Annotated Time for Recess IEA

The following task was designed to test SCALE's Criteria for 21st Century Science Performance Assessments, a set of design criteria that we developed to incorporate advances in research on teaching and learning into our design process. Our design process required that all of SCALE's current Design Criteria for Science Performance Assessments were met, in addition to at least one element from each category of the new criteria. This task demonstrates that the use of all categories of the 21st Century criteria results in a long, complex task. We might expect a single assessment used in a classroom to attend to only two or three, though in a system of assessments that includes two or three tasks like this over a year, each might attend to a different subset of the 21st Century criteria.

The task is not aligned to one specific elementary school performance expectation. Instead, it elicits evidence of how students use third grade practices, core ideas, and crosscutting concepts together as they are necessary to make sense of the phenomenon and design a solution. This table provides a map of the parts of the task that will show evidence of students using each dimension. Teacher-facing and student-facing rubrics accompanying the task would describe the multidimensional performances being assessed at specific points and guidance for using the task to evaluate students' progress.

Products to Be Assessed	Performances Assessed	Alignment to NGSS Dimensions
Group Product 1: Design a new communication strategy for recess transitions.	Design a solution to a problem using information about how groups interact to change behaviors in response to changes in the environment.	**ETS - Defining and Delimiting Engineering Problems:** Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. **DCI - Social Interactions and Group Behavior**: Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size **CCC - Cause and effect** relationships are routinely identified, tested, and used to explain change.
Group Product 2: Plan and conduct a test of the new communication strategy to decide which groups' strategy, or combination of strategies best met the criteria and constraints.	Plan and conduct an investigation to evaluate how a communication strategy designed to change group behavior meets criteria and constraints to improve on current strategies.	**SEP - Plan and conduct an investigation** collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. **DCI - Social Interactions and Group Behavior**: Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size **CCC - Cause and effect** relationships are routinely identified, tested, and used to explain change.
Individual Product Propose an improved transition process for recess supported by data collected from testing groups' solutions	Construct an argument about how animal behavior can be used to improve groups of students' transition from recess.	**SEP - Engaging in argument from evidence: C**onstruct an argument with evidence, data, and/or a model. **DCI - Social Interactions and Group Behavior**: Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size **ETS - Optimizing the Design Solution:** Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints.

Name _____ Date _____

Time for Recess!

Introduction

What's your favorite part of the school day?

You may have thought about going to recess. Did you know that there are laws in many states that require students to receive at least 20 minutes of recess a day?

Includes alternative ways students can be evaluated

the entire task can be made available in different languages (using google translate) or teachers could consider offering translated versions of early parts and supporting students in moving to English versions when they are ready, particularly when they sufficiently understand the problem and context. Teachers can also use Google translate to read student

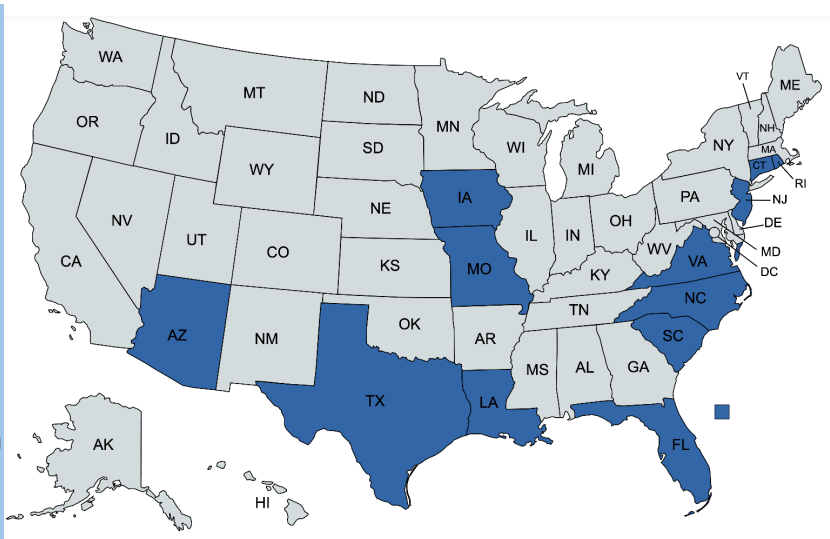


Figure A: 12 out of the 50 U.S. States have recess laws.

