

Plate Tectonics Lesson Analysis

NATS 3343.001

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Introduction of Lesson Plan and Objectives

The original lesson objectives, as stated in the lesson plan, were: 1) SWBAT describe the concepts of plate tectonics as they relate to the ocean floor, and 2) SWBAT explain the environmental factors of the ocean and how they can limit, expand or change population characteristics. For objective one I introduced the topic on the first day and covered with a manipulative created by the students. During the lesson I became aware that the students could not finish the lesson. I spoke to my mentor and with his permission I dropped objective two altogether.

The example to the right represents a finished manipulative. The taped strips of paper are assembled and simultaneously pulled. The idea was to pattern an ocean ridge and to help students understand that corresponding colors reflect a corresponding time in which the ocean floor was created.



However, the students lacked the basic skills to complete the manipulative. Some students did not even have basic spelling skills or hand-eye coordination. This proved to be very detrimental to my lesson. While I had anticipated some of the student's misconceptions it had never occurred to me that they would be unable to color. Some of them could barely write. Out of seventeen students twelve of them are classified as special education. While it is traditional to have an additional teacher present she could not be in the classroom for either lesson.

My original lesson also included group work for both days but I could not move past the 'engage' portion of my lesson due to the student's lack of skills. I did not attempt anything more complicated for the students, including my planned group work. However, part of this incomprehension was my fault. I could have done a better job of explaining the activity. During the lesson I decided to give 'chunked directions' so that the students could follow along more easily without getting lost. I only gave them a portion of the directions at a time but I neglected to show them the final product first so they did not know what the end result was supposed to look like. This created some confusion. The students varied widely in skill level. Some students had trouble completing the first set of directions as some were waiting on others. In the future, I would group the students in the class according to skill level. In this way the special education teacher could help with the lower level students so they could keep up in group work.

In accordance to what we discussed in CI I decided to change my mannerisms and vocabulary during the presentation of my lessons. I agree that moving and speaking similarly to your audience helps you connect and therefore helps in the learning process. I am much older than they are. While that affords me some respect it also means that have to try even harder to connect with them. During the lesson I also tried to stay as relaxed as possible and inject some humor. As the students entered the room I welcomed them in and thanked them for coming to class.

Day One Lesson

During the 'engage' activity the students filled out a survey, crumbled it and threw it in a basket at the front of the classroom. They really enjoyed it. That excitement

carried over when I asked for volunteers because many students were interested. They were having fun! I asked a quick assessment to see how many people felt comfortable with the survey. I wanted to see how comfortable they felt versus the number of correct answers that I would receive.

Prior to teaching I also had expectations of class discipline. When I asked questions they just started yelling out comments and did not raise their hands. In the future I might post a quick slide with a rule that includes hand raising. I kept asking them to be quiet and raise their hands but I eventually realized it was a lost cause. I then tried a different approach. Instead of chiding them every time they did something wrong I decided to praise the students every time they did something right. In the middle of the 'basketball' activity I received many volunteers but only picked one. I asked the students to give her a round of applause when her task was completed. I did this because I wanted to acknowledge how brave and eager she was. These acknowledgements lead to helping establish rapport with the students. As a direct result this student helped control the rowdiness of the classroom and encouraged respect for me per the feedback from my mentor. At seven minutes and ten seconds we had a group question and answer discussion about the survey.

There are several people in this class who do not care to participate at all while others seem to need constant attention. Judging by the rationale each of them give for their answers it is clear that some have a basis for this lesson while some are severely lacking. Additionally this 'group form answer' has caused low level murmuring which make it more difficult for both parties of people to hear each other. I try to counteract this by asking, "Did everyone here what (name) said?" and then paraphrasing the question r answer for everyone.

At seven minutes and twenty-one seconds I ask a question that is based on one of the lesson TEKS: "The earth's plates move due to what driving force"? By this time I am over the lesson time for the 'engage' portion of the lesson. However, since it is specifically defined in the TEKS I decide to address it even though I am over time. When the tallying of answer has finished I ask for sometime with that answer to tell me why they think that way. Then I asked, "Do you all agree with him? If so, why not?" One of the students said no because he believes that erosion breaks down rocks. He also believes that the Earth's plates are moved by heat." I like the way I asked 'why' questions and had the students 'debate' about the right answer. This is the recommendation of Manoucherhi and Lapp. I wanted to give students a way to communicate why they thought the way they did. It did show that students would often know the right answer but would not understand why. If I had more time I would address some of the misconceptions further as uncovered by this higher level questioning process.

