Wegener's Evidence of Continental Drift and the Reconstruction of Pangaea
9th Grade Academic Science Lesson

Target: I can interpret and analyze the evidence Wegener used to reconstruct the supercontinent, Pangaea, that existed 300 million years ago.

Lesson Plan From Teacher A:

Day 1: The teacher reviews the target for the day to the students. The teacher gives the all students the same warm up questions: Who was Alfred Wegener? What theory did he propose? The students all write in their notebook who Wegener was and the theory he proposed. The teacher has a class discussion about what the students know about Alfred Wegener and continental drift based on a video watched during the previous at the end of the class. At the end of the discussion, students all get the same worksheet.

The worksheet has students read 3 paragraphs about Wegener and his evidence for his theory on continental drift, plot the evidence on a world map, and then analyze the evidence Wegener had to prove his theory. The teacher has all of the students read the 3 paragraphs independently. The teacher uses gradual release to start the students off. She plots the first piece of evidence on the board. For further explanation, she draws the symbol for the glossopteris fossil (tropical fern plant) on the Southern part of South America, on the Northeastern part of Antarctica, etc. Students do the same on their worksheet. Then, she has the students help her plot the second piece of evidence on the board. The students and the teacher work through this piece together; both creating a similar map at the same time. At this point, the teacher feels she has demonstrated her expectations by both showing the students an example, and then doing one with them.

Next, she has the students count off by 4s and find their groups according to their number. The students work in varying ability level groups to plot the rest of the 5 pieces of evidence. The teacher circulates the room and touches base with each group for about the same amount of time.

Exit Ticket

Day 2: The teacher reviews the target for the day to the students. The teacher gives the all students the same warm up questions: What evidence did Wegener have to prove his theory of continental drift? The students all write in their notebook the evidence that Wegener used. The teacher has a class discussion about what the students know about the evidence so far based on the previous day's lesson. The teacher than has students return to their assigned heterogeneous groups from the previous day.

After plotting all of the evidence, the students are instructed to cut out each of the landmasses that now have multiple pieces of evidence on them, and connect the multiple landmasses by matching the evidence and making one large landmass, which Wegener called Pangaea.

Once students have plotted the evidence and reconstructed Pangaea, students are instructed to answer 20 short answer questions interpreting and analyzing each of the pieces of evidence Wegener used to reconstruct Pangaea.

Exit Ticket

Lesson Plan From Teacher B:

Teacher B gave the students a tiered (leveled with increasing difficulty) exit ticket and graded the exit tickets one day prior to this lesson. The teacher created groups based on the number of questions out of 5 each student got correct on the previous day's exit ticket. There were 4 groups as follows:

Accelerated Group: Earned a 5/5 on the exit ticket
On Track Group: Earned a 4/5 on the exit ticket
Supported Learning Group: Earned a 3/5 on the exit ticket
Modified Group: Earned a 2/5 on the exit ticket

Day 1: The teacher reviews the target for the day to the students. The teacher gives the all students the same warm up questions: Who was Alfred Wegener? What theory did he propose? The students all write in their notebook who Wegener was and the theory he proposed. The teacher has a class discussion about what the students know about Alfred Wegener and continental drift based on a video watched during the previous at the end of the class. At the end of the discussion, students are assigned into their different groups that are projected onto the board. The different groups are based on like ability levels. The teacher gives out 4 different worksheets. The same variation of the original worksheet (given by Teacher A in the above lesson) is given to each student in each group. For example, the accelerated group is given a more challenging worksheet, and the modified group is given a scaffolded worksheet. Each worksheet, regardless of the variation, has students read about Wegener and his evidence for his theory on continental drift, plot the evidence on a world map, and then analyze the evidence Wegener had to prove his theory. (Remember the original worksheet had 3 paragraphs, 7 pieces of evidence, and 20 questions).

Accelerated Group: This group of students were to read 4 paragraphs about Wegener independently. Students had written instruction how to plot the pieces of evidence, and were to plot all 7 pieces of evidence with their group. In addition, they are to research another piece of evidence (rock strata), that was not already given to them on their worksheet by researching where they could find the similar rock strata from 300 million years ago on their own. They are to plot this as well on their worksheet.

