Slides presented at the 2015 NGSS Network Leadership Conference

High School Lesson Presentation

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Session Layout

- What to look for...
- Lesson
 - Setup
 - Engage in the lesson as a student
 - Closure of the lesson
- What did you see?
- Other important things to look for and final thoughts



What to look for...

- Recognition of time limitation and that this is a snapshot of the classroom
 - Recognition of where we are in implementation



What to look for...

- Used the EQuIP Rubric as a starting place
- Though it is designed to look at curriculum and not instruction, we thought it might provide a good basis to identify and modify questions for this session



A few big ideas from the EQuIP

- Practices, disciplinary core ideas, and crosscutting concepts work together to support students in making sense of phenomena and/or designing solutions to problems
- Provides opportunities for students to develop and use the three dimensions
- Lessons fit together coherently targeting a set of performance expectations

In Context: What to Look for in the Lesson

- Purpose of the lesson
 - How does the lesson help students make meaning of the phenomena while deepening their understanding of the three dimensions targeted by the lesson and building toward proficiency on the PEs?
 - What will this lesson expose students to that would contribute to the overall understanding and how is this made explicit for students?



In Context: What to Look for in the Lesson

Three dimensions

- How were the students engaged in three-dimensional learning?
 - Opportunities to use and construct each of the dimensions
 - Dimensions work together to help the students make sense of phenomena or design a solution to a problem

Coherence

– How did the lesson fit into a coherent picture that would support students in being able to demonstrate the understandings identified in the standards?

Evidence



I can see it, point to it in a lesson or unit, highlight it, or quote it directly from what is written.



Lesson

Place holder for if presenters want this for their setup, lesson, and/or lesson debrief



Tricia Shelton Kentucky ConnectThinkLearn.com

of Students: 30 Age/Grade Level: 9 - 12 Content Area: Anatomy and Physiology
Unit Title: Introduction to Anatomy and Physiology: Systems, Subsystems, and Balance
Conceptualizing a Single System

Essential Questions:

How do the structures of organisms enable life's functions?

How do the inputs and outputs in a system affect its functioning?

Driving Question: If water is necessary for survival, how can such an essential substance kill us?

Performance Expectations:

HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

mantam nomeostasis.		
Science and Engineering	Disciplinary Core Ideas:	Crosscutting Concepts:
Practices:		
Models: Develop and Use a model based on evidence to illustrate the relationships between systems or between components of a system. Planning and Carrying Out	LS1-2 Multicellular organisms have a hierarchical structural organization in which any 1 system is made up of numerous parts and is itself a component of the next level.	Systems and System Models: Models (Physical, mathematical, computer) can be used to simulate systems and interactions-including energy, matter, and information flows-
Investigations: Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence,	LS1-3: Feedback mechanisms maintain a living system's internal conditions with certain limits and mediate behaviors,	within and between systems at different scales Stability and Change: Feedback (negative and positive) can
and in the design, decide on types, how much, and accuracy of data needed to produce reliable measurements and consider	allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms	stabilize or destabilize a system.



Phenomenon and Driving Question

Phenomenon to Explain

"Football Player Dies from Drinking too Much Water/Gatorade" Associated Press, August 2014

http://bcove.me/jj61pmlz

Driving Question: If water is necessary for survival, how can such an essential substance kill us?



Student-Generated Questions

Water Intoxication: Driving Questions

Michelle

Did he not feel bloated drinking that much?

Why didn't he do anything about it when he first felt something a little wrong?

How is it possible that you can over hydrate?

Natalie

How does drinking to much water and Gatorade affect the body?

How do you know what is to much water for your body?

Why did he collapse?

Did he ever go to the bathroom to get rid of the fluids?



Morghan

Why did it take so long to affect the body?

Why wasn't enough released for him to not collapse?

Was it in his bladder? Did the bladder end up bursting from to much liquid?

Taylor

hailey

What is more dangerous not enough water or too much?

Why didn't the body just try to get rid of the access water?

How do you know when it's too much?

