

Working through an example: Using one set of standards to help plan for instruction



This is a “shake-down” cruise for us



- How can we begin helping teachers make sense of a set of performance standards?
- How could we begin unit planning, based on the performance standards?
- You should consider re-inventing what I am doing with you today

Performance Standards

If you try to address all of these performance expectations...
you will go crazy

If you treat the performance expectations as separate and isolated activities in the classroom...
you will go crazy

You need to identify **core science ideas** and an **anchoring phenomenon** for students to study over an **extended period of time** that **“pulls in”** a number of standards.

This accommodates how the research says that students learn best.

MS.LS2 Ecosystems: Interactions, Energy, and Matter

[How to read the standards »](#)

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Students who demonstrate understanding can:

MS-LS2-a. Use a model to support explanations of an ecosystem. [Clarification Statement: Models may represent ecosystems in terms of change in populations and energy flow, food webs or food chains for various organisms, or the carrying capacity of ecosystems.]

MS-LS2-b. Ask questions to clarify the energy in similar ways. [Clarification Statement: Energy is obtained in various ways from the environment and is used to power biological processes.]

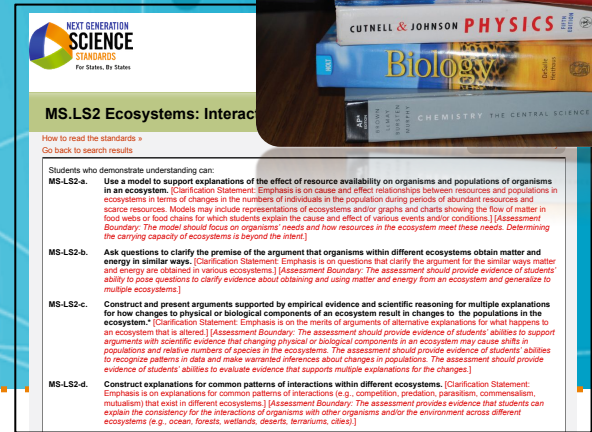
MS-LS2-c. Construct and present arguments for how changes to physical environments affect ecosystems.* [Clarification Statement: Arguments should be based on scientific evidence and include the populations and relative numbers of organisms.]

MS-LS2-d. Construct explanations for common patterns of interactions within different ecosystems. [Clarification Statement: Emphasis is on explanations for common patterns of interactions (e.g., competition, predation, parasitism, commensalism, mutualism) that exist in different ecosystems.] [Assessment Boundary: The assessment provides evidence that students can explain the consistency for the interactions of organisms with other organisms and/or the environment across different ecosystems.]

This is where a
focus on modeling
comes in, but
first...



Put your curriculum beside these standards, and let's start to prioritize



2 possible ways to start:

- We could work together and place the performance expectations in a logical order or...
- We could do a “card sort” to figure out the ideas with the most explanatory power.

Either choice is a way of finding the gaps in your own knowledge about the science—you'll hit the limit of your content knowledge very quickly, prepare for frustration control here.

Write down 10 of the most important science ideas from the standards or curriculum, one on each card.

Lay them out on the table, start to move some to the outside (less central ideas, not powerful ideas to help explain ecosystems) and some to the inside (ideas with more explanatory power).

Sentence starter: If my students understood that [one or two “core” ideas or relationships], they could basically understand most of these other ideas [ones on the periphery].

Card Sort

More power to explain other ideas

Better understood in context of other ideas in the “center”

Biodiversity
(adaptation, natural selection, niches...)

