

Maker Unit Design Tools: Introduction to the Exploration Mode

The Exploration mode of this maker education framework is designed to launch a unit, build excitement and engagement, and draw on students' prior knowledge to help guide their process of exploring the unit focus.

Activities should be open-ended and student-driven in order to maximize the students' ownership over their own learning. The students' process of exploration should be scaffolded to help them progress while preserving variability and opportunities for experimentation and self-expression whenever possible.

A recommended flow for an Exploration activity is as follows:

- Launch challenge
- Connect to prior knowledge
- Describe workflow & materials control
- Facilitate transitions in the process of learning
- Check for progress
- Facilitate sharing

Teacher's posture

When facilitating an Exploration activity, the teacher is mostly a helpful guide, launching the activity with a specific prompt, facilitating the use of tools and materials, and helping students continue to progress toward a solution or end goal.

When at all possible, teachers should allow students to generate their own ideas and their own solutions to issues and manage their own team dynamics. By facilitating the students through process steps (without focusing on a particular end product), the teacher can help students progress (and ease frustration) while minimizing his or her influence over students' thinking and creativity.

Students' posture

When participating in an Exploration activity, the students should be the primary driver of generating ideas, solving problems, experimenting and overcoming stuck points. Students should be encouraged to take ownership over their exploration of the domain, and seek help first from peers before turning to the teacher.

By creating a truly student-centered (but teacher-facilitated) learning experience, students will build their confidence, ownership and excitement for the topic. This process will create momentum as the students face more complex skill-building tasks.

Maker Unit Design Tools: Introduction to the Skill-building Mode

The Skill-Building mode of this maker education framework is designed to facilitate the development of students' confidence and competence with a particular skill. Instruction during the Skill-Building mode is far more prescriptive than the other two modes.

Activities should be designed to help students with varying degrees of ability to begin to develop mastery of a particular concept, such as CAD modeling. While the teacher may be giving more procedural instructions, he or she is encouraged to design learning experiences to be as hands-on as possible, preserving variability and opportunities for creativity whenever appropriate.

A recommended flow for a Skill-Building activity is as follows:

- Introduce technical skill
- Connect to prior knowledge
- Instruct on skill development
- Check for understanding
- Give more advanced students a task to work on once they have gained initial mastery
- Answer questions and help those who are struggling

Teacher's posture

When facilitating a Skill-Building activity, the teacher plays a far more traditional role – potentially lecturing and providing much more procedural, prescriptive, step-by-step instructions. The teacher maintains tighter command over the class in order to build specific knowledge and skills, check for understanding, and help individual students progress.

When at all possible, teachers should facilitate students to learn by doing. By instructing students using a more prescriptive approach, the teacher can help students progress (and ease frustration).

Students' posture

When participating in a Skill-Building activity, the students will be focused on acquiring new knowledge and skills from their teacher's instruction. Because students have already engaged in the topic in an open-ended activity, hopefully they will have developed an interest in the hard work required to build specific skills.

Maker Unit Design Tools: Introduction to the Challenge Mode

The Challenge mode of this maker education framework is designed to give students the opportunity to use the new skills they have built in order to solve a problem in a creative way. By using new skills to solve a problem, students will further develop their confidence in themselves as creative problem solvers and they will build mastery in the specific skills they learned during the unit.

Activities should be open-ended and student-driven, in order to maximize the students' ownership over their own learning. This activity should build upon the technical skills the students have built over the course of the unit. By making this activity challenge-based, students will find purpose in the application of their new skills and will draw motivation to solve the problem.

A recommended flow for a Challenge activity is as follows:

- Launch challenge
- Connect to prior knowledge (from this unit and before)
- Describe workflow & materials control
- Facilitate transitions in the process of learning
- Help overcome stuck points
- Check on progress
- Facilitate sharing

Teacher's posture

When facilitating a Challenge activity, the teacher is mostly a helpful guide, launching the challenge with a specific prompt, facilitating the use of tools and materials, supporting the use of new skills and helping students continue to progress toward a solution or end goal.

Teachers should allow students to generate their own ideas and their own solutions to issues and manage their own team dynamics. By facilitating the students through process steps (without focusing on a particular end product), the teacher can help students progress (and ease frustration) while minimizing his or her influence over the students' thinking and creativity.

Students' posture

When participating in a Challenge activity, the students should be the primary driver of generating ideas, solving problems, experimenting and overcoming stuck points. Students should be encouraged to take ownership over their solutions, and seek help first from peers before turning to the teacher.

By creating a truly student-centered (but teacher-facilitated) learning experience, students will build their confidence in their newly acquired skill while developing their identities as creative problem solvers.

The application of this new skill to solve a problem or meet a challenge will serve as the culmination of the process of learning for this unit.