I also liked the way I covered the concepts in the knowledge packet before I asked the TEKS question. It is clear that some of the students did not have any depth of information included in the knowledge packet even though I found out after the lesson they had watched a plate tectonic video several weeks before. This reminded me of the article written by Doran in which he states that, "knowing the right answers requires no decisions...carries no risks...and is thoughtless" (Doran 64).

As I move onto the 'explore' portion of the lesson it is clear that I am beginning to the attention span of the students. The low constant murmuring has developed into

mid-level continuous talking. Some of it has to do with preparedness on my part. When my partner and I have previously visited the classroom there was a desk at the front of the classroom. I had been anticipating this when I came in for my lesson so that I could divide my supplies out to make a smoother transition from each section to the next. However my mentor had moved it. Also, my partner did not show up until 10 minutes into the lesson and then asked me for a writing utensil during the beginning of my lesson. I am grateful that Dr. McConnell was kind enough to set up the video camera in her absence. Additionally, my mentor was nowhere to be found when I showed up and I did not get into the classroom until right as the bell rang. During my lesson I was working out of a supply bag and this slowed me down considerably. It also took my attention away from the students as my materials were not readily available. Nor was I able to have someone to help hand out the copies for the students. However, I was able to compensate for some of this because I decided to bring a clipboard.

If I were to do this section over again I would prepare differently. While a SPED teacher, in theory, should be present in this class I have not met her during any of our observations or lessons. She has a tremendous work load and she is always in great need throughout the school. I would not count on her presence. I would try to move the desks into groups of 3-4 with assigned seats, perhaps colored coded as we have in CI. Breaking up some of the social groups would help decrease the tendency for them to talk and my tendency to want to quiet them down. During the new seating arrangement I would also try to group by ability of behavior. This does not mean that a few students should do all of the work but rather I could better employ cooperative learning strategies. The grade on the activity would be partially based on how you work together as a group. This cooperative group learning is something we also discussed in CI. The current seating arrangement for this class has no restrictions. This 'free for all' seating poses some problems because even in the 'engage' portion there were students who were actively disengaging. Instead of having the peer pressure act negatively on the students, and on my lesson, it would be better to use it as an advantage to work in my favor. By this I mean construct a competition between groups with a desirable outcome for them to participate. In this way they might pressure each other to do well.

The most eye opening part of my lesson on day one was the 'explore' portion. I had hopes to cover all of the learning cycle phases in day one with one TEK and repeat for day two with the second TEK. I had decreased my lesson TEKS down to two, per advice from Dr. McConnell, to give me some 'wiggle room'. I apparently did not have enough because I could not get past certain directions in the 'explore' portion in lesson one. This caused me to forgo not only the second half of the 'explore' portion but day twos original lesson altogether.

In this break of the two sections I had begun to loose interest from the students due to causes already discussed. I could feel it at the time but I wasn't sure what to do about it. I was determined to get through the color/cut activity so we could at least move on to the cooperative group portion of the 'explore'. I thought this would increase the interest. By this time I was also very aware of how behind I had become. This is evident because by eleven minutes forty-seven seconds in the video I was starting to show signs of stress. My speed of speech increases and I seem to be more uptight.

I had prepared a finished version of the activity to show the class as I had learned from experience in Step 1. However, I failed to explain what we were making! I had

practiced the explanation of the model but skipped over it entirely during my lesson. Instead I skipped to the chunked 'how to' directions. I did however repeat the directions several times and then had a student repeat it back to me. This is also something I learned in Step 1. I noticed some students just sat at their desks. I then grabbed the excess colors to distribute while I walked around the room answering questions. I repeat the instructions again in several different ways and then hold up a student model.

As I became aware the lesson was not going to be completed in one day I started mentally readjusting what to do next. I began to calm down a little when most of my students seemed to finally understand what they were supposed to do. In fact, at fifteen minutes and thirty seconds into the video one of the students starts singing! I found out later that my mentor used this activity and played music. His class loved it! I would add this to the lesson as well.

At seventeen minutes into the video I decided to give them a time limit of five minutes to complete the coloring portion of the directions. I thought that this limit would help focus them to complete the coloring so that we could move on as it did when I taught in Step 1. The higher functioning students had already completed coloring but most of the class weren't even close. I had one student just beginning but I made the decision that we had to move on. To accommodate the great variation in skill I also decided to give the faster students the directions individually to keep them on task.