Human
Interaction/
Impacts

Systems
(Interacting, dynamic)
↓
parts interact or independent

disturbance

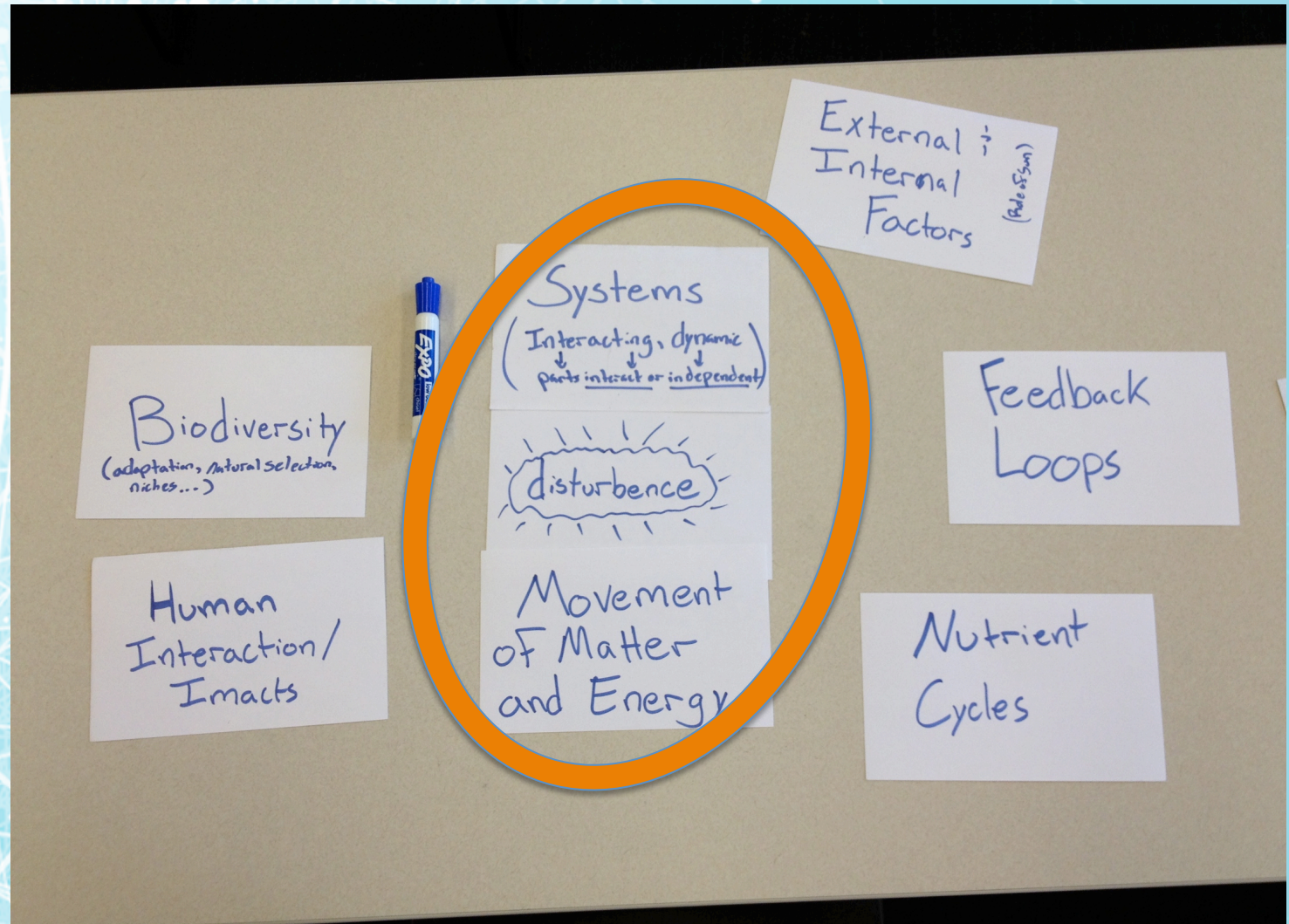
Movement
of Matter
and Energy

External ;
Internal
Factors (role of Sun)

