

I-SMART Goal 2

Scenario-based Tasks

Chapter 2: Testlet Co-design

Overview of Chapters

1. Introduction
2. Testlet co-design
3. Testlet prototype walkthrough
4. Think-aloud study
5. What we learned

I-SMART Goal 2

Design, develop, and evaluate learning map model-based assessments that incorporate science disciplinary content and science and engineering practices in highly engaging, universally designed, technology-delivered formats.

Focus of This Study

- Co-design and evaluate testlets for “secondary population” students
- Scenario-based tasks to evaluate range of depth of knowledge (DOK)
- Deeper application of UDL principles
- Greater emphasis on formative use of instructionally embedded testlets



Why co-design?

Co-design for equity and agency

Co-design gives students a say in how they want to show their learning and interact with concepts.



Co-design for formative feedback

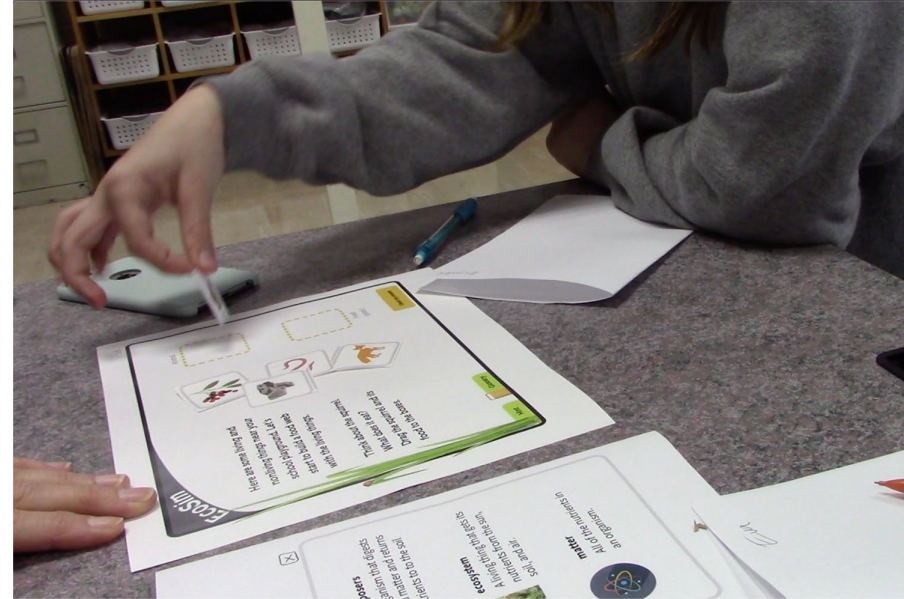
Lower fidelity (rough) prototypes

- invite feedback and out-of-the-box thinking
- make thinking and learning visible for everyone — designers, researchers, students



The co-design process

1. Rough concepts
2. Two rounds of paper prototypes
3. Refined & coded interactive prototypes



1. Rough concepts

Rough concepts leveraged UDL to provide students multiple means for students to demonstrate their knowledge, skills, and understandings.

5 Node 1

When the ecosystem is balanced, many organisms live in it, as you can see in this food web.

- Drag the shark's prey into this food web.
- If the shark population declines, the prey population (increases/decreases)

Third level consumer
Second level consumer
First level consumer
Producer

Hint Check my answer

6 Node 3

The tuna eat smaller fish.

- Drag and drop a first consumer into the food web.
- If the shark population declines, the population of first consumers (increases/decreases)

Third consumer
Second consumer
First consumer
Producer

Hint Check my answer

7 Node 3

Krill eat plants.

- Drag and drop the producer the krill eat.
- If the shark population declines, the population of producers will (increase/decrease).

Third consumer
Second consumer
First consumer
Producer

Hint Check my answer

9

Population graphs help ecologists understand changes in animal populations over time.

- Start the simulation to see the change in the tuna population (y axis) over time (x axis).
- Overtime, what happens to the tuna population? (increase & decreases)

Start simulation

simulation

Hint Check my answer

10 Node 2

When the **shark** population has been added, you can see how the shark and tuna populations depend on each other.

