

Glesner - SIOP Lesson Plan 2

Class & Lesson Information

Date: Roughly 3/10 or 3/11	Grade/Class/Subject: Earthscience (mostly 10th)		
Class setting (# of students & MLs, WIDA level if applicable, lesson duration, etc.): About 26 to 28 students. Roughly 4 “ELL” students per hour. Most have average WIDA scores between 4 and 6. One student is a 3ish and another student is about a 1-2.			
Grouping explanation: While sometimes I let them pick their small groups, at this point in the year they have been intentionally grouped with students they get along with but not by their best friends in the room. For this assignment, since they need to interact more and come to an agreement (since I’m modelling the main communication Task around a consensus), I am going to let them pick their partners. I want them to pair with someone they feel comfortable talking with and have similar ideas so it’s easier for them to come to an agreement they both enjoy and feel like they can defend their reasoning behind.			
☒ whole class The last thing I aspire to have them do is briefly share out which gas they picked in pairs but share to whole class. We’ll see if time allows.	☒ small group They’ll do bellwork in small groups. This will be a short 4 min sharing	☒ partners The bulk of their thinking will actually occur in pairs, this is when they will come to a consensus	☒ independent They’ll do some independent research alongside their partner to research the different greenhouse gases
Unit/Theme: Greenhouse gases / effect Carbon Cycle Global warming		Standards: (This lesson is kind of a mix of the two below, where they are beginning to think about the wider picture of how different pollutants all play a role in the greenhouse effect, but those roles are not equally significant.) HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth’s systems result in changes in climate. HS-ESS3-2. Evaluate competing design solutions for developing, managing, and utilizing energy and mineral resources based on cost-benefit ratios.* ELD-SC 9-12 Argue Expressive Defend or refute a claim based on data and evidence	
Content Objective(s): Students will analyze the statistics about different greenhouse gases to identify their differences.			

Language Objective(s):

Students will reason in pairs to come to a consensus about the most priority greenhouse gas

Key Vocabulary:

Greenhouse Gas (GHG)

Lifetime

Global Warming Potential (GWP)

Atmospheric Concentration

Carbon Dioxide (CO₂)

Methane

Nitrous Oxide (N₂O)

HFCs (HydroFluoroCarbons)

CFCs (ChloroFluoroCarbons)

Materials (supplementary & adapted):

- Student HO (physical copies, and a digital version for ELLs to translate)
https://docs.google.com/document/d/1wX9YIfUWQUKXz7vaeTnmj4qhcaX_CtfzGl3k2i3Y/edit?usp=sharing
- Chromebooks for researching the GHGs
- List of websites to make it easier to find correct information about each gas. I'll post this list to Schoology for them, so I know they don't get lost on the internet and waste time or find incorrect information.

Higher-order questions/tasks:

The beginning of the lesson is structured and relatively easy. Their pair task, though, asks them to think through all the data that they found about their choices and think about which greenhouse gas is the priority for us as a nation to solve first. I'll intentionally point out the vagueness of "priority" where they could look for the cheapest, easiest, hardest, the one everyone can do, or the one that is on a national level instead of local control, so that they have to decide both what their priorities are and then pick the one that best matches. There will be no one good answer until students outline their rationale.

Lesson Sequence (Pre-/Opening activities):

☒ Links to background The bellwork tries to get them to think about their lives and connect it to the topic of GHGs	☒ Links to past learning The bellwork tries to get them to think about a previous lesson about the definition of GHGs	☒ Review of learning objectives This will happen right after the bellwork, and again near the end of the lesson. Sometimes again in the middle during a hard transition.
☒ Review of key vocabulary I am intentional about reviewing the key and new vocabulary for a day. Most of the time I do it during instructions time, that way students don't just hear the definition but they hear about it in the context that they will encounter and use it that day.	☒ Comprehensible input I try to speak, model activities, and use visuals to be more comprehensible, especially during bellwork and instructions time.	☐ Strategies
☒ Interaction They should be interacting with each other during the bellwork, and I like to talk to a handful of them at this time too.	☒ Feedback I like to use the bellwork as a formative assessment, and I give intentional feedback at this time. I also like to continually circle the room and check-in on students during a lesson. I probably give more feedback then, honestly.	
Time allotted	Activities (Teacher talk, action, etc.)	Other notes

~8 min	Bellwork Like usual, we'll start with a bellwork question or two where students do a think-pair-share in their small groups (5-6 students). After a brief time for that, I then open the discussion up to a whole class wide level where students share what they talked about; I generally try to get one volunteer to share from each table group. The bellwork is designed to be a preview of the main idea for the day or a review of a main topic from a previous day. Since I want them to think about all the ways that we make air pollution, I think something like, "Name an activity you do in your everyday life that creates a greenhouse gas." And maybe a second one in, "What does a gas have to do in order to be a greenhouse gas?"	At this point students should already know what greenhouse gases (GHGs) are, what they do, and how they affect temperature on Earth, but this is the start to a topic where we discuss their different sources and characteristics.
~2 min	Review the Learning Objectives - I normally read the learning objectives with them at this point. I like to do it here so that kids see my rationale for why I might ask them to do or focus on things during the lesson. I like to be transparent on my teaching strategies with them.	I'm going to be intentional about how I want them to be co-equal partners in their discussion in the second half and that's why I picked a language objective that mentions "reason in pairs" and "consensus". I'm worried some pairs won't think very hard or let their partner decide and just agree without any thought.
~8 min	Introduce the Lesson with Instructions I try to speak slowly and clearly and use a bit of hand gestures or pictures to be comprehensible while I am doing the bellwork with the kids and especially while giving instructions for a lesson. I normally display the handout digitally on the board using a projector and read through it with them, marking where I am reading. And I'll also model how to do each step while introducing an activity. So at this point I'll pass out the HO they'll record their thinking. Show them where to find accurate data for the data section, and then explain how they'll form pairs and discuss and explain which gas they think is the priority for us to focus on first for solving global warming.	During the lesson instruction time, I'll pause and explain the new key vocabulary for the day. They need to understand in order to know if the data they find is fulfilling it correctly. I'm not so worried about the chemical names, and I am going to pause and go over <i>Lifetime, Atmospheric Concentration, and GWP</i> and maybe <i>Nitrous Oxide</i>, because students have confused it in the past.