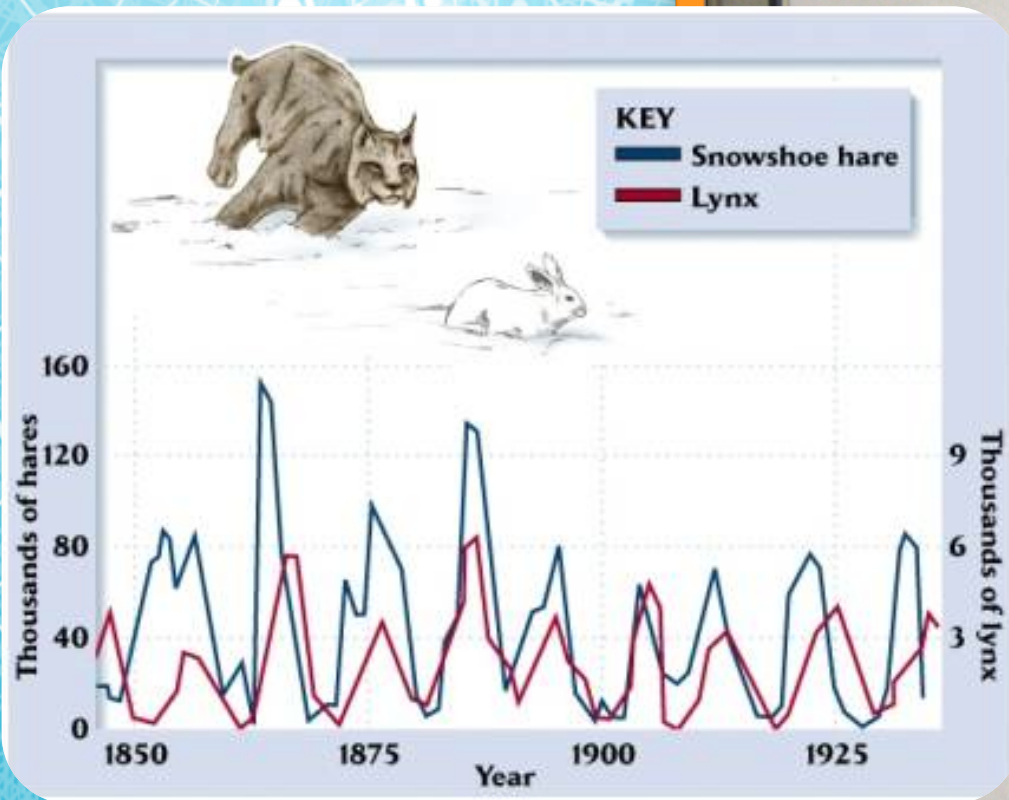
Feedback
Loops

Nutrient
Cycles

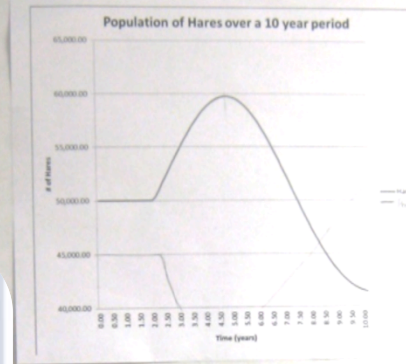
What kinds of anchoring phenomenon or event might allow students to explore the ideas at the center?