What part of the body is the water hurting by drinking too much?

CONTRACTOR STORY

Taylor

Why did he collapse? Was there more to the death then to much liquid? Would the same thing have happened if it was only water and no Gatorade? Or vise versa? Why did he cramp in his stomach? How much time did he drink all that liquid in? WhAt if it was milk or juice? Was it the sugar in the Gatorade that caused his death? Did it do something to his brain? Did his cells get so hydrated that they popped? What happens then if you are hydrated? Why can another person drink the same amount or more Nd have no side affects?

Taylor

How could you drink that much liquid

Megan

Did it kill off something else the body needs?

Why did he drink that much water?

Was there something in the water he drank?

What caused him to collapse?

Why didn't the body flush it out?

How does a body get over hydrated?

Bridget

Why didn't the body get rid of all of the access fluids?

Why is this the first time it's happened?

What caused him to collapse?

Was there something in the fluids that his body reacted badly to?

How fast did he drink all of the liquid?

Is this something that happens often?

Alex

Did other teammates drink that much and not have anything happen to them?

How did all the fluids stay in his body?

Is that much Gatorade not healthy for you after practices and games?

Did he not throw up from drinking that much water?

Eva

How does overhydrating cause harm to your body?

Do the specific liquids he drank have anything to do with why it was so dangerous?

How much is too much?

Amy

How does drinking too much water affect your body?

Why did he collapse?

Why was he crapping in his stomach?

Should he have been taken to the hospital right away when he started

Storyline for Unit

Graphic Organizer Template by Brian Reiser

Goal: Making sense of phenomena

Driving Question: If water is necessary for survival,

how can such an essential substance kill us?

Death of HS football player by water intoxication

Phenomena-driven Questions

What are the normal components of urine?

How is urine made?

How is the urinary system

controlled/regulated?

How does the urinary system interact with other systems to keep an organism alive?

Investigate and build knowledge through practices and CCCs

Models, explain [LS1.2, LS1.3] S&C, C&E

Using models [LS1.2] S&F, Systems

Models, investigations
[LS1.2, LS1.3]
S&F. S&C

Explanations, Models [LS1.2,LS1.3]
Systems, S&F, S&C

Incrementally Build Explanations,
Models, or Designs

Initial explanation, model or design

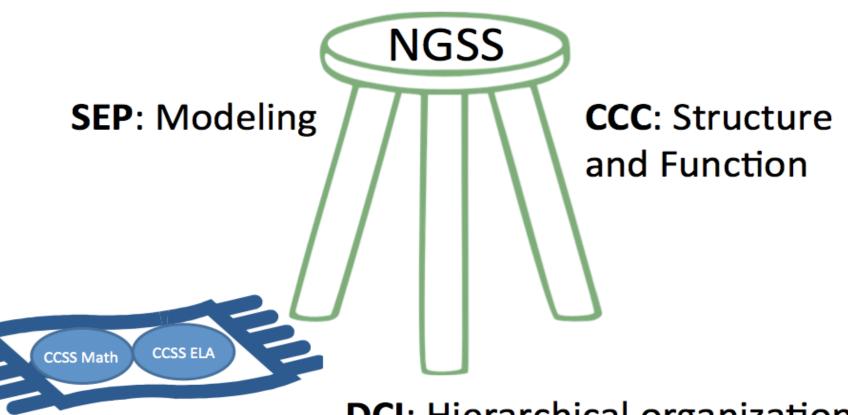
Add to/revise

Add to/revise

Final consensus explanation, model or design



Next Generation Science Standards



DCI: Hierarchical organization of interacting systems that provide specific functions



Transforming K-12 science from "Learning About" to "Figuring Out"

Learning about the science idea

 Knowing the body systems and levels of organization (cells, tissues, organs, systems) Vs.

NGSS: Figuring out how and why it works

- Developing a model that explains how we get energy out of food
 - Being able to explain why we have cells
 - Being able to argue <u>why</u> a chemical reaction is needed to get energy from food, <u>why</u> it occurs in cells
 - Being able to trace matter and energy through the body





Crosscutting Concepts

How is the shape and stability of structures related to an object's function?