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Lesson Sequence (Main activities):

☒ Scaffolding: modeling, guided practice, independent practice I'll model what kinds of data they'll be looking for and how their pair conversation should look. The handout will also have reminders and be structured in such a way to scaffold them along the way.	☒ Interaction They'll interact with their pair partner, and I like to constantly circulate and either help, formatively assess, or provide quality control for their choices.	☒ Processes: reading, writing, listening, speaking Students will be reading and writing when finding their data, and writing their final choice and reasoning. They SHOULD be speaking and listening in their pair talk, but I'm worried there might be dominant students. ☒ Feedback I try to give constant feedback of a variety of forms as I continually circulate the room. ☐ Links to objectives	☒ Comprehensible input Like I said above, I'll try to be comprehensible during instruction time and with the handout, but parsing the data might be hard for some kids. ☒ Application: meaningful, hands-on, promotes engagement I like this question and I think it's interesting because different kids will have different rationale for what is or should be the first priority. I'm going to frame their central question in a way that it has no one right answer.
Time allotted	Activities (Teacher talk, action, etc.)	Other notes	

~20 min	Split up and Gather Data Once students pick their pair partner for today. They will split up the data they need to collect and go research using the resources linked on Schoology. They will be tasked with finding the ● Lifetime ● Atmospheric Concentration ● Global Warming Potential ● How does human society create / release the gas ● How much humans make each year The gases they are investigating are: ● Carbon Dioxide ● Nitrous Oxide ● Methane ● CFCs ● HFCs	The handout will have a table to make it easy for them to split up different sections and record what they found. It will have reminders in each section about what they are looking for.
~4 min	Share data with each other	
~20 min	Consensus Discussion in Pairs Students will discuss what they found and try to decide which gas should be a priority for the world to stop creating in order to control global warming. They'll first answer questions about which gases they think are most powerful, cheapest to solve, easiest to solve, and things like that to make the pair think about the problem from multiple perspectives and get them talking about what makes each gas a different problem to solve. The end of this section will ask them to commit to one gas as a pair, and to explain their reasoning using their data above and about a paragraph length. This is a phrasing that they should recognize and gives them an expectation of the complexity of what they should record. What counts as a full "paragraph" depends on a student, and they know that. Some of my ELL students and SE students will write less and simpler arguments, while other students are expected to write significantly more complex things. They've written quite a few argument pieces by now and they've all been slowly pushed to write more / better each time.	When they pick pairs, most of my ELLs are at a point of English proficiency that trying to speak or write in the L1 is not really an advantage. However, one of my students is still transitioning into using English full time, and has a hybrid approach with half Korean and half English. They'll likely need to translate the digital version and websites. I have another pair of students who are the only two in my class who can talk to each other in their L1 (most of my students aren't that lucky, because we're so diverse). I highly expect they'll pair together and speak almost exclusively in Spanish until they talk to me or the rest of the class. They can read and write in English as well as the rest, I think they just like having someone in school to talk to in their L1, even though they don't <i>need to</i> in order to learn.

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Lesson Sequence (Post-activities):

☒ Review & Assessment: individual, group, written, oral Students will share what they picked and why, and listen to other groups. I like how this will show different perspectives and choices, but this is also an informal assessment for them to compare what they did to others, and for me to hear again what they did. I should already know how they did today given how much I circulate and help out though. ☒ Key vocabulary review I feel like the vocabulary review and content concepts review will happen while students are sharing out their reasonings. ☒ Key content concepts review ☒ Learning objectives review Going to do this after they share out their reasoning, or maybe before. I'm unsure where it would serve a better purpose.		
Time allotted	Activities (Teacher talk, action, etc.)	Other notes
~10 min	Reasoning share out At the end of the hour, I would like about 5 groups to read their choice and reasoning out to the whole class. (I'd do them all, but I don't think we'll have time since at this point I think it may already be day 2)	
~4 min	Reflection and Review Objectives Reread and review the point of the objectives for the day. After that, I like the idea of a quick reflection survey where I ask each student to think and raise their hand if: • They and their partners did a good job collaborating and finding an answer to the complex question of which gas to focus on first. • If another pair had really good reasoning for their choice • If one of the groups that shared had a similar choice or reasoning to them • If one of the groups shared something that their pair did not think about and was worth considering. Might close with a quick reflection question about how solving global warming is complicated and difficult and how much society will need to change in order for us to completely solve it.	

