



Project Planning Toolkit



New Tech Network

WHAT IS A PROJECT PLANNING TOOLKIT?

This robust template provides the granular details that help teachers design and execute a project. The toolkit is broken down into five categories:



Begin with the end in mind



Design the project scenario



Plan the assessment



Create the path



Assess your project before launch

NOTE TO EDUCATORS

We're so excited that you're thinking about using one of the NTN Model Projects! Before you begin, we'd like to share a few thoughts and considerations. **This project is intended to be a model, but only a model to get you started.** As with any instructional materials, you will need to adjust tasks, materials, and scaffolding based on the needs of your students. In addition, adjust your project based on your local context, such as connecting to community partners.

We have created a few examples of scaffolding for each benchmark section to help you get started. [NTN Practice Cards](#) are embedded in the "Create the Path" and "Project Calendar". The NTN Culture Practices help you create a safe, inclusive, and emotionally supportive classroom for all students and enrich your trauma-informed work. The NTN Learner-Centered and Assessment Practices help all students, including English Language Learners, in developing Learning Outcome skills. Some include a link to a lesson plan with suggestions for using the practice and adapting it to provide additional support based on your students' needs and your unique context.

"Project Calendars" are meant only to model day to day PBL and will need to be adjusted for various schedules, class period lengths, etc. Please note that on the secondary toolkits, the calendar generally assumes a 90 minute block.

Each toolkit is part of a Curriculum Framework that models the scope and sequence of projects throughout the academic year. See [NTN Curriculum Frameworks](#) and [NTN Glossary](#) in the Help Center to learn more.

<< [7th Grade Science Year-at-a-Glance](#)

<< [7th Grade Science Project Snapshots](#)

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Project Planning Toolkit



New Tech Network

PROJECT TITLE

Cold Cats & Hot Dogs

AUTHOR(S)

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DURATION

4 weeks/ 20 days

TABLE OF CONTENTS

	Begin with the end in mind
	Design the project scenario
	Plan the assessment
	Create the path
	Assess your project before launch



BEGIN WITH THE END IN MIND

Consider the standards you'll be addressing in this project as well as the rubric indicators (rows of bullets) from the NTN Learning Outcome rubrics you'll be targeting.

SUBJECT AREA

NGSS Physical Science:

Thermal energy

STANDARD

MS-PS3-3 Apply scientific principles to design, construct, and test a device that either minimizes or maximizes thermal energy transfer.

MS-PS3-4 Plan an investigation to determine the relationships among the energy transferred, the type of matter, the mass, and the change in the average kinetic energy of the particles as measured by the temperature of the sample.

LEARNING TARGETS

I can design a home and test it for stray and shelter animals that minimizes energy transfer to keep the animals warm in the winter and cool in the summer.

NGSS Engineering Design:

Engineering, Culture

MS-ETS1-1 Define the criteria/constraints of a design problem with sufficient precision to ensure a successful solution, taking into account scientific principles, potential impacts on people and the...environment that may limit...solutions.

MS-ETS1-2 Evaluate design solutions using a systematic process to determine how well they meet the criteria/constraints of the problem.
MS-ETS1-3 Analyze data from tests to determine similarities/differences among several design solutions to identify the best characteristics...to be combined into a new solution to better meet the criteria for success.

MS-ETS1-4 Develop a model to generate data for iterative testing....optimal design can be achieved.

I can design a dog/cat shelter by using the design process of brainstorming, planning, prototyping, testing and revision to create the best possible model for the solution.

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BEGIN WITH THE END IN MIND (Continued)

LEARNING OUTCOME



Knowledge & Thinking

[Scientific Research](#)



Agency



Collaboration



Oral Communication



Written Communication

RUBRIC INDICATOR/S

Provides general content information that is related to the question being tested

Experimental design is generally related to the testable question

Gathers data from several replications of the experiment

Identifies challenges or failures and describes reactions to them (e.g. giving up or trying harder)

Words and tone indicate respect and sensitivity to others

After listening, shows recall of key facts and main points

Provides a partial explanation of background and context of topic/issue

Ideas and evidence are mostly developed

LEARNING TARGETS

I can provide scientific content such as the concepts of thermal energy and energy transfer when writing or communicating about this project.