On Track Group: This group of students were to read 3 paragraphs about Wegener independently. They will, after gradual release** (read below), plot the 7 pieces of evidence.

Supported Learning Group: This group of students were to read 3 paragraphs about Wegener independently. They will, after gradual release** (read below), plot only 6 pieces of evidence.

Modified Group: This group of students were to read only the most important 2 paragraphs about Wegener independently and discuss as a group after.

The teacher works with the ***on track and supported learning groups* together first. She uses gradual release to start the students off. She plots the first piece of evidence on the board. Students do the same on their worksheet. Then, she has the students and teacher plot the second piece of evidence together on the board. Both teacher and students fill in their map at the same time. After plotting 2 pieces of evidence together, the teacher ***releases the on track group*** to complete the other 5 pieces of evidence with their group.

The teacher continues to plot the third piece of evidence on the board. The students and the teacher work through this piece together again. After plotting 3 pieces of evidence together, the teacher releases the ***supported learning group* to complete 3 other pieces of evidence with their group. (They have one less piece of evidence).

After gradually releasing the supported learning group and the on track group, the teacher works with the ***modified group***. During her time with this group, she gives direct instruction on Wegener, Wegener's theory about continental drift. The students take brief notes in the blank space below their reading on the worksheet. The modified group has a map that already has the 4 major pieces of evidence plotted. Instead of plotting the evidence, the teacher uses this time to talk with the modified group about what the 4 pieces of evidence actually mean. They discuss topics such as how could there be glacial scars on Madagascar and how there could be tropical plant fossils on Antarctica.

Exit Ticket

Day 2: The teacher reviews the target for the day to the students. The teacher gives the all students the same warm up questions: What evidence did Wegener have to prove his theory of continental drift? The students all write in their notebook the evidence that Wegener used. The teacher has a class discussion about what the students know about the evidence so far based on the previous day's lesson. The teacher than has students return to their assigned homogeneous groups from the previous day.

After plotting all of the evidence (regardless of if they have 8 pieces (accelerated group), 7 pieces (on track group) or 6 pieces (supported learning group), they will cut out each of the landmasses that now have multiple pieces of evidence on them, and connect the multiple landmasses by matching the evidence and forming Pangaea.

Accelerated Group: Once students have plotted the evidence and reconstructed Pangaea, students are instructed to answer 20 short answer questions interpreting and analyzing each of the pieces of evidence Wegener used to reconstruct Pangaea. The students here do not necessarily have more work, but their questions have an increase in rigor. The questions are more broad, having them analyze further and taking their learning to the next level.

On Track Group: Once students have plotted the evidence and reconstructed Pangaea, students are instructed to answer 20 short answer questions interpreting and analyzing each of the pieces of evidence Wegener used to reconstruct Pangaea.

Supported Learning Group: Once students have plotted the evidence and reconstructed Pangaea, students are instructed to answer 20 short answer questions interpreting and analyzing each of the pieces of evidence Wegener used to reconstruct Pangaea.

Modified Group: There are also a few pre-cut versions of the same paper at their table. Together the teacher and students work to put the landmasses together like a puzzle. We discuss how this represents Pangaea and the location of landmasses 300 million years ago. Students are instructed to answer the 10 questions to interpret and analyze the pieces of evidence.

After working with the modified group, the teacher checks in with the ***supported learning group*** to discuss some of their findings and what they mean.

Finally, after working with the supported learning group, the teacher checks in with the ***on track group*** to discuss some of their findings and what they mean.

Exit Ticket

What was differentiated:

- number of paragraphs to read
- if students received any direct instruction (modified only)
- if students went through gradual release and for how long (on track and supported learning (longer))
- if students completed the activity independently
- if students had to cut the activity or not
- the number of pieces of evidence that students had to learn about (8, 7, 6, 4)
- the number (20, 10) of the questions
- rigor of the questions