- When the tuna population (increases/decreases), then the shark population (increases/decreases)

Hint Check my answer

11 Node 2

Other factors also influence the tuna population.

- Select an environmental factor to see how it changes the population graph.
- The (environmental factor) causes the prey population to (increase/decrease/no impact)

Hint Check my answer

13

What is happening to the population of sharks over time in this graph?

- First, the population... (increases/decreases)
- Then, the population... (keeps rising/levels off)
- Next, the population... (increases but slower)
- Finally, the population... (levels off)

Hint Click on this video to learn more. (CC video)
Click on this Storyboard to learn more (1, 12a).

15a Storyboard: Carrying Capacity

There is a small shark population.

A small shark population moves into a new area and establishes itself.

Which statement best describes the situation?

Hint Click on this video to learn more. (CC video)
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15a Storyboard: Carrying Capacity

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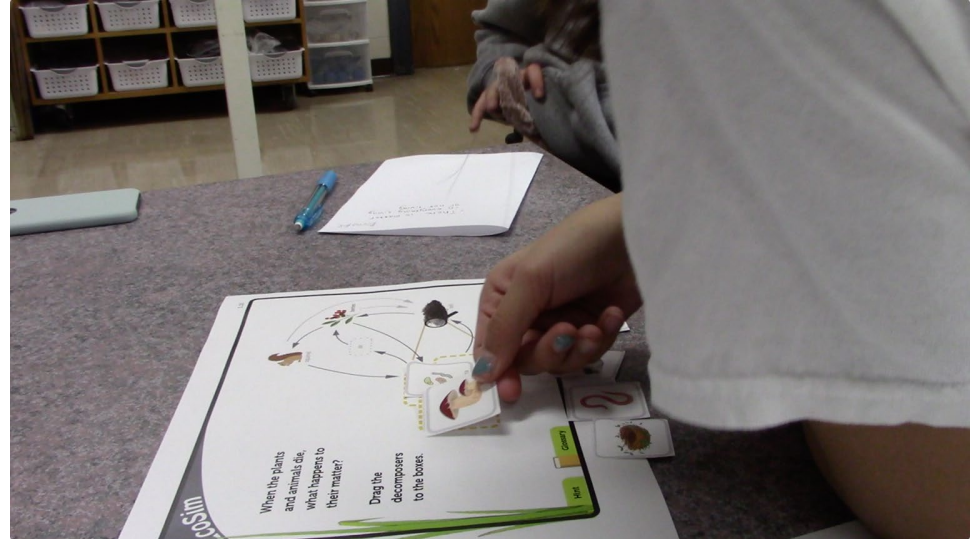
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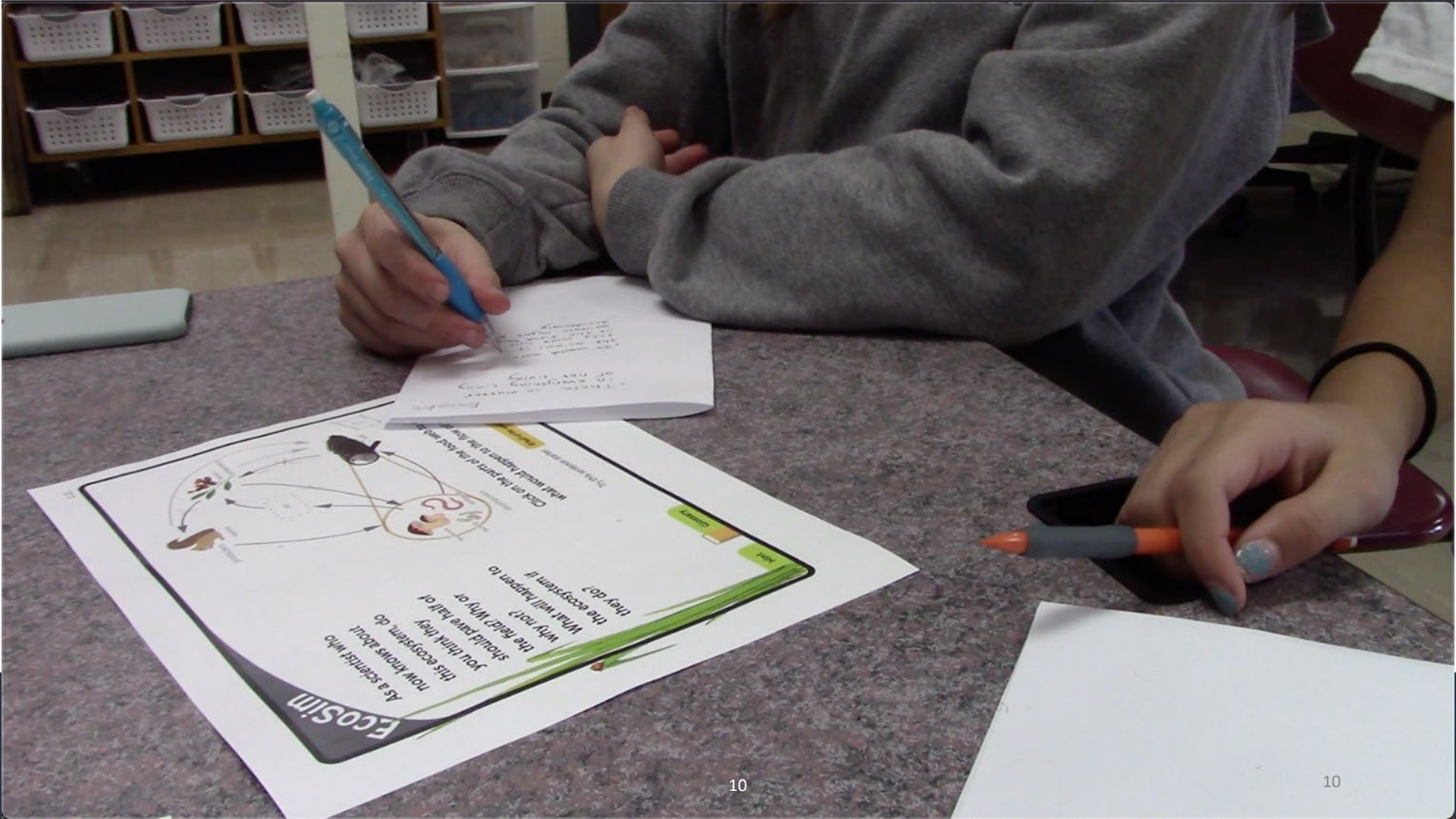
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2. Paper prototypes

The students operated on two rounds of paper prototypes, providing us with formative feedback and new ideas.





To help the principal decide whether to pave the field, let's explore this ecosystem like a scientist. Here's a food web for this ecosystem. Explain what is going on with the plants, animals, decomposers, soil, and air. Why are there arrows?



Hint




3. Refined & coded prototypes

Refined
prototypes were
then coded for
cognitive labs
(think-alouds).


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

EcoSim


**Population condition 3:
Finish the graph**



1.
There is plenty of food and space for the sharks to live and reproduce.



2.
There is increasing competition between sharks for food and space.



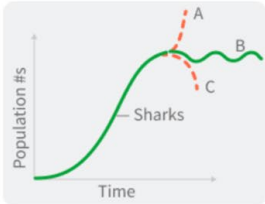
3.
The shark population maxes out.

Choose the graph segment that describes a population that has leveled off, but continues to rise and fall a little.


A - Shark population begins to grow exponentially again.

B - Shark population levels off and fluctuates cyclically.

C - Shark population declines rapidly.




Check my answer



?

Hint

Glossary



I-SMART

What we learned from students through co-design

- Tease out authentic scenarios
- Provide choice
- Capture deep thinking
- Lower barriers to interactive interface
- Make work products readily available



Next Up ...

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