At nineteen minutes into the video a student comments, "This is a lot of work!" I reply with a smile, "Now you didn't expect to come to class and not do any work did you?" She replies (with others), "I was hoping!" I laughed and said, "Awww, you were hoping!" We all got a good laugh. I think this is another good example of establishing good rapport with students. Several minutes later I realized that there was no way I could push them into finishing and I asked my mentor if I could drop the day two lesson entirely. When he agreed I informed Dr. McConnell and my partner which is evident on the video at twenty two minutes and thirty seconds.

At this point the noise level in the classroom is at its highest. Some students cannot let go of coloring the activity and others are almost finished completely. They are having loud conversations and I am desperate to keep them on task. I try to do this by calling them even more by name and standing in between them. I am also praising individual students who are on task. My students enjoyed coloring so much they tried to go back to that step when I was giving directions for another step. At twenty five minutes and thirty two seconds a student asks, "Can we decorate the middle?" My initial response was no but then I said, "You can decorate it after class but we need to do this step first." I did not want to stifle their fun but I just wanted to make sure that we finished the 'explore' portion so that we could pick up the 'explain' portion on day two. I knew that the only thing that would make them stop coloring was the bell so I did not want to carry coloring over to the next day. I learned from this lesson that high school students love to color too!

As I watch the video, I realize now that there are a few students who have trouble coping and need more minutes then I can give. There are also a small portion of students who want all of my attention and my approval for psychological reasons. The previous group has trouble keeping up with the lesson and with others while the latter group disrupts constantly. In the future I will be aware of this interaction of which I'm sure exists in all classrooms. At thirty two minutes into the video the classroom volume and

need for attention has caused me to miss a request by a student for tape. Thankfully, he sits in front of my mentor and he was able to get him the supplies he needed. If I was in this classroom by myself this student would not have had the supplies necessary to complete the activity. I will bring more supplies in the future.

At thirty three minutes I again have a student repeat the last section of the chunked directions to the class. As we are finishing the activity one of the students decides that the activity looks like a women's chest and part of the class giggles. I did not even see it happen but part of me knew he was doing something disruptive because I called on him by name immediately. In some way this may have been a good thing because to draw attention to it would have made it more disruptive. However, it is a good example of what you can miss while teaching a lesson.

After we complete the activity I begin to ask questions to help the students explain the model to me in their own words. At this point in the lesson I have about ten minutes left. One of the students answers, "It's the Earth's crust moving." This is what I am looking for but he doesn't seem to know why. At thirty-six minutes and sixteen seconds into the video I use the model to provide formal definitions and explanations of what the model represents. I also tie the model with the questions we explored at the beginning of the lesson. After three minutes of questions and vague answer the students still have not connected to concepts. I help out a little but in the future I will fill in the blanks faster as per feedback from Dr. McConnell. After this experience nothing looses a class faster than dead space and silent answers.

Day Two

At the beginning of day two I had a completely revamped lesson plan. After day one it was clear to me that I had been very overzealous with what I wanted to accomplish even after dropping some of the TEKS as suggested by recommendation. When class started I welcomed them in and asked some of the early students if they were going to the football game that night. Before the lesson I came to the high school area early that day and drove around for over an hour trying to learn about the neighborhood. I was determined to try to engage the students on a more consistent basis than I had done the previous day.

When we came in my mentor had a copy of the previous day's activity up under a document camera. He had been doing the activity with his previous class. It gave me a good idea on a more clear and succinct way to give directions to the students in the future. Also, there was a huge box of crayons on a lab table in the back of the class- also a good idea!

One of my changes included a short video by 'Bill Nye the Science Guy'. During the first day I saw an internet tab with 'Mythbusters' on my mentor's computer. I thought something similar would work for our class too. During our observation, and the previous lesson, I also noticed that the students had trouble staying on task. They get confused easily. I decided that we would watch a video but they would have to answer questions. I gave them these directions and started the video. Before each answer played in the video I told them it was coming because I wasn't sure that they could follow along. This helped quite a bit and it was fun. In the video for my day two I seem much more relaxed and the students do too. It took us much less time to get settled down and even though we had

several new students I was ready for them. I brought many additional handout copies and extra name tents.

My partner commented later that I ‘practically spoon fed the answers’ from the video. This is partially right. I wanted to cover a fun, short activity that re-explained the concepts from the first day. The object of the video was to get their attention again, have fun and have them tell me the answers. I was so pleased because, as you can see from the video, I had everyone’s attention. This was an improvement over day one. As the video played I tied it directly into our activity from the day before.

