

Why Do Microbiomes Make Us Uncomfortable?

Overview: Using the systems iceberg to understand why some observations make us feel secure and knowledgeable, and other information makes us uneasy. Inquiring into the idea that science is a human endeavor, and changes with our mental models. This can be used as a provocation for tuning-in at the start of a unit on research techniques, observable data, and changing paradigms. I use this to launch a unit on analysing and interpreting laboratory data including various ways of specimen preparation, microscopy, and understanding the genome.

Grade: 8-12, Science

Estimated duration: 1- 2 hours depending on age

Key Concept: Relationships

Related Concepts: Evidence & Transformation

Global Context: Orientation in Space & Time

Statement of Inquiry: Our understanding of relationships transform as we critically consider new evidence

Unit Questions: What makes science a human endeavor? To what extent can we pick and choose evidence?

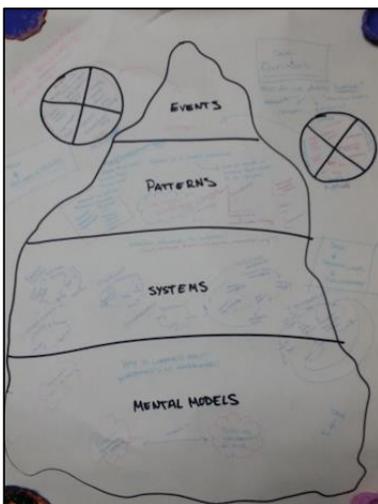
Outline:

1. Some students watch [Rob Knight's TED talk](#) on human microbiomes, some watch [Jonathan Eisen's TED talk](#), others watch [Jessica Green's TED talk](#) on designing for microbiomes.
2. Students come back together and share what each TED speaker had to say, and how they feel about it. They are then posed with the question on why we have such strong reactions to hearing about all of this work on microbiomes. "Why do we feel such strong reactions when sorting out what our microbiomes are and what they mean to us?"
3. To fully analyse the questions, Students create two separate Compasses: "Defining Human" and "Defining Microbiome". This will be the start to their Iceberg model, which should provide insight into our own mental models and how the endeavor of science is deeply linked to our current paradigms..

Tips and Ideas:

When discussing how learning about microbes make us feel, many students will notice feelings of exhilaration and others will note uneasiness. This could be a good time to try the "cross and uncross arms" exercise; where you ask everyone to cross their arms the way they usually do, then try it the other way. They can discuss what happened there, and how it relates to their experience with microbiomes.

Using the Compass & Iceberg: In order to address complex challenges, it is helpful to start by analyzing the problem through the multiple lenses of the system. Using the Iceberg to scaffold our analysis of systems, we can better understand all of the parts that work together and attempt to avoid unintended consequences from quick fixes and brash decision-making.



What the Compass tools do:

- Helps students analyse complex concepts in unfamiliar situations.
- Helps students organize their thoughts and justify their reasoning.
- Encourages deeper thinking to address all Compass points and to work through the Iceberg, students had to delve deeper into the applications of science.
- Promotes self-confidence through scaffolded mastery.

Student Perspective:

Students said that using the Compass and Iceberg tools helped them feel more confident when digging into big concepts, and was an interesting way to understand how science is used.

At the end of the unit, students were able to apply evidence from scholarly articles to address the unit questions independently. Through the use of Compass tools, they felt accomplished and empowered to solve complex issues.

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