

## Kelly: Helping Students Understand Human Impact on the Natural Environment

*“A lot of my students created algorithms that I had never thought of creating, to do things that I never would have thought of!”*



### Devices

Multi-device, Windows laptops.

### Learning Goals

Environmental Impacts

### Classroom Profile

Kelly teaches 7th grade general science and advisory sessions at a large, diverse public middle school in Queens, N.Y. Her classes consist of approximately 30 students and include multilingual learners, general education, special education and honors students.

### Classroom Strategy

Students work on their own, using *The Pack* in the classroom and at home over a two-week period. They spend the first week getting acclimated to the game in class. During the second week, they explore environmental impacts in the game and discuss real-world examples.

### In Her Words

I allotted a week for the students to acclimate to the game and to form a relatively uniform level of experience across the class.

The class engaged in a range of activities, from moving the avatar away from water, removing water from a biome, removing a type of biome or tree from the world, and observing the effects of each creature on the environment. As environments or creatures disappeared, students became more conscious of the effects their actions were having. Based on these experiences, they made different decisions in subsequent games.

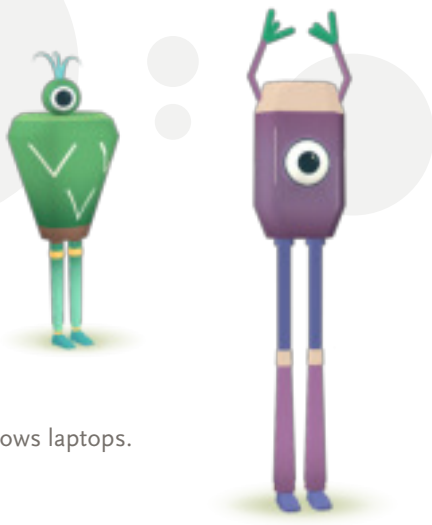
My goal was to use the game experience to help them understand how their actual decisions impact the real world. I hoped students would be able to see water as being the foundation of life, understand that access to water is not always guaranteed when moving through the world, and that different animals require different types of food from different types of environments to survive.

I want to use students' algorithms that helped restore environments in a broader discussion around conservation groups and how some humans are working to save the planet. In contrast, focusing on algorithms that destroyed environments could facilitate discussions around how human interactions impact habitats. These discussions could open into larger debates on the topics of human influences on environmental interactions in the real world.



## Kelly: Using Exploratory Games as Windows into English Learners' Learning

*"I can kind of see how their brain worked based off of how they played, and then target my instruction a little more to them. ... And I never would have known how to approach these students had I not watched them play."*



### Devices

Multi-device, Windows laptops.

### Learning Goals

Computational thinking, Environmental Impacts

### Classroom Profile

Kelly teaches 7th grade general science and advisory sessions at a large, diverse public middle school in Queens, N.Y. Her classes consist of approximately 30 students and include multilingual learners, general education, special education and honors students.

### Classroom Strategy

Students use *The Pack* in the classroom, working in small groups of 3 – 4. They use *The Pack* for one week, allowing Kelly to examine their interests and strengths in the context of computational thinking and environmental impacts.

### In Her Words

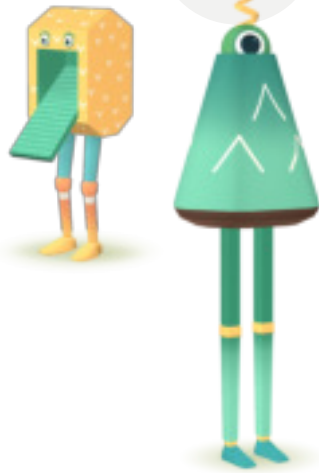
The added value of using an exploratory game like *The Pack* is that it allows you to understand students' learning styles and interests regarding environmental science concepts such as human impacts on environments, biotic and abiotic components of ecosystems, and the importance of water. This is especially important when teaching English Language Learners who don't always feel comfortable expressing their interests.

Spending the first week acclimating to the game allows me to observe my students' game playing strategies and identify which portions of the game they focus on (e.g., aesthetics, "broken" algorithms, exploring, collecting seeds and food, or water routing). After observing the students for the first week, I can use my understanding of their learning interests to design science projects and analogies that can help them stay engaged and excited about science. This involves me differentiating instruction based on students' expressed interests. For example:

- Students excited about the algorithms would spend time on the real-world application of computer coding and how the writing of algorithms is used.
- Students into seed searching would spend time on goal-setting lessons and how if you set small goals, you would be able to reach a bigger end goal.
- Students excited about food-gathering would further explore what foods grow in different environments and how each food grows best in a specific place. This would also involve challenging them to understand where and how food is grown and to see the impact of getting food products from far away versus nearby.
- Students excited about how they could change the biome would spend time on human interaction with the environment and how over time the planet has changed.
- Students enjoying moving water would learn about the pipe network that provides water to New York City and how this was created.

