more likely to keep them in mind and help monitor each other.

Safety issues are not just physical. Psychological and social safety are equally important, so that all participants feel comfortable, free, and connected. Mentors are essential as role models for encouraging help and understanding, and for empowering youth ideas.

CELEBRATE THE ROLES OF EVERYONE

Mentors can play vital roles in helping to build a club culture that recognizes and celebrates the roles of everyone in it. Through discussions, reflection, notebook use, and documentation, there are continual opportunities for Young Makers and mentors alike to develop habits of regularly noting and sharing attribution for ideas, inspiration, and support. Simple questions—such as “Who helped me today? Who and what inspired me? Who did I help?”—go a long way toward developing this culture and increasing awareness of what everyone has to offer in support and inspiration.

This is especially helpful during brainstorming. Individuals who feel recognized are more likely to seek further ways in which they can share their gifts with others. All mentors can model these behaviors and help establish routines and language to build a culture of contribution, attribution, and respect.

THE POWER OF LANGUAGE

As a mentor, always bear in mind that one of your most powerful tools is also one of the most accessible and widely used: language. Words have the power to invite, inspire, and potentiate but also to shut down and exclude. We encourage you to carefully consider what language you use, when, and the overall tone you set. Sometimes, the best thing to say is nothing. Can what you are about to say be instead discovered by a Young Maker or perhaps better heard coming from a peer rather than a mentor?

When giving recognition, try to avoid empty praise. Rather, compliment the way that Young Makers try different things at least as much as you heap praise on the results. For example, saying, “I admire how you worked through that hard problem. I noticed how you tried [x], [y], and [z], and you stuck with it until you figured it out.” can foster confident learners, perhaps more than saying “Good job!” a thousand times.

Some simple but powerful phrases can help convey attention and show recognition in meaningful ways. For example:

- I notice ...
- I see ...
- It looks like ...
- I wonder...
- I'm curious about ...

Consider the difference between “That’s awesome! Good job!” and “Wow, I see a huge amount of careful stitching! How did you develop the pattern to create such an intricate design? It looks super tricky. Could you show me more about how you did it?”

Children are masters at recognizing genuine interest and curiosity in all the ways you communicate, including your facial expressions and body language. Your language use should show that you value their thinking, you’re genuinely curious, and that you respect their abilities and ideas. Most of all, it’s helpful to come from a place of excitement and fun, rather than a more “adult” or authoritarian tone.

LANGUAGE EXAMPLES

To help illustrate how language use can invite rather than exclude, here are language examples from our Youth Makerspace Playbook.

“Wow, you really stuck with this and figured that out after all those problems. Would it be okay with you if I sent others to you for help if they need it with this kind of thing?”

“I notice you keep finding new ways of connecting those LEDs! Have you drawn any of these setups or recorded any of your observations? I’d love to be able to share them with everyone.”

“I notice you’re really struggling with this. I wonder if someone else has encountered the same problem. Let’s check.”

“I hear your frustration. I would be frustrated too after so much work. Would you like to take a break and come back to it? Perhaps you can help someone else with the battery connection you got working earlier?”

“You know, that doesn’t make any sense to me either. How cool is it that we have this mystery? I wonder what’s going on? If you figure it out, can you tell me so that I can share it with everyone?”

10 TIPS FROM YOUNG MAKERS MENTORS

We're fortunate to have learned over the history of Young Makers from its many wonderful mentors. Their wisdom has helped shape this document and has nurtured hundreds of amazing projects that have been showcased over the years. Here we present highlights of their tips based on their experiences.

1. Reflect upon what you notice, and ask questions to help lead to discoveries.
2. Find and connect those who may be struggling in a particular area with those who may have found a solution. Your role is to enhance peer-to-peer support. A classroom classic is to suggest: "Ask two others before you ask me."
3. Mentors (and educators) are not the only teachers! Oftentimes, peers are referred to as a second teacher, and the environment is a third. Mentors can facilitate the optimal use of all three.
4. Let your group know that while some struggle is expected, if they are really stuck, you'll help connect them to peers or help directly when needed.
5. Admit and celebrate what you don't yet know, and share your excitement about learning with and from Young Makers.
6. Celebrate and share mysteries, and recognize efforts driven by curiosity and playfulness.
7. Let the kids fail, while monitoring their safety. Occasional failure, and the accompanying recovery and adaptation, are an important part of the learning process.
8. If you see something faulty, point it out (in advance if possible), but try to avoid insisting things be done a certain way unless safety is an issue. You'll be surprised how many different paths lead to the same goal, or what new ideas are developed by accident.
9. A helpful motto from the classroom is "think, pair, share," which means allow time to think, encourage pairing, and invite group sharing.
10. Use your downtime well. Your services may not be required every moment that you're working with the Young Makers. It's OK to feel superfluous sometimes. You can sit back and watch for opportunities to point out something interesting (those teachable moments), or you can work on your own project or pick up a new skill alongside the Young Makers (just be sure to be open to interruption). The Young Makers might learn something by seeing you plan out your project, muddle through a problem, or struggle with a new tool. You can also use this time to get to know your club members better by just chatting about things that might not have anything to do with making.