After the video completed we reviewed each answer as a group to make sure that everyone got the right answers. It was imperative for me to remember what I wanted the students to know was not how to analyze how to get answers from a video but to know the concepts. The beauty of the video was that it was also short and to the point so I was under time. Afterwards I had two volunteers use silly putty to act out additional concepts of plate tectonics that were part of the lesson TEKS. The silly putty was a hit more than the concepts and throughout day two I was plagued with the question, “Can I play with the silly putty?” I did not bring enough for everyone because I was afraid it would be a repeat of the coloring activity from the day before. I did want them to have a chance to do it themselves so I put it with the items from the lab.

Just as the first day of my lesson I was originally determined to have a cooperative learning activity but it was dashed. While everyone was willing to color the day before very few were willing to participate during day two. Instead I had several people tell me when they came in that they ‘weren’t going to do anything’ and they let me know it. Several of them seemed very tired during day two and some told me they were ready to go home to take a nap. They seemed to have warmed up to me but I was fighting a battle all period to get them to do anything beyond watch the video.

At eleven minutes and fifty six seconds into the video I ask for another volunteer and this time it is one of the mentally handicapped students and I have to give her the answer. This taught me a valuable lesson in this class. Many people want to be involved , and they should be, but many do not even know the answer or the question. I will in the future design my questions not to embarrass a student and put them on the spot. I gave her answer quietly to put on the board but a better way would have been to give her a ‘lifeline’ to use for a classmate. I drew the example as I went over the concepts but if I had the opportunity I would like to have had the diagrams already drawn. This would save time and dead space when my back is turned. I did a very good job waiting for the student’s answers and feedback on both days. This is an example of this because I did not rush the student as she was figuring it out. It may have cost some time but I feel that this helped establish more rapport with the students as it gives them the respect they deserve. Extra time also allows students to really think about their answers.

As the students struggled to give coherent answers I guided them more than I did from day one as recommended. The question and answer portion moved faster but I’m not sure that they still understood the concepts. I could not tell if they were uninterested because they were tired or lost. On a positive note I did get a larger variety of students to volunteer and that was progress to me.

After a quick review of the concepts I asked everyone to get up. Hardly any one moved. A student, which defended me on day one (she had applause during my first lesson), told everyone to get up and they did. I didn’t get offended that they were tired. I

was too but I should've made a quick change to the lesson. I should have made the decision at the beginning of class to send artifacts around to the students instead of making them get up. At fifteen minutes and forty five seconds everyone moves. This is another example of good rapport with students. They didn't want to move but they did.

On the lab table I brought several shells, a recording of a whale, and algae with the hopes of connecting the TEKS covered in day one with the TEKS for day two. I knew that getting them moving would help me to keep them engaged. They were to tell on their student sheet how these organisms would be affected by plate tectonics but they didn't want to do that either. So I modified the lesson, at one minute and forty-one seconds in video three, to give them examples. In the background a student is continually making fun of me and I am trying to ignore it. This is the same student who has been the primary disruptor during my lessons and the observations. After the lesson, my mentor says that she disrupts his class in the same way however a student during my lesson defended the need for her to keep quiet.

At two minutes and fourteen seconds I concluded that very few of the students are interested or engaged. Instead of further boring them I decide to tell about each object and relate to my personal experience. That seems to help some but I struggle through this portion of the lesson. I have effectively lost every student. They are just mindlessly playing with the marine objects. Then something surprising happens. The students are actually starting to discover the objects. At seven minutes and two seconds it is evident that they are putting the shells up to their ears, and using the magnifying glasses. A student then decides to record themselves on the audio recorder and I decide to send them back to their seats. There are audible sighs on the video tape.

At one minute and three seconds into video four I write a sentence stem on the board for ELLs. Even though I do not have any ELLs in the class I think it helps everyone. However, I got distracted and forgot to finish my stem. It did help the review process. At five minutes and ten seconds into the video students are talking during the post-assessment even though I've asked them to be quiet. I walk up to them and stand. This is a classroom management skill I learned from CI. When the majority of the class had completed their post assessment I gave them permission to play with the lab objects. I explained that this was only allowable if they were quiet. They finished so quickly that I had an extra ten minutes to the class period. I decided that I was not going to let that go unused even if they had already finished their post assessment. I remembered a recommendation from Dr. McConnell that involved globes so I had every student pick a globe and go back to their desk.

Time is precious in a classroom. It truly can be your worst enemy or your friend. Any extra time is an opportunity to help a student grasp important concepts and I wasn't going to squander it. When the students came back to their desks I showed them where the mid-Atlantic ridge is located, where we are and other points of geologic interest. I thought that they might be bored because they were so tired. Now that there were no expectations and they could sit down they did a great job. It turns out that they knew a lot about mountains, sea floor spreading and the ocean floor. They asked me about hot springs and anacondas. All of which I related to our lesson. In fact, we covered more ground and they were more eager during this 'after lesson' portion than they had been all period.