## June: Identifying Cause and Effect Relationships in Ecosystems

*“We try to keep writing with science also, I would add a writing component. We could have them write a letter to their friend, telling him what he needs to do if his resources are not there ... or they can draw a seed and write one sentence about it, and that it can be a cause-and-effect relationship, and that can incorporate art or drawing to help kids that may not want to write.”*



### Devices

Multi-device, mixed devices

### Learning Goals

Cause and effect reasoning

### Classroom Profile

June teaches 6th grade science and advisory period at a small, diverse 6 – 12 school in Brooklyn, N.Y.

### Classroom Strategy

Students use *The Pack* over 2 – 3 weeks in their advisory periods as a supplement to the ecosystems unit in science class.

### In Her Words

Many 6th graders and some 7th graders study biomes in their science class. The game provides an opportunity to connect creatures' interactions within different biomes and the environment with real world conditions. Students can explore characteristics of a biome and compare it to other biomes. The game compliments my hands-on exploratory teaching approach and enables students to try out different actions in the world.

We played the game in segments that support each standard I teach, rather than engaging in a longer gameplay experience. I used *The Pack* in my third unit of 6th grade, during discussions about ecosystems. The standards the game supported are:

- Analyze cause and effect relationships that may be used to predict phenomena in natural or designed systems. (MS-LS2-1)
- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)
- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)
- Identify cause and effect relationships. (MS-LS2-2)

I used the game over 2 – 3 weeks in my advisory period. Students identified and analyzed cause-and-effect relationships since they could clearly see the connection between their actions and the resulting effects on the environment. I used the game to highlight how organisms are dependent on their environmental interactions with other living and nonliving things, tying in the avatar's need for water and the creatures' need for food to their survival.

## Jessica: *The Pack* as an Introduction to Computational and Sequential Thinking

*“I teach a middle school science research class and I see the game fitting into that curriculum ... especially building computational skills in this group because a lot of them are using coding and writing programs to enhance their research.”*

### Devices

Multi-device, MacBooks

### Learning Goals

Computational thinking

### Classroom Profile

Jessica teaches 9th and 10th grade general education, honors and AP students at a small K – 12 private school in Westchester County, N.Y. She used *The Pack* in her general education 9th and 10th grade science classrooms.

### Classroom Strategy

Students use *The Pack* in their computational biology class for two class periods (40 minutes each) at the beginning of the semester. *The Pack* is used as a tool to introduce students to computational and algorithmic thinking, designing an investigation, and thinking in sequential processes.

### In Her Words

The creatures and their functions are the most relevant part of the game for this class. The game serves as a transitional tool to develop computational skills and algorithmic thinking.

Before playing *The Pack*, I first introduce the students to algorithms, the computational thinking method of problem solving, and designing an investigation. Then I teach students to think in a sequential processing manner that would hopefully lead to more organized lab reports.

Using visuals from the game, I introduce students to the game environment, the creatures and their functions. Then the class discusses how they could use their creatures to build algorithms, what creatures are needed to perform certain complex functions, and hypothesize on the possible outcomes of various combinations of creatures.

My intention is to encourage players to think about individual functions and how they could be used together to solve a problem, something that is core to computational thinking. I suggest that the students sketch the algorithms, discuss with their partners how their solutions might work, and then rework their algorithms based on their discussions. After all of this, the students can test their solutions in the game.



## Jenny: *The Pack* as a Tool for Learning Organized Thinking

*“They learned to see patterns in the world ... Recognizing patterns is definitely part of computational thinking.”*

### Devices

Multi-device, platform depends on at home availability

### Learning Goals

Organizational skills

### Classroom Profile

Jenny teaches 6 – 8th grade general education students in advisory at a large public middle school in New York City’s borough of Manhattan.

### Classroom Strategy

Students use *The Pack* at home and in advisory over the course of a semester, doing daily check-ins with Jenny in class about their personal progress.

### In Her Words

I see *The Pack* as a skill-building platform, something that students could play for the week in open-ended exploration. As a science teacher, I teach kids to analyze a problem and organize and follow procedures to achieve a specific goal. Coming from elementary school, kids are all over the place with their organization skills. *The Pack* could be a tool for learning to organize.

My implementation is a guided use of the game, and takes place over a semester in my 45-minute advisory periods. Students also have the option of playing during their lunch period. Their overall goal is to find the most seeds possible in the shortest time possible by maximizing their algorithms.

*The Pack* can be used to develop students’ organization, time management and problem-solving skills by playing the game and tracking various elements (time played, food collected, biomes discovered, levels completed, seeds collected, creatures collected, algorithms created, general observations, and more). During our daily check-in, we review what they had accomplished compared to previous days, and reflect on their time management practices, efficiency of their algorithms, or other goals that we set.

The goals and activities for this advisory-based reflection are tailored to each student’s needs and level.

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Time Started							
Time Ended							
Number of Food Collected (by Type)							
Number of Biomes Discovered							
Levels Reached							
Number of Seeds collected							
Number of Creatures (by Type)							
Number of Algorithms Created							
Time Difference Compared to Previous Day							
New Discoveries							