Recess must be important if 12 states have laws that require recess in schools. Research shows that recess helps students:

1) Learn in school
2) Focus in class
3) Feel less stressed
4) Resolve conflicts and work as a team with their peers

Why is recess important to you?

Define the problem (Whole Class)

Problem: Sometimes students and teachers have challenges with the **transition** from recess back to class. When a class has problems with transitions, recess time can get shortened, students and teachers can get frustrated or upset. These emotions can work against the positive effects of recess, and make students feel less ready to learn when returning to the classroom.

Investigate! You will conduct interviews with people in your class and your school community to find out: **what are some problems that different people have with the transition from recess back to class**?

The whole class discusses the problem and decides on questions to use to interview diverse members of the school community to understand different experiences people have with transitions. The goal of these interviews is to elicit a range of perspectives about this problem that will be used to define the criteria and constraints of the solution. As a class, students make a chart summarizing the different problems the class and other people in the school community have with the current way transitions are done and they decide on 1-2 (e.g. wanting transitions to be faster, quieter, less conflict, increase accessibility, more inclusive or efficient ideas for moving during transition, etc) they want to focus on for their solution.

Requires critical analysis of diverse perspectives

Students use interviews to bring their awareness to a wide range of perspectives on the problem they will work to solve, including stakeholders

Identify the problem with transition from recess back to class that your class has decided to solve. Explain why it is a problem.

Challenge: How can you use communication strategies inspired by animals to help solve your class' recess transition problem?

During this task, in groups you will:

- Learn about animal communication strategies
- Identify a new communication strategy inspired by the ways animal communication
- Conduct tests to compare how successful the different strategies are at solving the recess transition problem

Individually, you will:

- Propose the best strategy, supported with evidence, for improving how your class communicates during transitions from recess back to class

Engages students in making sense of problems that are consequential to different students and their community
Students focus on solving a problem where they will have the opportunity to see and experience the impact of their solution every day and continue improving on it after the task is completed

Part A. Learn about animal communication strategies to help solve the problem (Whole Class)

Scientists sometimes use **biomimicry** to help solve problems. Biomimicry is when people learn from and mimic nature to solve their design challenges or problems.

Our Design Challenge: We need a new communication strategy that can help us improve our transition from recess back to class. Let's look to animals for inspiration!

Teacher introduces information from a text and shows the class a video about how bees communicate through the waggle dance to prepare groups to play the game. Teacher gives each group a flower or colorful piece of paper to represent a food source to hide as part of the game. After each group completes the game, teacher facilitates group discussions and completion of the Animal Communication Reflection Chart.

Use what you learned about how bees communicate to play the Animal Communication Game with your group.

Play the Animal Communication Game .

1. Select one group member to be the bee who found a flower with lots of pollen. Give this bee the flower. This is Bee #1. The rest of the group members will be worker bees at the hive, Bee #2, #3 and #4. .
2. Bee #1 should go and hide the food source (flower) somewhere in the classroom while the other bees hide their eyes. Bee #1 then returns to the group.
3. Bee #1 will use the communication strategy from bees - the waggle dance - to show the other bees in their group where to find the food.
4. Optional: Repeat this game so that each group member can be Bee #1 and practice communicating like a bee.

Rules:

1. No talking like humans!
2. Work together as a group!

Group Discussion and Reflection.

Discuss and complete the chart below as a group. Be sure to encourage each person to share their ideas before recording the group's responses.

Animal Communication Game Reflection Chart

The animal we were learning from to help solve our problem was the bee.

How did your group communicate with each other like bees during the game?

How did this animal communication strategy work for your group?

Describe how this strategy helped your group communicate and work together to successfully find food.	Describe how this strategy did not work or was a challenge for your group.

Encourages meaningful collaboration

Assessment supports development of group work skills where students reflect on how they worked together to solve their problem and how they can learn from what worked well and what didn't work will to construct a solution to the problem

Reflect on your group's communication and group work skills. Each person in your group should share how they think using this strategy from bees helped you communicate with each other and work together as a team.

Describe one way you think this communication strategy might help improve your class transitions back from recess.

Part B: Plan and test your communication strategy to solve the problem (Whole Class)

We are going to work in groups to design a new communication strategy to improve transitions from recess.

