Researchers

Once the game designers delivered the Alpha prototype, we were interested in finding out if children were excited to play the game, interested in continuing to play it, and if they understood the mechanics (how to find food, how to invite the animals to join their pack, how to navigate the world, etc.).

To get at these questions, we invited children in the target age range who were visiting the museum with their parents to play the game. We had children verbalize what they were thinking as they played.

We found that the children enjoyed playing the game, understood the goal of the prototype (feed the creatures to get them to join your pack), had difficulty figuring out how to feed the creatures initially, and wanted to continue playing the game.

To integrate computational thinking into the game, the designers planned to use the animals as pieces of code. Each animal would have its own function. When placed in a line with other types of animals, their functions could work together to complete a task. To carry this out, it was important that kids be able to infer possible functions or tasks that an animal can complete, based on their appearance.

To test kids perceptions of the drawings, we showed them images of the animals after they had played the game. We asked kids to tell us what they would call each animal and what they thought it would be good at.

We were able to confirm that the kids understood that these animals could have different roles in the game and different functions that they were best at.

CREATURE	GAME DESINGERS		KIDS	
	Name	Function	Name	Function
	Bumper	Bump into things and knock them over	Zombie, Lion-Elephant	Could be ridden, were strong and solid, could knock down obstacles
	Flipper	Flip things over	Beaver, Platypus	Thought it could cut down trees, make a big splash, slap things
	Night Lighter	Provide light at night	Flashlight guys, Lanterns	Glow in the dark, make it less dark around you, scare people

A Pack to Create *THE PACK*: How Multiple Perspectives Can Inform Digital Game Development

Tara Chudoba and Amanda Jaksha, The New York Hall of Science

The New York Hall of Science (NYSCI) is undergoing the entrepreneurial task of developing a digital version of NYSCI's award-winning 2,300-square-foot *Connected Worlds* exhibition. The game, *The Pack*, is an example of how NYSCI's projects are moving beyond the walls of a physical building to expose more people to our Design, Make, Play pedagogical approach to STEM learning. The game will integrate the complex topics of computational thinking and environmental science. The design-based research process can be used to inform the interactive design of product from the perspective of three different team members: pedagogical designer, researcher and design teachers.

Pedagogical Designers

The goal of pedagogical designers is to keep learning and developmental appropriateness in mind as the project progresses. In the process of developing the game, we continually think about extensions for educators and how the game might be used to support teaching and learning of these more complex topics: computational thinking, environmental systems and systems thinking.

Core concepts and skills promoted by *The Pack*

Computational Thinking Concepts:

- If/Then
- Repeat loops
- Modifiers
- Counters
- While loops
- Sequences

Computational Thinking/ Systems Thinking Practices:

- Decomposing the problem
- Seeking repeated patterns
- Reusing
- Repurposing
- Debugging
- Troubleshooting
- Seeing circular relationships of parts to whole

Environmental Systems:

- Feedback loops
- Trade offs
- Tipping points
- Delays
- Changes over distance and time

Design Teachers

At our kickoff meeting, classroom teachers were tasked with creating a word web, showing their current thinking about computational thinking and environmental science and the ways they may intersect.

"Make a web showing your current thinking about computational thinking, environmental science and the way they may intersect."

To find out more about how teachers currently teach the required environmental science content in middle school, we conducted in-depth interviews with individual teachers. In addition to having teachers explain their curriculum, we asked them to identify the content areas that are most difficult to teach. This information is allowing us to create a game that meets teachers' actual curriculum needs, rather than creating a game that focuses on content that is easy to teach without technology.

Design Teachers Interviews

Areas of need identified by teachers:

- Drawing conclusions from data
- Change over time
- Climate vs weather
- Systems and balance of system
- Species diversity

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