Bethany's Case

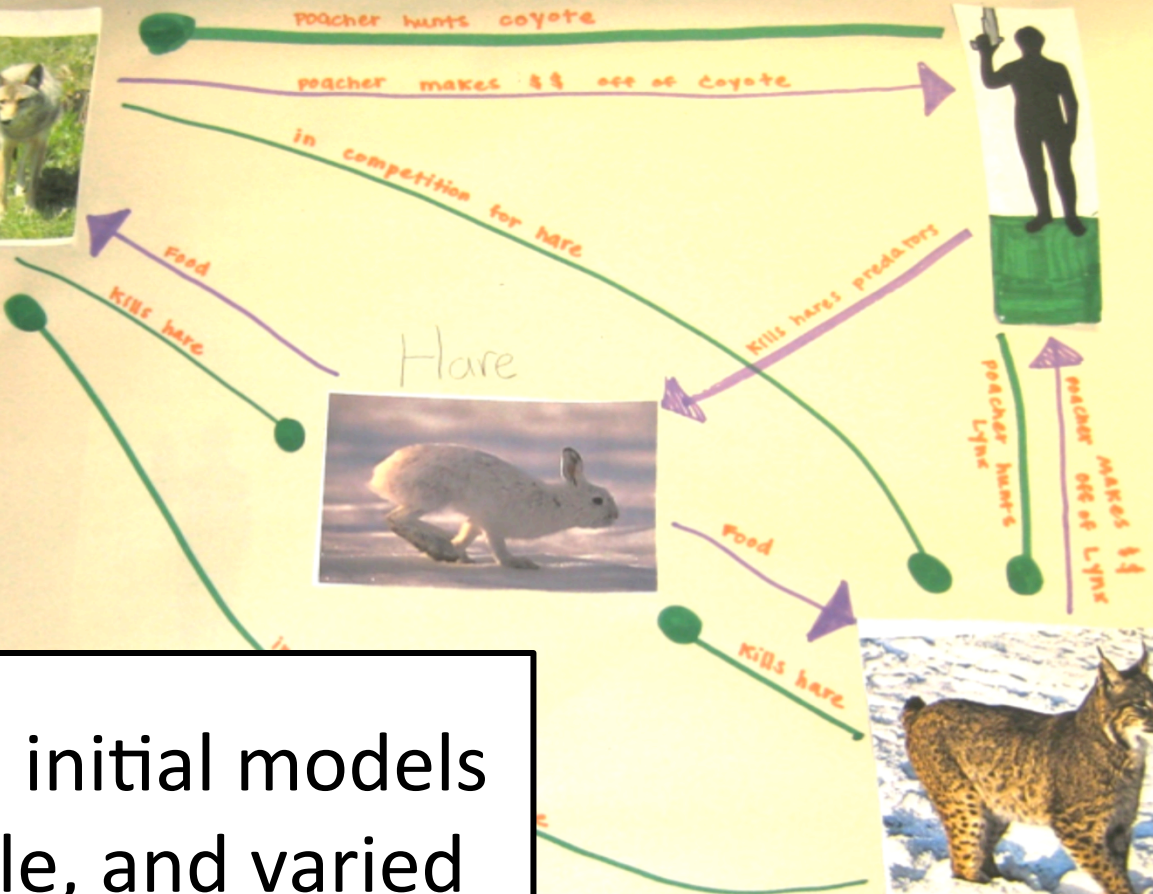


Hares vs. Predators vs. Poachers



In the beginning, predators ate a lot of hares that are being born. Then, after poachers begin to kill the predators, and the population of hares increase. With less predators to eat the hares, the population of hares increases. After a few years, the population of hares gets so low, they are added to the endangered list and poachers can no longer hunt them. The population of hares increases, and as they increase, they begin to decrease. The population of the Hares begins to decrease.

Alyssa, Wallace, Juan, Michelle



Students' initial models are simple, and varied

Michelle, Alyssa, Wallace, Juan

that the coyote migrates to different
rest) because Sarennia said she saw
her grandparents never saw them before
parents house. Also the coyote isn't the
life in the Borro and hares in the L

In the beginning, predators were unable to capture
snowshoe hares because they were still learning how to
deal with the new species of prey. But, a change of
environment occurred & predators an advantage of
the hare. Poachers humans moving in which
made IF the
crease on

Explanation
The

Hares vs. Predators

vs. Poachers

Our graph increased was
the reason why the
graph increased was
because they can
have up to 4 Babies,
four separate times.
The reason why it

resources which
population growth. There
climate change which
the resources which caused
es to rise.