The teacher supports the class in reviewing together the transition problem recorded in Part A and the concerns shared by stakeholders. The class decides on the criteria and constraints for solving this problem. Optional scaffold: the teacher may want to start the list with one criteria and constraint and have students add to the list (e.g. criteria: if transition needs to be faster, criteria is that the transition time is short, constraint: strategy needs to be inspired by an animal).

Planning Our Test.

Complete each step below to create our class plan.

Step 1: Review the problem that your class has decided to solve (Page 2).

Step 2: List the criteria and constraints that your class decided will be used for the communication strategies. Later, you will use this chart to see how well different animal strategies meet the criteria and constraints to decide which to test as a group.

Promotes student agency

students decide on the problem, the criteria and constraints for addressing it, and data collection methods. Students don't do this on their own, but they have agency over the decisions that are made about what success looks like.

Plan to Test Our Communication Strategies Decide if each animal meets the Criteria and Constraints by checking the box		
Criteria	**Animal #1 Name:**	**Animal #2 Name:**
1.		
2.		
3.		
Constraints	**Animal #1**	**Animal #2**
1.		
2.		
3.		

Step 3. All groups will need to collect data to compare how well the communication strategies meet the criteria and constraints. List the data your class decided you will collect and describe how you will collect the data.

The Teacher's Guide would have examples of common criteria and constraints and types of data and methods to give the teacher ideas about how to support students in using criteria and constraints to identify the data needed. For example, if students decide transition time needs to be shorter, data could be the time it takes to transition and they could use stopwatches to time the time between when the end of recess is announced and when students are in line. Or if a criterion is that students want less conflict during the transition the data could be a survey where students rank their experience from 1 (low conflict) to 5 (high conflict). Teacher supports would include lists of low tech (e.g. survey students by representing their response with their fingers) and high tech tools (using cell phone decibel meter to measure noise during a transition).

Data	Methods

Includes alternate ways students can be evaluated

Books may be available in text with pictures, audio, and in multiple languages so students have various ways to access the information.

Part C: Design a communication strategy to solve the problem (Groups)

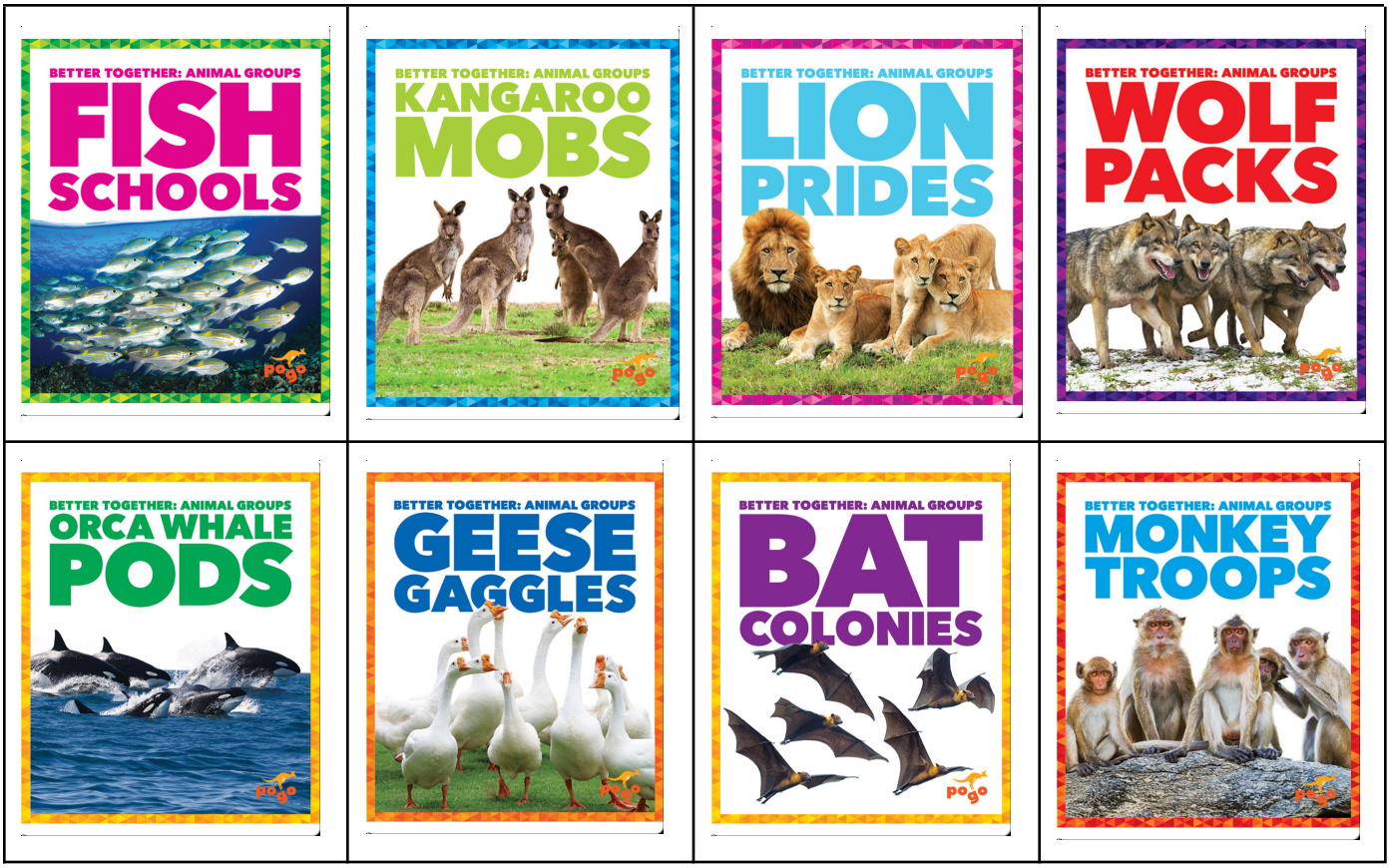
Your group will use the books below to learn about the different ways animals communicate. After recording what you learn in a graphic organizer, your group will decide which strategy to test as a solution to your class transition problem. You will need to consider how each strategy meets the criteria and constraints from Part B as part of your decision-making process.