My mentor was very precise on what he wanted and did not want in the lesson. He would not allow any new vocabulary words or complicated activities. And, true to his prediction, the students had a very hard time with some basic hand eye coordination and independent tasks. In contrast, they did very well on the pre- and post tests which told me that they had some rote memorization of material but did not understand some of the concepts behind them. During the extra time during the second day they asked me base questions such as, “Why do we have a certain number of days in a month”? They also seemed to be clueless about average temperatures on the Earth. They didn’t know that the equator was hotter than the Antarctic. I believe they were so engaged because this was information they wanted to know about versus information they were not interested in. Duckworth referred to this as learning with “breadth and depth” otherwise known as scaffolding (Duckworth 78).

Examples of Student Artifacts:

Name Andrew Date _____

Virtual Tour of the Ocean Floor: Plate Tectonics

Section I:
Answer the questions below as we watch 'Bill Nye the Science Guy'.

1. Until World War II most scientists thought the Ocean was flat.
2. Scientists later discovered the 12,000 mile long mountain range under the Atlantic Ocean called the: New Atlantic Ridge
3. The seafloor is spreading!
4. Does the Earth grow as the sea floor spreads? Circle one: yes or no
5. Recycling of the Earth's crust is called subduction

Section II:

1. Name one layer of the Earth's interior:
a. sky b. air currents c. mantle d. water
2. The Earth's plates move because of what driving force?
a. Water b. Heat c. air currents d. erosion
3. The extension of Earth's plates cause the following:
a. Rift Valley b. Earthquakes c. Mountains d. Hot Spots

Section III:
What did you enjoy the most about this lesson?
the shells

Name Manuel Guerrero Date _____

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Section III:
What did you enjoy the most about this lesson?
The lab

Revisions and Reflections

In the few lessons I have been privileged to be a part of the 5E lesson seems to work well. Most students enjoy the scaffolding and repetition provided by the structure. However, in this class I would not use the 5E lesson model if I had the opportunity to do it all over again. The students seemed more engaged with a very loose structure. In the moments that they asked many questions they seemed very content. I just tried to guide the questions in the direction that I would like for them to go. If I pushed them they were not interested and shut down very quickly. If it were my classroom I would ask them what they want to learn and then mold it to the TEKS and the lesson plans. This group has a projected disdain for school but they are still coming to class. Indeed several of them are past the age of 17 and could leave if they wanted to but they don't. They choose

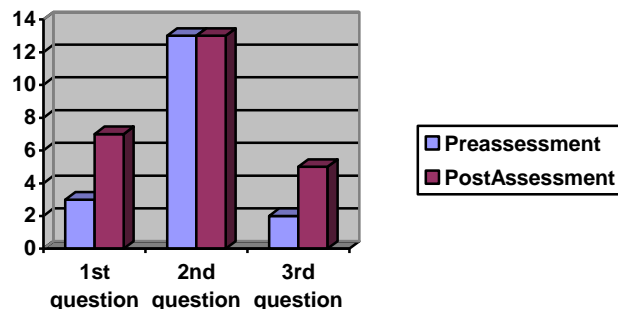
to come back again and again...and that gives me hope. Somewhere deep inside these students have a true reason for attending school. If the instruction could tap into this reason the results would be very exciting to see. With this in mind I have created a format that would be more beneficial for this class. Indubitably a teacher would have to tweak their lesson format for each of their classes and may even have to tweak day to day. The dynamics change depending on the students, the community and events that influence them at home.

I gave an assessment before and after the lesson which gave some surprising results. I only used two of the questions for a comparison. Question number one asked, 'plates move because of what driving force?' The first assessment was given on day one and the same assessment, with rearranged questions, was given on day two. During the first assessment only three students chose the right answer whereas seven students chose the right answer the second time. There was also an improvement on the third question results. I believe that the changes in results are too small to represent any change in student's knowledge. Upon reflection I would make the lesson plan much more interactive.

Assessment Questions:

- Plates move because of what driving force?
A. Water B. Heat C. Air D. Erosion
- Name one layer of the Earth's interior?
A. Sky B. Air C. Mantle D. Water
- The extension of the Earth's plates cause the following:
A. Rift Valley B. Earthquakes C. Mountains D. Hot spots

Right Answers by Comparison:



Mentor Teacher Feedback:

UTeach Dallas - Classroom Interactions

Helen A

Lesson Feedback From Mentor Teacher

Please fill this out and hand back to UTeach students before they leave your class.

