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TE 861B
Interview Final Report

Interview Topic and Informants:

The unit that my 5th grade students will be starting in November is "The Human Body." This unit consists of many different features of the human body such as human bones, muscles, reaction time, the heart, the lungs, skin, teeth, fat, protein, carbohydrates, and the senses. There are no NGSS performance expectations that correlate to the human body, however, there is an expectation about Earth and Human Activity that relates to the effect of humans on the environment. With climate change and Earth conservation in full awareness these days, it is crucial for my students to understand the impact of humans on the environment.

Student Names*	**Gender**	**Achievement Level**	**Comments**
Susan	F	High	Loves school, loves to please teacher, wants to be a doctor when she grows up
Sarah	F	Medium	Perfectionist, always needs to make sure her work is done exactly the way she wants it to be done
Nicole	F	Medium-High	Loves school, when I asked her she could not think of one thing she does not like to learn about, believes that she is capable of succeeding at anything she puts her mind to
Vince	M	Medium-High	Enjoys reinforcement from teacher, always needs constant reassurance from teacher
Mike	M	High	Writes tests for the teacher to complete that she doesn't even know the answers to, very curious and resourceful
Carl	M	High	Highly intelligent, loves science and loves to read about science for enjoyment

Questions:

- Science Practice Questions:
    1. What do humans need from the Earth? (ESS3.C, Cross-cutting #4)
        - Why do humans need the Earth? (Practice #8)
        - Could humans live anywhere but Earth, why? (Practice #1)
        - Does the Earth need humans? Why or why not? (Practice #8)
        - How do you hear these things? (Practice #8)
        - What evidence do you have to support your answer? (Practice #6&7)
        - Throughout, ask do you agree/disagree? (Practice #7)

* Pseudonyms used

2. What changes do humans make to the environment? (ESS3.C, Crosscutting #2)
    - How do you know that humans have an effect on the environment? (Practices #2,6&7)
    - Do humans hurt the environment, help it, or both? (Practice #8, Cross-cutting #7)
    - How do you hear these things? Do you agree that humans make changes to the environment? (Practice #8)
    - What would the Earth be like if humans did not live on it? (Practice #7)
    - Throughout, ask do you agree/disagree with _____? (Practice #7)
3. How can we protect the Earth? (ESS3.C, Cross-cutting #4)
    - How can you help the environment? (Practice #8)
    - How can we learn more about helping our Earth? (Practice #8)
    - How can we share our ideas? (Practice #8)
    - Throughout, ask do you agree/disagree? (Practice #7)

- Interview Questions about Nature of Science:

(In addition to asking my students about the effects humans have on the Earth, I also plan on asking them the following questions related to the nature of science)

4. Do "science facts" ever change?
5. What do scientists do? Do you do anything similar to what scientists do?
6. Do you think it is important to learn science? Why or why not?
7. How can humans observe the world around them and share the information that they learn?

Question Summaries

- Question 1: What do humans need from the Earth? (ESS3.C, Cross-cutting #4)

My students all agreed that humans need basic things from the Earth. Carl suggested that we need gravity "…so we aren't just floating around." Sarah agreed and said that it would be hard to live on the Earth if we did not have gravity. Mike chimed in and said that we need "basic gases such oxygen, carbon dioxide and nitrogen because humans need to breath oxygen to breath and plants have special things to breath in the carbon dioxide." Susan then said, "I agree with Mike because we need water and food. Without water we become dehydrated. Our food comes from plants so it is like a cycle." Carl then added, "…the plants need water to grow and it keeps them alive and we need plants to grow. Plants also need the water and the sun." Mike said, "…that we need food to get vitamins, so we don't get too thin or sick." The students also all agreed that humans could not live anywhere but the Earth, but got into a debate about how the Earth would be different if it was one inch closer or further from the sun. Carl said "If we are one inch closer to the sun, the Earth would be a barren wasteland. If it was an inch further, it would

be solidified in a solid ball of ice." Mike disagreed with Carl instantly saying, "The Earth is 93 million miles away from the sun so even a mile different wouldn't make a difference." Susan mentioned how, "I kind of disagree with Carl as well." This is when Carl made the comment, "Well we don't know any of this for sure. But, I think, based on the book that I read, this is the inference that I can make."

This question was great to listen to and provided a great deal of information. My students got a little off topic, spending a majority of the question talking about the Earth's distance from the sun and the Earth being tilted on an axis. All of my students agreed that we need food, water and gravity from the Earth. Relating to the discussion about the Earth's distance, they understood that the reason why we are able to live on the Earth is because of how far we are from the sun and the vast amount of resources on the Earth provides. They connected with one another about how we can't live on other plants because, "We don't know what is on those planets. There could be poisonous gases." (Vince) Sarah added, "We need food and water and we don't know if other planets have that." There was disagreement about whether or not the Earth needed humans. Susan said, "If we didn't have people there would be no one to water the plants." Carl was very sure that the Earth would be a better place without humans when he said, " I disagree with Susan because it rains and that is more natural. If we, man, did not be here it would actually be better place. There would be more animals to help fertilize the plants and the Earth would be happier. It could survive without humans." Vince agreed with Carl and informed that, "without us there would be no pollution and no litter on the ground, so it wouldn't be as dirty." Then Mike came in and changed the conversation by saying that, "The Earth sort of needs humans. Humans and plants react to each other to keep a balance."

