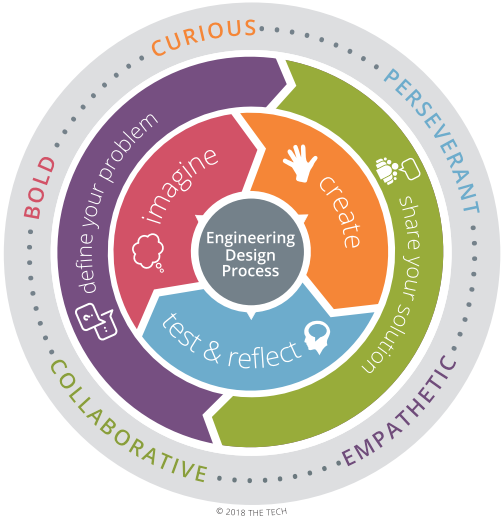
TECH TIP: Engineering Mindsets

At The Tech, our goal is to foster these critical mindsets to help learners become creative problem solvers. These mindsets must be intentionally modeled, taught and practiced just like any other concept or skill. Fostering these mindsets can translate to increased confidence outside a classroom or specific learning setting and are especially valuable to populations traditionally underrepresented in STEM careers.



BOLD
An engineer often takes risks to try new and innovative solutions. A learning environment that encourages risk taking helps learners develop leadership capabilities and boldness to get their ideas heard in the classroom and in the careers they choose to pursue.

CURIOUS
Engineers are curious about how or why things work, as well as how they can create new solutions and improve the lives of others. Their curiosity drives them to try many different solutions to a problem. Norms that encourage learners to wonder, notice, question and be open to other perspectives help to foster curiosity.

PERSEVERANT
Engineers require perseverance to learn from numerous failures as they prototype, test, observe failure points, iterate and test again. Messages and norms that celebrate learning from mistakes, reward effort, and honor process as well as results help to foster perseverance.

EMPATHETIC
Empathy for people affected by a problem leads an engineer to design solutions that truly serve the intended audience. Reflective questions, protocols and tools that guide learners to observe, communicate with others and self assess help to build empathy.

COLLABORATIVE
Most engineers are responsible for a small part of a much bigger project, requiring them to work with large, diverse teams to create solutions. Modeling, practicing and reflecting on interpersonal skills such as active listening, negotiation and building consensus help learners to become strong collaborators.

TEACH ENGINEERING MINDSETS THROUGH FACILITATION

Engineering mindsets show up implicitly through the questions we ask youth and help them to notice and reflect on these critical skills (e.g., To foster curiosity, "What do you wonder? What do you notice?").

Explicit Education

Teach the mindsets explicitly:

- Lead a discussion during which your learners define engineering mindsets for your learning setting
- Actively note when you see these in practice as learners work to solve problems
- Provide a poster on the wall as a reference that includes sentence starters. (e.g., To foster active listening, "I heard you say _____. Is that right?")

Reflect on the Mindsets

We measure what we value, so provide young engineers with opportunities to note growth in these areas.

- Self-evaluations (attached) — Use before and after an engineering unit or at the beginning and end of a school year.
- Self reflection — Have learners reflect on these mindsets as part of journaling after each day or week of engineering design activities.

Bowers INSTITUTE
Supporting educators to develop the next generation of problem-solvers
thetech.org/bowersinstitute

TECH TIP: ENGINEERING MINDSETS SELF-EVALUATION

	Rarely	Sometimes	Not sure	Often	All the time
BOLD					
I make sure my ideas are heard.					
I'm not afraid to share and try out an idea or solution no matter how crazy it might seem.					
CURIOUS					
If I don't know something, I figure out a way to learn more.					
I wonder how things work.					
PERSEVERANT					
I like to work on problems that aren't easy to solve.					
If I don't solve a problem the first time, I just keep trying until I get it right.					
EMPATHETIC					
I value others and take time to listen to what they have to say.					
I like to understand why others have different opinions.					
COLLABORATIVE					
Having all teammates contribute matters to me.					
I stand up for myself without putting others down.					
I think my teammates can help make our solution better.					
ENGINEERING					
I think engineering is fun!					

TECH TIP: ENGINEERING MINDSETS SELF-REFLECTION

	Area of strength?	Today I did this and it looked like:	Next time I want to try:
BOLD			
CURIOUS			
PERSEVERANT			
EMPATHETIC			
COLLABORATIVE			