Teacher places students in strategic groups of four, considering cultural and linguistic assets, including English Learners of varying proficiency levels for translanguaging opportunities.

Encourages meaningful collaboration

Strategic grouping creates opportunities for students to support and learn from each other as they gather information from texts.

Step 1: Each group should choose 2-3 books from the books provided below.



Step 2: As a group, work together to read each book you have selected and record information on the Communication Strategy Graphic Organizer.

Communication Strategy Graphic Organizer

Name of Animal	Identify the communication strategy	Describe how and when animals communicate	List 1-2 ways this strategy could help solve the class transition problem
Animal 1 is:			
Animal 2 is:			

Encourages meaningful collaboration Teachers may have students read independently, in pairs, or in groups. Students engage in collaborative knowledge building by sharing what they learned from the books and using information from all of the texts to decide on a strategy together.

Step 3. Decide as a group which animal communication strategy you will test.

- Review the communication strategies for Animal 1 and Animal 2 for your group using the Plan our Test Chart in Part B. Decide how well each strategy meets the criteria and constraints of the class transition problem.. Use the information you recorded in the graphic organizer to support your discussion.

Step 4. Use the information from reviewing the criteria and constraints, and the graphic organizer to compare the two communication strategies for your group. Discuss which strategy, or combination of strategies could be used to improve the transition from recess back to class. Identify that strategy below and explain why your group thinks this strategy will meet the criteria and constraints of the transition problem.

I think using _____(strategy)_____ from _____(animal)_____ is the best strategy because it...

Step 5. Create a video to explain your communication strategy. Your group will use this video to train a group of students from another class to test your strategy while you collect data on how it works. First, plan your video by recording notes about the questions in the table below.

Some students will benefit from increased scaffolding here to help them access this step, which gives them practice with a performance that is building toward the individual student product at the end of the task. Teacher's Guide would include optional scaffolds to introduce to students if groups completing Step 3 demonstrate that they would benefit from additional structure. Scaffolds include sentence frames, such as: We will use _____ strategy by _____ and this will help show students recess is over by____.

1. How will students use the animal's strategy to communicate to other students that recess is over?	
2. How is your communication strategy inspired by animal communication?	