- Question 2: What changes do humans make to the environment? (ESS3.C)

I think this question was a bit more difficult for my students to answer. They all agreed that humans both help and harm the Earth. Nicole said, "humans can help the Earth by watering the plants." Mike stated, "More humans means more carbon dioxide for the plants. We hurt the environment by burning coal, which puts smoke in the air. Buildings put bad gases in the air like sulfuric acid and that's not good." Carl then proceeded to talk about human population. He said that, "The more people there are the less space there is for plants. By 2050, well that's just a

guess, there will be little plant space and people will have to engineer mechanical air, which isn't natural." Vince agreed and added, "humans are killing the animals which we need to eat." My students all understood that humans have an impact on the Earth. The debate about whether it was a good impact or a bad impact tended to sway towards the bad. My students didn't have too many good things to say about humans on Earth. Although Nicole mentioned how we can water the plants, the other students mentioned how the rain can do that without the help of humans.

- Question 3: How can we protect the Earth? (ESSC.C)

Only a few of my students had comments about this question. Carl mentioned how we could use bikes instead of driving in cars all the time. Susan and Carl both said we could read books to learn how to protect the Earth, and "learn about what the Earth needs and do that for it." Vince challenged Carl and Susan by asking, "the people that write the books, how do they know?" Carl replied, "They could be environmentalists, they might have a whole team that spends the whole day studying the Earth." Carl then discussed how we could "do something good without even being told to. If us kids see a problem we can go and fix it." Sarah then said, "Yeah we can start by recycling, we can start reusing plastic bottles and other things."

When I asked my students how they can share their information Carl mentioned social media and the Internet. Susan said that they could, "write strict rules that everyone around the world can follow, like no littering anywhere or don't use vehicles that use gas." Mike then said, "Imagine what the world would be like! There would be no poisonous things that would hurt animals." This shows that my students understand that Earth is a valued commodity and needs protecting, but they weren't sure about how to contribute to this protection.

- Question 4: Do "science facts" ever change?

When I asked my students this question all of them said, "yes" simultaneously. When I asked what made them say that, Mike gave an example. He said, "for one example some people used to say lightning never strikes the same place twice, but now there is evidence that that happens." Vince mentioned how the Earth is constantly changing and because of this the facts are always changing. The rest of my students proceed to shake their heads in agreement for this question. So I asked, "Why do science facts change?" Carl responded, "Well my mom does

research for medicine and I know she is always looking as new things." My students did not have too much to add to this, which leads me to believe that even though they understand that science fact is not always going to be fact, they could not truly analyze or describe why.

- Question 5: What do scientists do? Do you do anything similar to what scientists do?

This was another question that my students seemed to struggle with. Susan said that they study the Earth to learn more about it. Nicole agreed and said that "scientists learn about the Earth or we can learn about the Earth." Carl said, "Scientists do research to learn different facts. They come up with theories and then come up with proof to support it." Mike added, "Scientists study stuff and make predictions before going to find the facts. They use different tools like a magnifying glass. In order to be a scientist you have to be good at math." Overall, my students understood that scientists do research about the Earth to learn about how it works and how we can protect it. The students did not provide any further discussion about the similarities between them and scientists. Even after probing my students could only come up with the idea that they do experiments in science class.

- Question 6: Do you think it is important to learn science? Why or why not?

This question also got an overwhelming "yes" when I first asked it. Susan said, "By studying science it tells us more about humans and keeps up healthy. By studying nature we can keep the Earth healthy." Carl described how science, "is the top most interesting subject to me, buts it's not for everyone." Nicole mentioned, "in other subjects we can't learn too much, but we can always learn more about science because it is always changing." I can observe that my students know that it is important to learn science, but their understanding of why is very limited at this age level. They all seem to enjoy learning science, but were unable to connect to the idea any further.

- Question 7: How can humans observe the world around them and share the information that they learn?

I actually ended up not asking this question because I felt like my students answered it throughout the interview session. Mike commented on how scientists use different tools. Carl, Susan and Mike all said that we obtain information from books. Vince said we should question

the validity of the books and Nicole said that we could use our senses. My students had a difficult time describing what they could specifically do to help the Earth, and only relayed general things that they could do. I was attempted to probe for more suggestions that they students could do, like for instance Sarah mentioning how kids can recycle things and reuse plastic bottles, however, the students could not supply any more information.