I can use experimental design to create our prototype housing for cats and dogs and gather data from several tests or experiments

I can identify challenges I face when designing and testing our model and am able to describe how to appropriately react to those challenges.

I can use words and tone of voice to show respect and sensitivity to my classmates and adults.

I can recall or repeat facts and main points after listening to someone.

In my writing, I can provide a background explanation of the project to give context to my audience that I am writing to.

In my writing, I develop my ideas and my evidence to explain or persuade my audience.

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DESIGN THE PROJECT SCENARIO

Consider an authentic project scenario that will allow you to develop and assess the standards and outcomes you determined above.

PROJECT SCENARIO

What is the scenario that will guide student inquiry throughout the project?

According to the Humane Society of the United States, animals being left outside in dangerous weather is one of the most common forms of animal cruelty. This form of abuse is more investigated by police and animal control agencies than any other form of animal abuse. Stray animals are also impacted by dangerous weather. According to the ASPCA, approximately 6.5 million companion animals enter U.S. animal shelters nationwide every year but only 3.2 million shelter animals are adopted. This imbalance results in many stray animals being turned away due to shelters being at full *indoor* capacity. But what if shelters could safely expand their *outdoor* capacity?

In this project, learners will work as teams to design a structure that either minimizes or maximizes thermal energy for dogs or cats that can be used by pet owners who are unable to house their pets indoors or by local animal shelters needing to expand their outdoor capacity during times of dangerous weather. As learners build alliances, they will reflect on ways they can lean on each other's experiences and strengths to foster an inclusive and supportive community. As a class, they will produce community agreements, and develop rituals and routines to cultivate a learning community that continues to honor each other's unique identities.

DRIVING QUESTION

Open-ended, high interest, thought provoking

How can thermodynamics help design a structure that provides animals a safe and comfortable place to rest during dangerous weather?

PROBLEM STATEMENT

Role, task(s), purpose

We are (role).... Thermal engineers who will do/create (product)...create blueprints to a design for safe, energy efficient and comfortable outdoor animal structure so that (purpose)...pet owners can keep their outdoor pets safe and comfortable during dangerous weather and local animal shelters can increase the number of strays they rescue

WRITTEN PERFORMANCE TASK

See NTN Written Task Templates and the Quality Checklist for help writing a prompt.

Write a persuasive letter to local animal shelters/pet owners to use your blueprint design to build thermodynamic structures that will provide safe and comfortable living spaces for animals and allow shelters to increase their stray capacity without expanding their buildings/keep pet owner's pets safe without having to bring them inside.

OR Write the instruction manual to your design for a thermodynamic structure explaining not only how to build it but why the energy conservation and thermodynamic principles allow for the dog/cat to remain safe and comfortable during periods of extreme heat or cold.

CULMINATING PRODUCTS

Be sure to allow for student voice and choice in the products.

Presentation / Performance:

- Informative presentation on how the thermodynamic animal structure creates a safe and comfortable living space
- Persuasive presentation to local shelter/pet owners on why they should use your blueprint design and how it will keep animals safe/comfortable in dangerous weather.

Artifact(s):

- Blueprints of thermodynamic animal structure
- Prototype of thermodynamic animal structure

AUTHENTICITY AND PARTNERS

How will you make this project as real-world as possible, and who will help you?

- Communication with local animal shelters
 - Q&A session about their needs and current protocol and procedures during dangerous weather
- Communication with local animal control
 - Q&A session about where and why strays are picked up and the condition they are in when brought to the shelter
- Audience: Local animal shelters and/or pet owners

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PLAN THE ASSESSMENT

Create the rubric you'll use to assess your students' work. Pull from the learning targets and the NTN Learning Outcome Rubrics, keeping in mind what you selected above in **STEP 1: BEGIN WITH THE END IN MIND**. Consider whether or not your students will need a separate rubric with more student friendly language.

TEACHER PROJECT RUBRIC

Try using the **CRAFT RUBRICS** practice below to build your rubric.

You can also reference the New Tech Learning Outcome rubrics in the [Help Center](#) for help creating your rubric.



LINK TO YOUR RUBRIC

[Cold Cats and Hot Dogs Project Rubric](#)

CRAFT RUBRICS



What?

