Maker Unit Design Tools

Organizing Themes

When developing your maker-based scope and sequence for the year, you can use any of the organizing themes below. By structuring the learning around tools, materials or skills, students will begin to develop their fluency with making by leveraging multiple approaches. Once you have chosen your organizing theme, select the topics within the theme as your unit foci.

Tools

- Crafting tools (scissors, glue, tape, etc.)
- Hot glue gun
- Hand tools (hammer, screwdriver, drill, saw, etc.)
- Power tools (drill, circular saw, etc.)
- Clay oven
- Soldering iron
- Sewing machine
- Vinyl cutter
- Laser cutter
- 3D printer
- CNC router
- CNC mill
- Laptops & tablets
- Graphic design software
- CAD modeling software
- Cameras, video, audio
- Others

Materials

- Paper
- Cardboard
- Tape (duct tape, masking tape, etc.)
- Glues (Elmer's, glue sticks, Super Glue, etc.)
- Crafting supplies
- Office supplies
- Salvaged materials
- Microcontrollers (Raspberry Pi, Arduino, etc.)
- Circuit supplies (solder, wire, LEDs, batteries, motors, etc.)
- Inks, dyes & paints
- Fabrics & fibers
- Wood
- Metal
- Vinyl
- Plastic (acrylic, ABS, PLA)
- Food
- Others

Skills

- Teamwork
- Sketching
- Brainstorming
- Designing
- Measuring
- Modeling & prototyping
- Fastening (adhesives, hardware, knots, etc.)
- Building & fabrication
- Graphic design
- Circuitry & soldering
- Coding
- Welding
- Jewelery making
- Casting
- Robotics
- Woodworking
- Metalworking
- Sewing & weaving
- Carving
- Storytelling
- Others

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Challenges and Prompts

Use the challenge areas below when creating an open-ended activity for students to work on solving. Consider the scope and scale of the challenge. The prompts can help you frame the challenge for students.

Possible Challenge Areas

- Shelter
- Water
- Energy
- Animals
- Transportation (moving people; boats, planes, space, etc.)
- Waste & sustainability
- Internet of things
- Automation
- Medical devices
- Musical instruments
- Games & entertainment
- Toys
- Wearables
- Hacking & improving
- Others?

Scope and Scale

Home-based: morning routine, cooking, sleeping, etc.

School-based: lunch, recess, carpool/bus, bathrooms, etc.

Community-based: parks, waste pickup, bus stops, etc.

Industry-based: manufacturing, medical devices, technology, etc.

Globally based: clean water, climate change, disease control, etc.

Prompts

Tool prompts

Use this tool to solve...

Use this tool to invent...

Use this tool to create...

Materials prompts

Use this material to solve...

Use this material to invent...

Use this material to create...

Skill prompts

Use this skill to solve...

Use this skill to invent...

Use this skill to create...

Others

Problem-solving prompts

Solve _____.

Make _____ more _____.

Make _____ less _____.

How might we improve...

How might we increase...

How might we decrease...

How might we (verb that implies change)...

What if...

Can we at least try _____?

Others

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Affective Learning Objectives

Affective learning objectives focus on the emotional domain and overlap with social and emotional skills, including values, attitudes and mindsets about ways of learning and working. Use the traits below to isolate particular affective learning objectives you want to focus on as a part of your maker-based activity.

Students are engaged in their learning.

Students direct their own learning.

Students are mindful of and can communicate their learning.

Students reflect on their progress.

Students seek and receive feedback and work to improve.

Students demonstrate self-reliance.

Students demonstrate resilience.

Students demonstrate the ability to persevere and overcome when they are stuck.

Students successfully collaborate with others.

Students demonstrate the ability to face open-ended, ambiguous problems and actively work to solve them.

Students seek help and additional resources when they have exhausted their own process of problem solving.

Students demonstrate curiosity when faced with a tough problem.

Students demonstrate optimism when faced with a tough problem.

Students demonstrate a willingness to make changes, fix problems and positively influence the world around them.

Skill-Based Learning Objectives

Skill-based learning objectives focus on skills students acquire that are not specific to a content area. These skills are focused on a particular tool or material or technique. Use the traits below to identify particular skill-based learning objectives you want to focus on for your maker-based activity.

Students learn a new skill to solve a problem.

Students gained confidence in the new skill.

Students gained competency in the new skill.

Students can apply the new skill to a variety of challenges.

Students gained confidence using a new material.

Students gained competency with a new material.

Students can apply the use of the new material to a variety of challenges.

Students gained confidence using a new tool.

Students gained competency with a new tool.

Students can apply the use of the new tool to a variety of challenges.

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Cognitive Learning Objectives

Cognitive learning objectives focus on the thinking domain and overlap with subject area knowledge acquisition and recall as well as higher-order thinking such as application, analysis, synthesis and evaluation. Use the boxes below to isolate particular content areas you want to focus on as a part of your maker-based activity.

Language Art
e.g., Creative Writing, Poetry

Social Studies
e.g., Topography, Historic Shelters and Tools

Math
e.g., Measurement, Geometry

Science
e.g., Habitats, Gravity

Art
e.g., Sculpture, Drawing

Other

Taxonomy for Teaching, Learning and Assessment

Remember	Apply	Evaluate
Understand	Analyze	Create