Date 10/19 Time 3:20 to 4:10 (Circle) Lesson 1 2 3 - Math or Science

School Berkman HS Mentor Teacher: Paul Mikesell

UTeach Teachers: Helen A / Christian L.

Please use these codes to complete the form: \checkmark^- = needs improvement; \checkmark = observed; \checkmark^+ = good

1. The effective teacher has positive expectations for student success.	2. The effective teacher is an extremely good classroom manager.	3. The effective teacher knows how to design lessons to help students reach mastery.
\checkmark^- Invites students to learn.	\checkmark^- Students know what to do and how to do it.	\checkmark^- Students know what they are to learn and do.
\checkmark^- Welcomes students to classroom.	\checkmark^- Uses strategies that promote good student discipline.	\checkmark^- Teacher checks for understanding during the lesson.
\checkmark^- Speaks clearly, with appropriate volume.	\checkmark^- Teacher redirects or stops inappropriate behavior that may occur.	\checkmark^- Students are working to learn; they are engaged and on task.
\checkmark^+ Uses "please" and "thank you." <i>(in direct affirmative and positive)</i>	\checkmark^- Class is task-oriented; there is a predictable environment.	\checkmark^+ Students work productively in cooperative groups. <i>own</i>
\checkmark^+ Smiles. <i>(politeness)</i>	\checkmark^- Relatively little wasted time, confusion, or disruption.	\checkmark^- Students are actively working during direct teach.
\checkmark^+ Addresses students by name.	\checkmark^- Students demonstrate respect for the teacher and for each other.	\checkmark^- Teacher asks questions at different cognitive levels to probe what students know.
\checkmark^+ Teacher dresses professionally.	\checkmark^- Students demonstrate the ability to apply what has been comprehended.	\checkmark^- Teaching is shared equally by both members of the team.
	<i>(Eke strongly defended the need for students to respect you)</i>	

Comments:

All lessons have variables - "hands on" is the most variable (and, true story, they love craft activities). You can't rush these experiences or else you miss out on the learning. Good work.

Teacher's signature [Signature]

Stayed focused on the point is a flexible course with the procedure

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Films are funny. I've noticed that ~~the~~ the students say they like to watch them but often don't pay attention — you did well keeping them focused (calling out the questions as the film progressed). → (then immediately following up.)

Some students were actively & intellectually engaged and some were intellectually engaged but not as active. ^(that's ok) The harder part is to recognize (and redirect) the ones that are active but not engaged (Destiny & Crystal are often in this group) or are so quiet they are able to stay totally disengaged. (Rico ~~was~~ & Angie are good examples). Things like "I learned that..." is a good way to encourage engagement — is also very positive. So is self-directed thoughtful play.