Create rubrics from NTN Learning Outcome Rubrics

Why?

- Help learners focus on specific indicators and master skills/outcomes over time
- Skillfully crafting rubrics takes time and a clear understanding of exactly what you hope students will be able to produce
- Not only do you need to clearly understand what your standards mean, you also must contextualize that content for your learners in the project or problem

How?

1. **Select one or two key indicators** (rows of bullets) from each NTN Learning Outcome rubric to focus on in a project or on a task.
2. **Create a project** or task rubric just from those indicators.
3. **Add any additional content indicators** based on your standards, as needed.
IMPORTANT: As you craft the language, articulate different levels of skill or mastery, **not** simple differences in number or quantity. For example, "Thoroughly supports opinions with evidence and warrants" rather than "Supports each opinion with two to three facts."
4. **If you will be providing grades** based on this rubric, determine how you will do that in a way that prioritizes learner growth and acknowledges where learners start. See **Using Rubrics as a Feedback Tool** card for more.

REFLECT

- What data might you need to help you determine what indicators you will focus on? (Data could be formal or informal.)
- How will you keep the rubric alive for yourself and learners?

GO DEEPER

- See NTN Rubrics in Echo
- See sample rubrics in the Help Desk
- [5 Tips for a More Meaningful Rubric](#)

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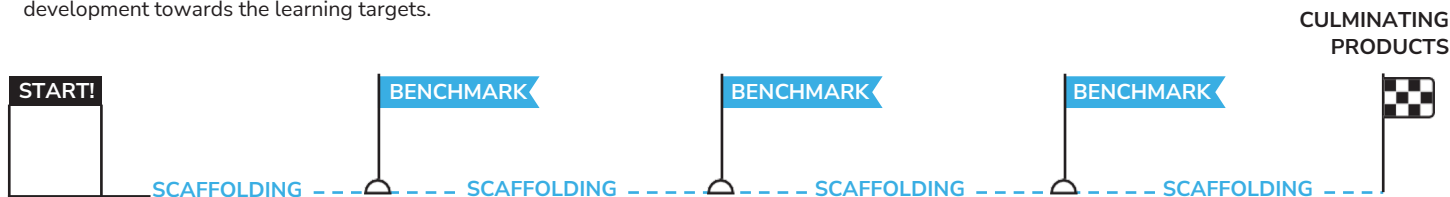
CREATE THE PATH

Plan how you'll move through the project with students from beginning to end.

- Entry Event
- Project Phases: Benchmarking & Scaffolding
- Literacy & Math Plans
- Project Calendar

PROJECT PHASES: SCAFFOLDING AND BENCHMARKS

Consider the sequence of learning that will likely take place based on student need-to-knows and skill development. Consider project benchmarks and scaffolding that can help students to stay on track and focused on the end products, while also allowing you to assess their development towards the learning targets.



ENTRY EVENT

DESCRIPTION AND PLAN What will be the hook to spark curiosity and initiate the inquiry? How will you introduce the students to their role and tasks? Will you use a document to accompany the entry event? What should it include (i.e. academic vocabulary, description of role/tasks)?

[Cold Cats and Hot Dogs Entry Letter](#)

Guest Speaker: animal shelter/animal control/animal hospital representative to speak about lack of space in shelters/the importance of keeping dogs/cats safe and comfortable during inclement weather.

Request from: Animal shelter, animal control OR animal hospital asking students to design a structure that can comfortably and safely house a cat or a dog during extreme heat or cold. (Include thermodynamic vocab here)

ANTICIPATED KNOWS AND NEED TO KNOWS

Generate two lists that students may come up with during the entry event. Afterwards, revisit your standards and entry document and revise as needed to ensure alignment (i.e. does the entry event generate need to knows that are aligned to the standards?) Note: This list should be used for planning purposes only. Students should generate their own know / need-to-know list and revisit it frequently throughout the project.