After the 5th year the
over populated so the
surrounding

A)

| ACTIVITY | WHAT HAPPENED? (pattern observations etc.) | WHY??? | Your Group Hypothesis | Other Group Hypothesis |
|-------------------------|---|--|--|--|
| Deer pop. Simulation | <input type="checkbox"/> Sketch of graph <input type="checkbox"/> Describe graph | <input type="checkbox"/> Explain Connection between <input type="checkbox"/> Carrying Capacity <input type="checkbox"/> Limiting factors | <p>The snakes are dying and then at the same times the resources are going up well they are dying so basically it is going up and down.</p> <p>Resource Hypothesis Because if you think about it, we would expect that if resources were abundant, the population would increase, but they don't.</p> <p>I supported our idea because we said it would go down because it already reached its capacity. I'm pretty sure.</p> <p>Period 1 Food & reproduction - supports We had food, but no more reproduction, and a higher number.</p> <p>Period 2 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 3 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 4 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 5 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 6 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 7 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 8 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 9 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 10 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> | <p>Supports Climate Change hypothesis If climate can affect resources</p> <p>Predictor: A food dependent on food</p> <p>They are so many of them that they would have to eat all the resources and so that's why they run out of food and they die.</p> <p>How Support Others they said that they reached their carrying capacity so it had to go down everything</p> <p>Period 1 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 2 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 3 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 4 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 5 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 6 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 7 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 8 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 9 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> <p>Period 10 Food & reproduction - supports The deer started to die, and the population was decreasing.</p> |

Add other Hare for competition because if there are lots of hares there would be a limited amount of food.

Added food for hare because if there was no food the hare would not survive.

Other Hares



do the poachers hunt the hares also? all were wondering because if the hunter hunted both, the hare population would go down as well as the predator population.



poacher hunts coyote

poacher makes \$\$ off of coyote

in competition for hare

Food

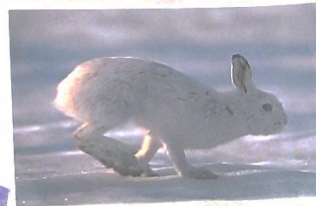
Kills hare

hares in competition for food & shelter

hare eats plants

food

in competition for hare



Hare

Food

Kills hare

Kills hares predators

poacher hunts lynx

poacher makes \$\$



Post-it note critique of each other's models is a regular part of her teaching

I think your
idea is great because

I like your idea, I also thought...
That's such a great idea, I agree because...

How to respectfully disagree with a science idea

- ★ I like your ideas but I think _____.
- ★ Your idea is missing important parts,
Such as _____.
- ★ That may be true but my
thought on it is _____.
- ★ I have a non-example _____.
- ★ I don't agree with your idea
because _____.

Classroom
discourse about
“working on each
other’s ideas”
requires structure

How to agree and add on to a science idea using evidence

agree because...

I agree with you because... and would like to add...

I like your idea and I also
agree with it because...

I agree with you
but I also think...

Based on the evidence
you showed I think you
right because

I agree with you
but I did it this way...

Can I add-on to ~~be~~ your
Idea?

I agree with you but I found
different evidence...

I agree

I think your
idea is great because

T

How to respectfully disagree
with a science idea

★ I like your ideas but I

I agree with your statement,
however I would like to add...

I like what you're
thinking plus....

I agree but I also think

I think your statement is
true because...

Indeed sir ~~be~~ because.....

I agree with
you because....

I think it like this

... I agree b/c

I agree ~~be~~ this is what
I think

I agree, but according to these
facts I found...

I like your idea, I also thought...