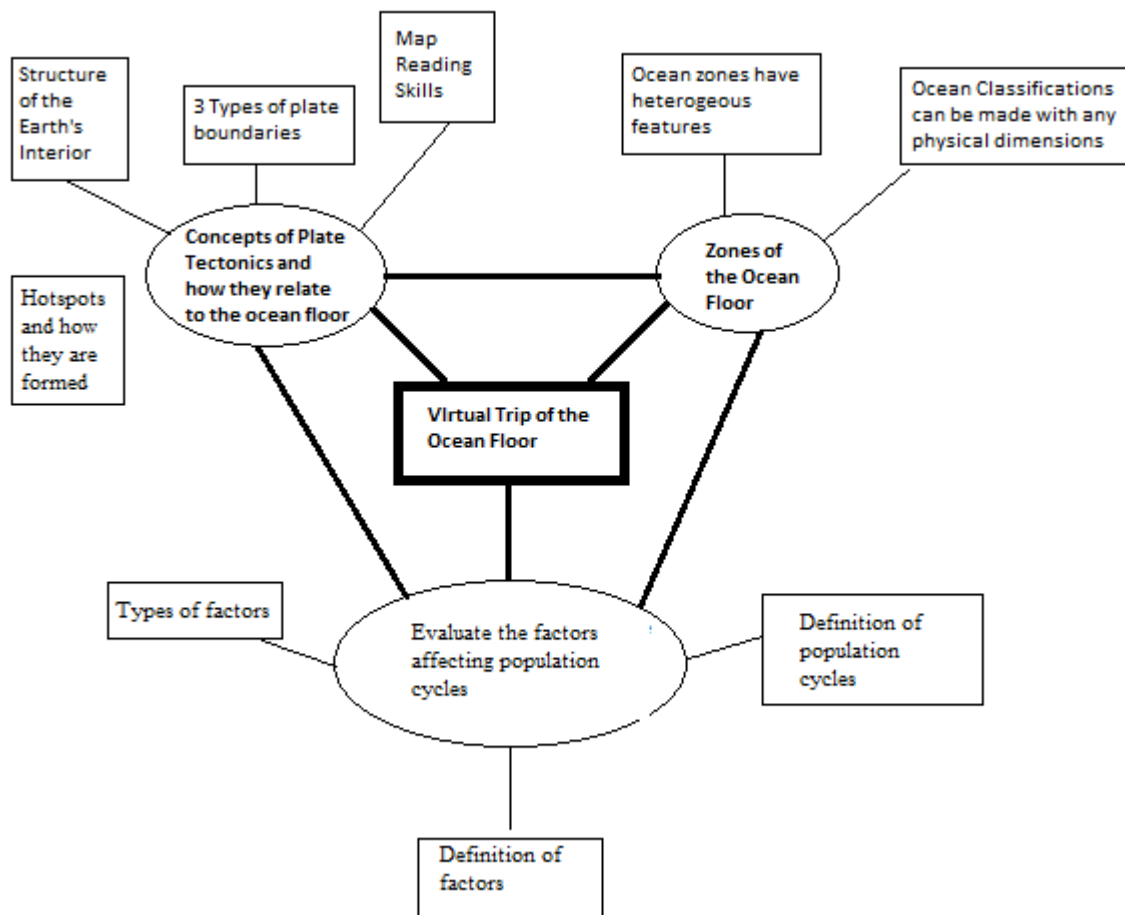
Good wait time with questions.

I've observed in AP classrooms and the conversational style works very well there — it's hard to translate this to gen. level (and especially to "behavioral" situations) — there is no good recommendation here and I forgot over it still.

Works Cited:

- Doran. "Chapter 3: Alternative Assessment Formats." *National Science Teachers Association* : 64. Web. 6 Nov. 2012.
- Duckworth. "*The Having of Wonderful Ideas*" & *Essays*.: 78. Web. 6 Nov. 2012.
- Manouchehri, Azita, and Douglas Lapp. "Unveiling Student Understanding: The Role of Questioning in Instruction." *National Council of Teachers of Mathematics* 96.8 Nov. (2003): 562-66. Web. 6 Nov. 2012.

Knowledge Packet Map:



5E Lesson Plan

Author(s): Helen Arceneaux

Date/Time Lesson to be taught: 10/18 and 10/19, 3:20pm - 4:10pm

Course Description:

Name: Virtual Trip of the Ocean Floor

Grade Level: 10, 11, & 12 grade

Honors or Regular: Regular

Lesson Source: Not based on any outside lesson plan source

Concepts: The Earth consists of large pieces of crust called tectonic plates. These plates move and shift over a hot flowing mantle layer causing geologic features both above and below the ocean. These geologic processes help to determine the different aquatic zones of the ocean. Within these zones there are environmental factors that can affect population characteristics.

Performance Objectives:

Students will be able to:

- Describe the concepts of plate tectonics as they relate to the ocean floor
- Explain the environmental factors of the ocean and how they can limit, expand or change population characteristics

State Standards:

Concept TEKS:

ES (10) Solid Earth. The student knows that plate tectonics is the global mechanism for major geologic processes and that heat transfer, governed by the principles of thermodynamics, is the driving force. The student is expected to:

(C) Explain how plate tectonics accounts for geologic processes and features, including sea floor spreading, ocean ridges and rift valleys, subduction zones, earthquakes, volcanoes, mountain ranges, hot spots, and hydrothermal vents

AS (11) Science concepts. The student knows about the interdependence and interactions that occur in aquatic environments. The student is expected to:

(B) Evaluate the factors affecting aquatic population cycles.

Process TEKS:

ES (4) Science concepts. Students know that aquatic environments are the product of Earth systems interactions. The student is expected to:

(C) collect and evaluate global environmental data using technology such as maps, visualizations, satellite data, Global Positioning System (GPS), Geographic Information System (GIS), weather balloons, buoys, etc.