KNOWS

- **Weather can be dangerous**
 - Extreme cold: snow, wind
 - Extreme heat: high temperatures
- Energy is conserved
- Cats/dogs are mammals with fur
- cats/dogs pant when hot
- We are designing blueprints to a model that keeps animals cool/warm during dangerous weather
- We will show the blueprints to pet owners and/or shelters
- We will use scientific processes to design a model
- We will use heat and energy concepts to help with the design process

NEED TO KNOWS

- What is thermodynamics?
- How cold is too cold/how hot is too hot?
- How do cats/dogs naturally stay warm/cool?
- Can we build a "model" structure?
- Where can we get materials to build a model?
- How can we test its effectiveness?
- Are we just going to build blueprints?
- How can we control the temperature of our design without heating/ac?
- What does a finished blueprint look like?

NEXT STEPS

- **Learn about thermodynamics**
- **Talk with animal doctors about safe conditions/temperatures**
- **Look at examples of blueprints**

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CREATE THE PATH
(Continued)

Project Phases: Benchmarking & Scaffolding

 PROJECT PHASES: SCAFFOLDING AND BENCHMARKS

SCAFFOLDING

- [Community Circle to establish: Community Agreements → Your Ideal Learning Environment](#)
*See *Culture Practices: Community Circles card*
[Design Plan Checklist](#)
- [Chalk Talk: Applying Thermodynamics to Animal Structures](#)
*See *Learner Centered Practices : Chalk Talk*
- [Types of Energy Concept Map](#)
*See *Learner Centered Practices : Concept Map Card*
- [Investigating Insulators: Conduction and Convection](#)
- [The Effect Radiation has on Different Colors](#) (Lab Options)
- [Blueprint Checklist](#)

Ongoing Scaffolding: Oral communication workshops/breakouts and "Mindful Moments"/"Community Circles"



BENCHMARK 1

B1: Thermodynamics

Group submits:

- Design Plan
- Group Contract

Individual submits:

- Energy CMAP
- Lab Data and Analysis

Feedback on Learning Outcome progress based on rubric

SCAFFOLDING

- [Card Sort: Examples of Heat Transfer](#)
*See *Learner Centered Practices : Card Sort Card*
- **Establish "Mindfulness Mondays"**
*See *Cultural Practices/Mindfulness card and Rituals and Routines Card*
- Writing Workshops: Informative vs. Persuasive
- [Guest Speaker Exit Slip](#)
Community Partner: Local Animal Shelter
- [Prototype Materials Checklist](#)
- [Popcorn Lab: Which Type of Heat Transfer Pops Popcorn More Efficiently?](#)
- *Community Partner: Animal Care Expert*
[Exit Slip: "I used to think, Now I think...After 2nd Community Connection"](#)
*See *Assessment Practices : "I used to think, Now I think..." Card*

Ongoing Scaffolding: Oral communication workshops/breakouts and "Mindful Moments"/"Community Circles"



BENCHMARK 2

B2: Blueprint Design

Group submits:

- First draft of blueprint
- Finalized materials list for prototype

Individual submits:

- First draft of assembly instructions or persuasive argument

[Team Conference for Benchmark Check](#)

*see *Assessment Practices for Conferencing and Running Rubric Cards*



CREATE THE PATH (Continued)



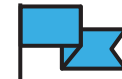
Project Phases: Benchmarking & Scaffolding

PROJECT PHASES: SCAFFOLDING AND BENCHMARKS

SCAFFOLDING

- *Community Partner: Engineering Expert*
[Exit Slip: "I used to think, Now I think...After 3rd Community Connection"](#)
**See Assessment Practices : "I used to think, Now I think..." Card*
- [What are thermal imagers?](#)
- [Praise, Question, Suggestion](#) protocol for Prototypes
**See Learner Centered Practices: Praise, Question, Suggestion Card*
- Peer Feedback on collaboration + community circle to reflect
See **Cultural Practices/Community Circle card*

Ongoing Scaffolding: Oral communication workshops/breakouts and "Mindful Moments"/"Community Circles"



BENCHMARK 3

B3: Prototype Design

Group submits:

- Revised blueprint
- Final Prototype

Individual submits:

- Prototype test results

[Team Conference for Benchmark Check](#)

**see Assessment Practices for Conferencing and Running Rubric Cards*

SCAFFOLDING

- [Praise, Question, Suggestion](#) protocol for Presentations
**See Learner Centered Practices: Praise, Question, Suggestion Card*
- Written/Oral Communication Workshop
- Revision based on feedback

