



Brainstorming is a process that can help engineers and designers of any age generate many creative and innovative solutions while also eliciting a sense of wonder, imagination and excitement at the start of a design process. At The Tech, we have found that brainstorming is particularly effective when all ideas are documented without judgment and when different brainstorming methods are employed throughout a program or school year. This allows learners to flex their critical thinking skills and think expansively, imagining big, small and wildly creative solutions.

## FACILITATION

*Brainstorming often occurs naturally, yet in order to make it part of learners' design process, we suggest introducing these methods in a more structured way:*

- Establish norms for brainstorming.
  - Document all ideas without judgment. After the ideas have been presented, provide a separate time to constructively critique and narrow ideas.
  - Encourage learners to “borrow” ideas from other groups, but give credit to the originator(s) of the idea and build on it.
  - Focus on the “why.” Why are we designing a solution for this problem?
  - Think expansively by imagining big and small solutions.
- Organize learners in small groups of two to six. Introduce the design challenge for brainstorming.
- Assign a brainstorming method (suggestions below) and provide five to 30 minutes to brainstorm. (Note: You can also allot time for individualized brainstorming, depending on your learners and setting).
  - During longer sessions, the facilitator can move around the room and engage with learners to push thinking in new directions or to refine a few ideas using facilitative questions.
  - If they will be building something physical, have materials available for exploration during brainstorming.
- After the brainstorm, have teams share out or move on to the next steps in the design challenge.
  - Groups can share their wildest idea, the themes that came out during brainstorming or their agreements and disagreements.
  - Participants can start to build their prototype, develop their solution or decide on the next step in their process.

If you have artifacts, related art or tangible examples that might inspire, excite or generate questions and ideas, place them around the room or on an “example table.”

## Facilitative Questions

### To focus thinking

- What problem are we trying to solve?
- Who will benefit from this solution?
- Are there other problems that are similar to this?
- Is there anything in nature that might inspire ideas or solutions to the problem?
- Are there current solutions that have already been imagined and implemented?

### To expand thinking

- What is a wild idea for solving this problem?
- What metaphors and analogies can you think of that help you connect to the problem?
- How many possible ideas can you come up with to solve this problem?
- If you had no criteria or constraints, then how would you solve this problem?

### To breakdown a problem

- Is there a way to break this problem into smaller parts?
- What seems confusing about the challenge — note those pieces. List what you do know about the challenge. Can you bridge what you know and don't know to better understand the challenge?



## METHODS FOR BRAINSTORMING



**Post-it Note® brainstorming.** Give each individual a pad of sticky notes. Have them write and draw on sticky notes and read their ideas aloud as they post each to a board.

Phase 2 - Affinity Diagramming: Give learners time to sort notes, engage in conversation, and combine like ideas (if desired). This step could also be done as a class.



**Free write/draw.** Identify a topic and have each learner write or draw any ideas that come to mind. Then, give individuals time to share ideas within their team. After all have shared, allow time for teams to share additional ideas that emerged after hearing from each other.



**Mindmap.** Put the central concept on the middle of a mindmap and have learners record all their ideas related to the concept, clustering ideas and connecting related items visually with lines.



**Storytelling.** Have learners create a story about their solution. How does it impact a stakeholder? How would someone use it to solve the problem?



**Materials brainstorm.** Have each team member select a different material and share ideas for how that material could be used in the team's solution. While one team member starts the sharing, others can provide additional ideas on the use of each material.



**“Super-Figure” Storming.** Have learners choose a role model, favorite character in a book/film, historical figure, a superhero attribute/persona, or something from nature, to role-play and imagine ideas from.