

Earth's Structure

Lesson Overview:

In this lesson, Agree and Disagree Statements will be used to assess student understanding of science concepts related to the Earth's Structure. Students will also use Harkness tracking to self-assess their group dialogue.

Standards Addressed:

SC 8-3 The student will demonstrate an understanding of materials that determine the structure of Earth and the processes that have altered this structure.

Disciplinary Literacy Best Practices:

Agree and Disagree Statements
Harkness Strategy Group Tracking Sheet

Lesson Plan

Time Required: One 60-minute Class Period

Disciplinary Vocabulary: fossil fuels, minerals, crust, mantle, core, continental crust, oceanic crust, magnetic field, density, P waves, S waves, divergent boundaries, convergent boundaries, transform boundaries, convection currents, lithosphere, and asthenosphere.

Materials Needed:

- A&D statement sheet (1 per student)
- Harkness Strategy Tracking Sheet (1 per group)
- resources available for student research

Assessment: completed A&D statement sheet, student dialogue

Engage

- Introduce students to the group tracking strategy, The Harkness Strategy. Explain to students that today, there will be a facilitator in their group who will track their group interaction/dialogue. Lead them in a short discussion about what you might hope to see in a group tracking sheet using questions such as: *What might we like to see as we are tracking our dialogue? Would we want to see (at the end of class) that one or two group members dominated the group conversation? Would we want to see that one or two group members didn't participate at all?* Students should come to a consensus that we want to see a balance in group dialogue. Let them know that they will reflect on their group dialogue at the end of class.
- Pass out the Harkness Strategy Group Tracking Sheet (or something similar). Have each group either choose a facilitator or choose one for them. Explain that the responsibility of the facilitator is to monitor group dialogue by drawing lines from group members on the group tracking sheet. He/she needs to write group members' names in the circles on the sheet or a blank sheet can be used and students can be written in the way that they are arranged. The facilitator will begin the line with the first student who talks and continue that line as the conversation continues. The line may go back and forth between students or all the way through the group. The challenge for the facilitator will be to track and participate. (Note: I changed my facilitators in the middle of the lesson to provide practice for someone else and allow the facilitator to focus on the conversation.)
- Introduce students to Earth's Structure Agree and Disagree Statements. Explain that today, they are going to read statements about different concepts they learned during their unit on Earth's structure. Hand out statements.
- As a group, students should read each statement and make a decision about that statement. They have 4 choices: *agree, disagree, it depends on* (maybe they need more information), or *not sure*.
- Once a choice is made, then there is a place to "Justify my thinking". In this space, students write why they made that choice.
- Once the first column is complete, students should move to the next column: How Can You Find Out? This is where each group decides where they will look/research that statement. This could be their notes (if they have some), internet (acceptable sites), work from class, science notebooks, informational texts, etc. Once the middle column is complete, tell students they will need to check with you prior to moving to the 3rd column. Once teacher approval is given, they may proceed to the 3rd column, which is using the resources listed in the middle column to write "What did we find out". Ask for questions at this point.

Explore

- Each group begins with exploring their thinking of the first column. They may discuss and debate which choice should be checked. At this point, it is okay for group members to not come to a consensus. They must justify their thinking for making that choice and write it in the first column underneath where they checked: *agree, disagree, it depends on, or not sure*. Also, if group members disagree, they should make note somewhere on their paper as to who is thinking what prior to doing the research.
- Monitor groups as they are working and question thinking. Make sure that group members are completing the “justify my thinking”. Also, check in on the facilitator and see how the tracking of the dialogue is coming along. Are there any patterns that need to be addressed already? Are there students who aren't participating at all at this point? (If so, is it because they don't remember anything from the unit? Or do they not feel safe to talk in their group?) Is there a student(s) who is dominating the group dialogue? Why?
- As students complete the first column, their conversations should move to the 2nd column – which resources are they going to use for their statements? They may or may not choose the same resource for each statement. Encourage students to choose more than one resource. It is always a good idea to check multiple resources to validate or provide evidence. Remind groups to check with you prior to moving to 3rd column. Look over their resources to ensure that they make sense for the statements and will “work”. **At this point, check in with facilitators to see if they may wish hand their role over to someone else in their group.**
- Students use their resources to explore statements and dialogue about their choices that were originally made. (NOTE: Students are not allowed to go back and change their original choice in the first column.)