Structure and Function



Modeling

Term	Description
Model	Objects, symbols, or relationships representing another system called the Target in a different medium.
Target	The system of phenomenon the model represents.
Fit	Accuracy with which a model represents its target.

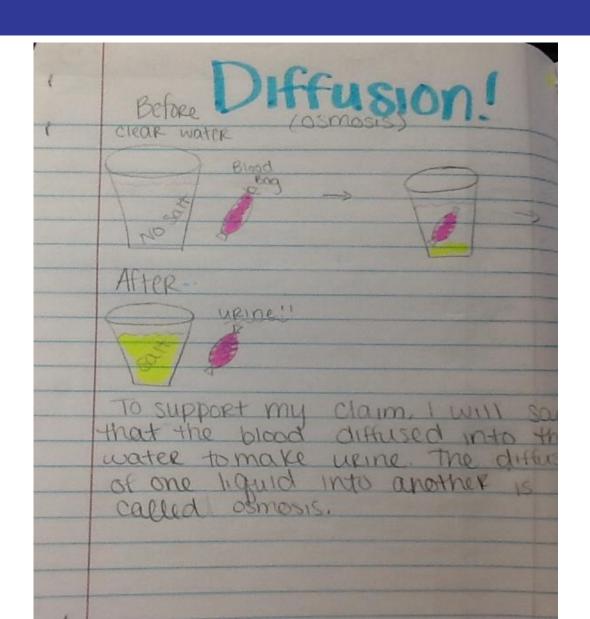


Meaning Making

- 1. Make a DRAWING communicating the Phenomenon represent by the model.
- 2. What does the model show you? CONNECT to a Big Science Idea.
- 3. What EVIDENCE from the model support is the Big Idea in number 2?

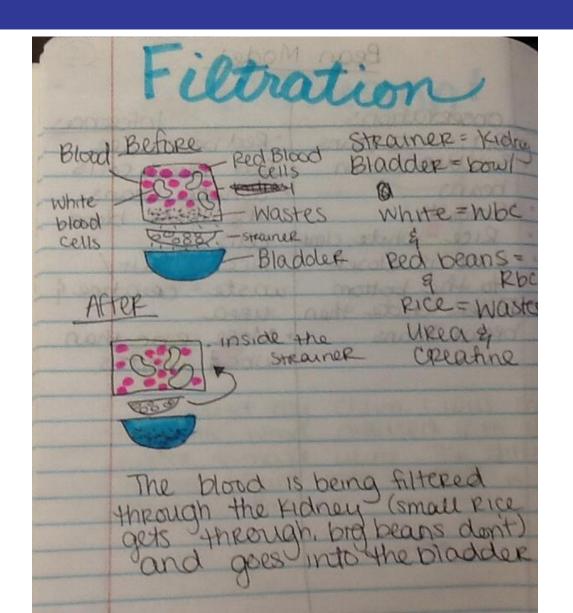


Student Work





Student Work





Student Work

Merits & Limitations of our models of the URINARY System - (Target) URINARY System structures: Kidney upeter, upethra, upinary bladder Function - "Clean blood & produce Reanspeption Excretion Filtering wastes Giving back Body & other products products needed. getskid out of blood. to blood. of wash (Small things > (some H20.) (all uses all creating water, salt, all glucose. glucose, amino some salt, some H20 acids, upea, all amine acid) some salt Creatinine). Bean Model Merits = Kidney = Strainer, urinary, bladder = bowl, exception - Rice in cup. FILTRAtion-upea creatinine Limitations- No ureter, no weether, did not filter 420, glucose, sout, amino acidi No reabsorption, no sout/H20 in excretion



Lesson

Full Learning Progression and Resources

http://www.ngsspln.com/classroomsupport.html



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Other important things to look for?

What are some other things we would want to see in a high-quality lesson aligned to the NGSS?