How are you using this strategy in similar and different ways to the animal(s)?		Promotes student agency Students record videos in which they draw on the knowledge and communication skills in their group to discuss their use of animal communication strategies and how their solution meets the problem's criteria and constraints. Students have the opportunity to to hear how other students express their ideas, press each other for stronger explanations, practice communicating their own ideas, and get feedback from other groups before they do a similar written argument individually in Part E.
3. How does your strategy meet the criteria and constraints for the problem you are solving? (see Part B Steps 1 &2)		

Then, discuss your answers to the questions in the table with another team. Ask them:

- Is it clear how to use our strategy to communicate?
- Is it clear how the strategy was inspired by animal communication methods?
- Do you think it will meet the criteria and constraints?

Use the feedback from the other team to revise your notes in the table before you record the video.

Promotes student agency
The teacher supports the whole class in reviewing decisions about methods from Part B to co-construct a data collection sheet that all students will use to conduct data individually and to create a whole-class chart that all groups will contribute to. The Teacher's Guide will have sample data sheets and prompts to help the teacher support students' decision making.

Part D: Test the effectiveness of your communication strategy and compare it to other strategies. (Groups)

Now it is time to test your communication strategy with a group of students from another class. Use your team data collection sheet to record data for one transition. Then you will discuss with your class how the data collection methods worked and if you need to make any changes before the next two tests.

Step 1. Choose Roles for Group Members:

- Data collectors: Each type of data you are collecting needs one data collector.
- Recorder: Records data on the data collection sheet.
- Supporter: Helps the test group use the communication strategy.

Step 2. Conduct the first trial of your communication strategy. Record data in the first row of your data collection sheet. Then discuss with your group:

- ☐ What went well?
- ☐ What would you change?
- ☐ What questions do you have?

Each team tries collecting the data during the first test, but when they compare with other teams they will find that they made different decisions about the methods (e.g. exactly when to start and

stop timer). After the first trial, discuss variations in methods and what they mean for comparing the data across the class and across transitions. The class will discuss ideas about how they will refine their methods for the next two trials.

Navigate and make sense of information-rich environment

Students reflect on the significance of variations in data and refine their data collection methods to reduce differences in interpretation and application of methods.

Step 3. Discuss your data collection methods with your whole class. Did everyone collect data the same way? Did everyone record data the same way? Do any changes need to be made to your data collection methods so that the data from different groups can be compared?

Step 4. Conduct the second and third trials of your communication strategy using any changes to the methods discussed with your class in Step 3.

The teacher supports students in making sense of the data. They will use math skills to find the highest/lowest, fastest/slowest, average depending on the data that were collected. The teacher supports students reflecting about the changes in methods to reduce variability so they can compare.

Step 5. Each team will describe their communication strategy to the class and record their best trial into the class data comparison table.

Part E: Propose a New Communication Method for Your Class (Individual)
How can animal behavior be used to improve recess transitions in your class? Propose a communication strategy inspired by any animal (or animals) that a group in your class tried. In your proposal, include:

- ☐ A description of a new communication strategy and how it will help you improve your class recess transitions
- ☐ A description of how your strategy was inspired by an animal.
- ☐ Evidence from your class data
- ☐ Reasoning that describes how the evidence shows it is the best strategy for meeting the solution criteria and constraints.

Navigates information-rich environment

If the students are accustomed to using online programs for visualizing and analyzing the data, Step 5 could be done using tool like CODAP and the class can create graphs that help them use math skills (highest, lowest, average, mean) to compare the strategies.

Part F: Come to Consensus.

Listen to everyone's claims. Vote on a class communication strategy. Implement the communication strategy and reflect. How can it be improved? Continue to adjust your transitions to maximize your time for recess!

Engages students in making sense of questions that are meaningful
Students use their solution every day and can continue modifying and improving it. They can also share with other classes, other schools, and even use their solution with their families in crowded places and in other situations with similar communication constraints.

Many people contributed to the development of these assessments and design criteria through participating in focus groups, brainstorming sessions, and working on task development.

The Exploratorium Teacher's Institute

Ari Jamshidi	Lacy Szuwalski
Ben Daley	Louisa Rosenheck
Benjamin Lee	Mila Wesely
Cady Staff Hwang	Sabrina Poon
Daniel Damelin	Sara Dozier
G. Reyes	Sherry Hsi
Jim Malamut	Tamyra Walker
Justin Wells	Teresa Ortega
Karen D. Wang	Victor Lee
Katie Huang	Vinci Daro
Kozue Sofia Palaco	Zoë Randall