Explain

- As students move into the researching and exploring their statements, this is where they begin to validate their thinking and much of the debate that occurred earlier is turned into explain why what they have read in the researching portion is now the answer. At this point, students should write their explanation in the 3rd column of what the answer should have been and why. Questions to ask as students are working in the column “What Did We Find Out” are: *What did you originally put? Were you correct? How did you know in the beginning? Were you incorrect? What were you confused about in the beginning? How did you find out your answer?*
(If students used resources/sites on the internet, have them record those sites.)

Extend

- At the end of class, lead students in a discussion about the statements. *What “stumped” you in the beginning”? What statement(s) were you really sure about at first, but when you researched, you discovered something different? How helpful was it to work on this as a group? Why might it be important to check multiple resources?*
- Reflect on using the Harkness Strategy. Students (if possible) may want to count their lines and compare. Visually, how does it look to them? What do they notice about the tracking sheet? If there are groups who had students who dominated, what might those students do next time so that they don't dominate the conversation? If there are groups where students did not participate as much, what might those students do the next time to ensure that they participate in the dialogue more? Have students write their group reflection on the back of the tracking sheet. This reflection should include goals for the next time that this strategy is used.

Teacher Reflections and Biographical Information

A&D statements are a great activity to use as a formative assessment for any concept. Students had difficulty identifying research sources so I had to provide them with some ideas to get them thinking. I also quickly discovered that having students do 2 new strategies was a little overwhelming. The group interaction tracking strategy paired with the A&D statements would have been more successful if they had a prior experience with each one. I did later pair these 2 strategies again and they worked much better since students were more familiar. It is important to create safe groups for group dialogue and pick a strong facilitator since they have a dual role.

To read more about the Harkness Teaching Method (which began at Phillips Exeter Academy):

http://www.exeter.edu/admissions/109_1220.aspx

[http://www.nais.org/Magazines-Newsletters/ITMagazine/Pages/Introducing-and-Using-the-Discussion-\(AKA-Harkness\)-Table.aspx](http://www.nais.org/Magazines-Newsletters/ITMagazine/Pages/Introducing-and-Using-the-Discussion-(AKA-Harkness)-Table.aspx)

<http://reallybigyear.wordpress.com/2013/03/27/teaching-science-using-the-harkness-method/>

Lesson Author:

Angie Greer is a 7th Grade Science Teacher at the Middle School of Pacolet in Spartanburg School District 3 in Spartanburg, SC. She is certified in Middle Level Math and Science, Elementary Education, and in School Leadership and Administration. She currently teaches 7th and 8th grade science, as well as STEMology.

Statement	How Can You Find Out?	What Did We Find Out?
1.) Fossil fuels are classified as minerals. <input type="checkbox"/> agree <input type="checkbox"/> disagree <input type="checkbox"/> it depends on <input type="checkbox"/> not sure Justify my thinking:		
2.) Movements of the core cause the magnetic field. <input type="checkbox"/> agree <input type="checkbox"/> disagree <input type="checkbox"/> it depends on <input type="checkbox"/> not sure Justify my thinking:		
3.) Continental crust is less dense than oceanic crust. <input type="checkbox"/> agree <input type="checkbox"/> disagree <input type="checkbox"/> it depends on <input type="checkbox"/> not sure Justify my thinking:		
4.) S waves travel faster than P waves. <input type="checkbox"/> agree <input type="checkbox"/> disagree <input type="checkbox"/> it depends on <input type="checkbox"/> not sure Justify my thinking:		
5.) Divergent boundaries result in mountain building forces. <input type="checkbox"/> agree <input type="checkbox"/> disagree <input type="checkbox"/> it depends on <input type="checkbox"/> not sure Justify my thinking:		
6.) Convection currents cause the movements of the lithospheric plates. <input type="checkbox"/> agree <input type="checkbox"/> disagree <input type="checkbox"/> it depends on <input type="checkbox"/> not sure Justify my thinking:		

Group Interaction Tracking Sheet

Directions: Write each group member's name in one of the circles. Choose a facilitator for your group who will track the dialogue during your work. The facilitator will draw an uninterrupted line from person to person each time someone speaks to track the conversation in your group.