Ongoing Scaffolding: Oral communication workshops/breakouts and "Mindful Moments"/"Community Circles"



BENCHMARK 4

B4: Final Design

Group submits:

- First draft of presentation

Individual submits:

- 2nd draft of written task

[Team Conference for Benchmark Check](#)

**see Assessment Practices for Conferencing and Running Rubric Cards*

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CREATE THE PATH (Continued)



Project Phases: Benchmarking & Scaffolding



PROJECT PHASES: SCAFFOLDING AND BENCHMARKS

SCAFFOLDING

- Revision based on feedback
- Written/Oral Communication Workshop



CULMINATING PRODUCTS

Final Product: Presentation

Group submits:

- Presentation with Final Blueprint for animal structure

Individual submits:

- Assembly instructions for designed animal structure

OR

- Persuasive argument for why animals should be protected during dangerous weather

Feedback using rubric

REFLECTION

Allow group members to assess each other on the Peer Collaboration Tool in Echo
Gather Feedback on Project from students using the Critique Card in the Assessment Practices Card Set

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CREATE THE PATH (Continued)



Project Calendar



PROJECT CALENDAR

DAY 1

Project Launch

Knows/NTKs/Next Steps & Problem Statement

Measure your Mindset Survey

[Design Plan Checklist](#)

DAY 2

[Community Circle](#)
→ [Establishing Community Agreements](#)

[Gallery Walk: Applying Thermodynamics to Animal Structures](#)

[Types of Energy Concept Map](#)

[Start Blueprint/Review Blueprint Checklist](#)

DAY 3

[Mindful Moment: Cooling Conduction](#)

[Investigating Insulators: Conduction and Convection](#)

Add to Types of Energy CMAP and/or Apply lab data to Blueprints

DAY 4

[Benchmark 1 Due Community Circle](#)
→ [Mood Meter](#)

[Mindful Moment: Relaxing Radiation](#)
[The Effect Radiation has on Different Colors \(Lab Options\)](#)

Add to Types of Energy CMAP and/or Apply lab data to Blueprints

DAY 5

[Community Circle](#)
→ [Dream Pet](#)

Writing Workshops: Informative vs. Persuasive

Choose one and start outline: assembly instructions or persuasive argument

Work on outline

Benchmark 1 Due

Cold Cats & Hot Dogs



CREATE THE PATH (Continued)



Project Calendar



PROJECT CALENDAR

DAY 6

[Community Circle → The Incredible 5 Point Scale and Cold Pets](#)

Connection with local animal shelter
Guest Speaker Exit Slip

Blueprint revision based on connection

DAY 7

[Mindful Minute → Peaceful Popcorn](#)

Popcorn Lab: Which Type of Heat Transfer Pops Popcorn More Efficiently?

Work on instructions or persuasive argument

DAY 8

[Community Circle → How Animals can Teach us "Teamwork"](#)

Connection with animal care experts
Exit Slip: "I used to think...After 2nd Community Connection"

DAY 9

[Mindful Minute → Breathing Lava](#)

Card Sort: Examples of Heat Transfer

Writing Workshop

*First draft of assembly instructions or persuasive argument due

DAY 10

[Benchmark 2 Due Community Circle → How Empathetic is your Dog?](#)

Finalize Prototype Materials Checklist

Finalize blueprints

Blueprints due

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CREATE THE PATH (Continued)



Project Calendar



PROJECT CALENDAR

DAY 11

Mindful Moment
→
Rainbow Breathing

Connection with engineering experts

Exit Slip: "I used to think, Now I think...After 3rd Community Connection"

Work on presentations/ prototypes

DAY 12

Community Circle and Storytelling →
Applying Persistence to FAILs

Start building prototype based on blueprints

Work on presentations/ prototypes

DAY 13

Mindful Minute →
Turtle Tracks

Finish building prototype

Praise, Question, Suggestion on prototypes

Work on presentations/ prototypes

DAY 14

Community Circle on Storytelling →
Helping Hands

Test prototype using thermal technology under various conditions

Work on presentations/ prototypes

DAY 15

Benchmark 3 Due
Mindful Minute →
Infinity Breathing

Revise blueprints/prototypes based on test results

Work on presentations/ prototypes

Benchmark 2 Due

Cold Cats & Hot Dogs



CREATE THE PATH (Continued)