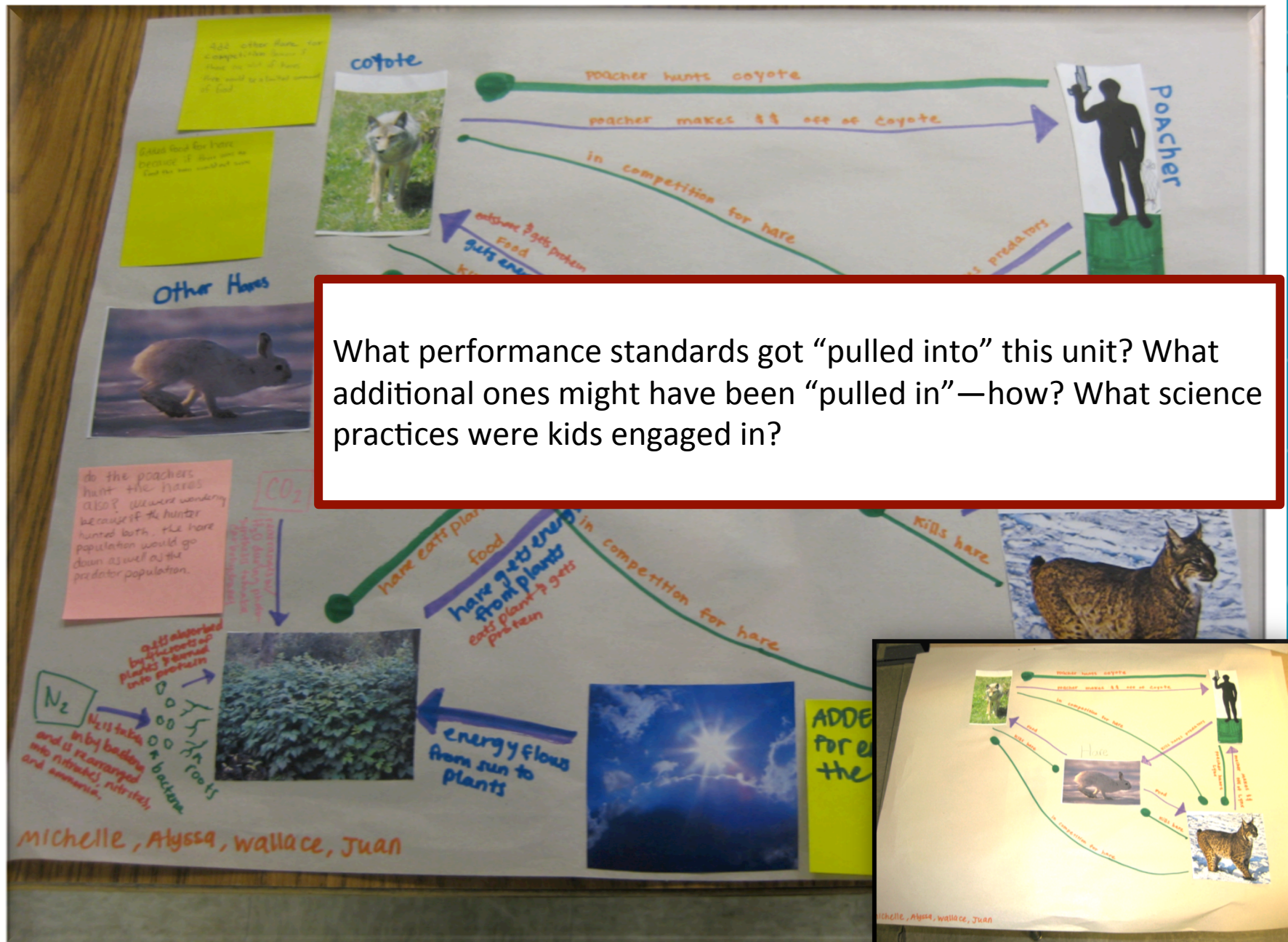
That's such a great idea, I agree because...

Students are prompted:

“What do you need to know to make your model more coherent, complete?”

Questions about Hares - P.1

- What is the environment like? weather?
- Are there Predators? Lynx, coyote, fox, & birds of prey.
- Are there hares who come to the area?
* Immigration They don't migrate.
- How fast do they reproduce?
(Hares)
- How many babies do they have at a time?
* exponential growth? 3-4 hares
- What time of year do they reproduce?
- They mate February to July.
- Do they live near humans?
- What is the average life span of a hare?
1 yr - 1.5 yrs
- What makes it different from a bunny?
- lives above the ground.
- Is this the normal cycle of the hare population?



What performance standards got “pulled into” this unit? What additional ones might have been “pulled in”—how? What science practices were kids engaged in?