Conclusions:

Overall, I learned a lot from my student interviews. There were agreements and disagreements throughout the interview about how humans impact the Earth, how we can obtain information and how we can share it. The disciplinary core idea that I was focusing on was Human Impacts on Earth Systems (ESS3.C). I first asked my students about what humans need from the Earth. They all agreed that humans need food and water. Each of the six students understood that we need minerals and vitamins from the Earth, which Mike said, "come from plants." There was a definite understanding that humans can only live on Earth because we have food and water. Carl even mentioned how we can live here because of "gravity and the atmosphere." When I asked if humans could live anywhere other than the Earth there was also definite agreement that we could not. They understood that humans require resources from the Earth to survive and it is because of these resources that humans can live on Earth. A few of my students were even able to make connections to the Crosscutting Concept "Systems and System Models." This concept discusses how systems are described based on the interactions of its components. While the students were discussing how the Earth would be fine without humans, Mike added, "Humans and plants react to each other to keep a balance." This comment Mike made, describes understanding of how the different plants and animals on the Earth are needed to keep the Earth stable. The conversation with my students demonstrated that they have a deep understanding of the basic needs of humans, why we need the Earth to survive and how without one of the parts the system would be off balance.

The six students that I interviewed understood that human activities have an impact on the Earth and they focused mainly on how humans hurt the Earth; not help it. Carl discussed how we should be riding bikes instead of cars, due to the fact that cars emit gases that are harmful to the Earth. Mike also discussed how we burn coal which then puts gases in the air that "aren't

good for us." Susan was able to suggest that, "If we all pitched in, the Earth would start to look totally different." Carl even made the comment that the Earth would be a better place if humans did not live on it. Vince agreed and discussed that "humans pollute the Earth and without us there would not be any pollution." All of this talk about the negative impacts made me ask the students how did they obtain this information. This question linked to my scientific practice of obtaining, evaluating and communicating information.

All of my students said that we could obtain information about the Earth through research by reading books or through the Internet. Susan, Mike, and Carl said they like to read books about the Earth to learn more about it. My favorite comment of the entire interview came from Vince. He asked Carl, "The people that write the books, how do they know?" This directly relates to the evaluation piece of my scientific practice. Vince made the others think about where the information was coming from and question whether or not we can believe that information to be true. Carl then mentioned how, "We don't really know any of this for sure." He made the comment, "The Earth is spherical, or so we've been told." This correlated to my question about science facts. My students agreed that, "the Earth is constantly changing, so the facts are changing too." This provoked Susan into saying that, "I kind of agree with Carl, we don't know if this is true true, we just know that it is true right now."

Although my students provided great discussion about why humans need the Earth, how they negatively affect the Earth and where we can obtain our information there were also a lot of gaps in their understanding. When I asked my students what evidence they had to support their answer I would get blank stares. Mike replied, "Oh, well I just read it in a book." This group of learners was able to make the connection that humans have an impact, but were unclear about how we can make more of a positive impact. My students could not come up with many ideas about how humans help the environment which shows me that my students are not very aware of the second part of the DCI: how communities are doing things to help protect Earth's resources. Nicole said that humans help the Earth by "watering the plants," but then Carl made the counter argument that rain can also do that and "it is more natural." This shows me that my students are mostly looking at how the Earth would survive without humans and that's that.

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There was not much understanding related to what scientists do and why it is important to learn science. My students were able to state that scientists conduct research and learn about the Earth, so we know about the Earth. This is true, but they could not describe any ways that scientists do their jobs. Carl did mention environmentalists, but just described them being someone who has a lot of animals to study. My students all agreed that it is important to learn science, but mostly just mentioned because it was fun to learn. Susan mentioned that it can teach us about the Earth and how to protect it, but when I asked her how we could protect the Earth she just talked about writing rules to stop littering at beaches. Other than Carl's mention of social media, this was the only other idea about sharing information with others. My students could not think of many ways to communicate their findings with others and this is something that needs to be understood in a deeper way.

Through conducting this interview, I now understand that my students need more understanding of how even though we are negatively impacting the Earth, there are things that we can do to protect it as well. In my lesson sequence I would like to be able to teach my students how we can start protecting the Earth in our own school community. I would also like to improve my students understanding of who scientists are and what they do. My students understand that "science facts" can change and I would like them to be able to relate that to the work that scientists are doing. In my lesson sequence I plan to improve these understandings by having my students ask questions, obtain their own data, obtain other forms of information, evaluate the information that they find, and communicate their findings with their peers through the form of a visual.

One of the important parts of the nature of science is being able to obtain, evaluate and communicate information with others. It is my goal to help expand my students' understanding of this specific scientific practice through actual experience. This interview taught me that my students clearly understand that humans need the Earth and that we are doing things to harm it. I would like to also widen my students' understanding of how we as a community, can also help protect the Earth since we are a main part of the Earth's system.