Project Calendar



PROJECT CALENDAR

DAY 16

Community Circle
→ Your Animal Side

Re-test prototype under same conditions

Make revisions if necessary

DAY 17

Benchmark 4 Due
Mindful Minute → City Sounds

Praise, Question, Suggestion on presentations

Make revisions to presentations

*First draft of presentation is due

DAY 18

Community Circle
→ The Importance of Perseverance

Oral/Written communication workshops as needed

Last minute revisions to written or performance tasks

Final instructions or persuasive arguments due

DAY 19

Mindful Minute → Joyful Jar

Oral/Written communication workshops as needed

Last minute revisions to written or performance tasks

Final Presentations are due

DAY 20

Community Circle
→ Your Perfect Place to Live

Present blueprints/ prototypes to predetermined panel of community experts (engineers/animal care/etc.)

Benchmark 3 Due

Cold Cats & Hot Dogs



ASSESS YOUR PROJECT BEFORE LAUNCH

You're almost ready! Now, take a moment to pause and reflect and ask for feedback from colleagues before launching your project. Revise your project as needed.

PROJECT DESIGN CHECKLIST

Use the checklist to do a self-assessment of your project idea and plan. You may need to revise your project plan after conducting your self-assessment.

PRINCIPLES OF PBL: SECONDARY

- Determine high impact standards and Learning Outcomes for the foundation of your project's design.
- Create a driving question/problem statement
- Design an authentic scenario (problem to solve) that will require students to master the standards and outcomes you chose, keeping in mind relevance to students' lives, community and the discipline of study
- Create an entry event that will introduce the project, generate student curiosity and interest, and elicit need to knows.
- Determine benchmarks that will serve as performance assessments and lead to the final product/s.
- Determine scaffolding that will support student mastery of standards and outcomes and lead to the benchmarks and product/s.
- Design opportunities for students to collaborate with peers and adults.
- Create rubrics that allow you and students to assess progress towards mastery of standards and outcomes

SOLICIT PROJECT FEEDBACK

Before implementing the project, it is helpful to get peer feedback on your project plan. To help focus the conversation, consider what questions / ideas you are grappling with. Allow time for your own reflection – what new insights did you gain? What might you revise? See space for feedback on the following page(s).

Try using the **PRAISE, QUESTION, SUGGESTION PROTOCOL** (below) from the [Learner-Centered Practices Card Set](#) to engage in feedback on your project plan.

PRAISE, QUESTION, SUGGESTION PROTOCOL



What?

A process to provide constructive peer critique

Why?

To offer critique and feedback in preparation for revision of work. It should be used after a draft of what will become a finished product is complete. The focus is on offering feedback that is beneficial to the author.

How?

BEFORE YOU BEGIN:

- Provide agreements/norms for engaging in critique and feedback (See "Critique" in Assessment Practices)
 - Provide time guidelines to keep feedback effective and focused.
 - Feedback can be written on sticky notes/supporting document and given to the author.
1. **Provide product descriptors and rubrics** as clear guidelines of the expectations and criteria for the piece of work that will be critiqued. (example: a particular section of the project rubric.) If the work is written, providing copies for the critique group is helpful.
 2. **The first participant presents a draft** of his/her work and offers a focus question(s) to the group.
 3. **The group provides specific praiseworthy comments** that help the presenter with his/her work.
 4. **Next, the group asks clarifying and probing questions** to get a better understanding of the presenter's work.
 5. **Lastly, the group offers helpful and specific suggestions** based off of the criteria from the descriptors and rubrics. Feedback should relate to the focus question(s) identified by the presenter.
 6. **After each member of the group has offered feedback**, the presenter thanks the group and reflects aloud on suggestions he/she wants to implement.
 7. **Others then present their work** in turn and cycle through the feedback process.

GO DEEPER

EL Education: "Management in the Active Classroom"

<https://modelsofexcellence.ededucation.org/resources/strategy-praise-question-suggestion>.

Learning Outcomes Icon Appendix

For use in the “Learning Outcomes” column on page 3. Copy and paste the appropriate icon into the column on the left.



Knowledge & Thinking



Oral Communication



Written Communication



Collaboration



Agency