English Language Proficiency Standards (learning strategies, listening, speaking, reading or writing)

(C) Cross-curricular Student Expectations

(1) Cross-curricular second language acquisition/learning strategies. The ELL uses language learning strategies to develop an awareness of his or her own learning processes in all content areas. In order for the ELL to meet grade-level learning expectations across the foundation and enrichment curriculum, all instruction delivered in English must be linguistically accommodated (communicated, sequenced, and scaffolded) commensurate with the student's level of English language proficiency. The student is expected to:

- (A) use prior knowledge and experiences to understand meanings in English;
- (C) use strategic learning techniques such as concept mapping, drawing, memorizing, comparing, contrasting, and reviewing to acquire basic and grade-level vocabulary;

Ex: stem

- I learned that _____ is when one plate moves under another.

Materials List and Advanced Preparations:

- Scissors
- Tape
- Map colors

Per Student:

- One student Sheet

Safety:

- Make sure that the students do not injure themselves or others with the scissors.

Accommodations for Learners with Special Needs (ELL, Special Ed, 504, GT, etc.):

This lesson contains peer partnering, chunked directions, a jigsaw activity and a think-pair-share activity.

DAY 1		
ENGAGEMENT		Time: 10 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Show PowerPoint slide #1 with the ground rules</p> <p>Have students fill out the pre-assessment here (Layers of the Earth Basketball). The teacher holds up a bucket and they throw it in. The teacher picks a student to come to the board and tally the answers to one question as the teacher unwraps the wads of paper.</p> <p>Then the teacher says: Let's explore this concept!</p>	<p>When you hear that the Earth has plates what does that mean?</p> <p>The Earth's plates move because of what driving force?</p> <p>What is an Ocean anyway?</p>	<p>[Rocks] (Students may not understand that the Earth's crust is made of plates)</p> <p>[water] (While the Earth's surface has water the plates are driven by heat. They do not float on water)</p> <p>[Mermaids live there](Students may have ever seen the ocean but just heard about it in stories)</p>
Evaluation/Decision Point Assessment	Assessment	Student Outcomes
<p>If you hear "the Earth's crust moves because of plate tectonics" then move ahead.</p> <p>If you hear that the ocean stays the same over time then you will need to explain some of the concept of plate tectonics. This explanation will have to include that the top layer of the Earth (called crust) is made of flat plates that move over time.</p>	<p>Does earth's crust stay the same over time?</p>	<p>[There is a mountain building range in the ocean that makes crust.]</p> <p>[The ocean is on a plate and it moves over time.]</p> <p>[Stays the same]</p>

EXPLORATION		Time: 15 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>The teacher says: “to find out about the Ocean we have to find out how it was formed. When the plates move apart magma rises up and makes new crust. Thermodynamics, or internal heat, from the Earth powers this system”</p> <p>Count off the students into groups. Each student should get a “subduction construction” sheet and materials.</p> <p><u>Go over directions with your students. They can work together in their groups!</u></p> <p>Color the corresponding rows in each strip the same color. Then cut out each strip. Turn the stripes facing each other and tape together one end. Cut each of the vertical lines on the ‘ocean floor’ cut out. Stick the pair of strips through the center cut. It should make a Y shape. Then put the left loose end in the left cut and the right loose end in the right cut.</p> <p><u>After students have completed the model have them use their electronic devices to answer the questions on their student sheet.</u></p> <p>They should be ready to share with the class!</p>	<p><u>Circulate among the students and ask:</u></p> <p><u>For the model:</u> So why do the colors match up? What’s happening in the model?</p> <p>What is forming the new ocean crust?</p> <p>After the new crust is formed where does the old crust go?</p> <p><u>For the student sheet:</u> Which type of plate tectonic activity is occurring at each of these locations?</p>	<p>[Because I colored it that way](Students may not understand that matching layers correspond to a certain time period)</p> <p>[layers of rock](Students may not understand that magma is rising to the surface and cooling to create strips of new ocean floor)</p> <p>[Nowhere. The Earth is getting bigger] (Students may not understand that old crust is being subducted and melted to form magma)</p> <p>[Mountains] (Students may not realize that there may be more than one plate tectonic activity at one location)</p>
Evaluation/Decision Point Assessment	Assessment	Student Outcomes
If students do not understand that the ocean plate subducts from their model you will need to explain.	If magma makes new crust and some crust subducts under other crust, is the earth growing bigger?	[Yes](Students need to understand that the earth is not growing bigger.)

EXPLANATION		Time: 10 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>The Teacher says: “So let’s think on these models for a second.”</p> <p>Show Plate Tectonic PowerPoint</p> <p>The teacher will say “earthquakes occur at plate boundaries. Spreading centers create hydrothermal vents, rift valleys and ocean ridges.”</p>	<p>What happens to the old ocean crust? How do we know?</p> <p>Where does the new ocean crust come from? How do we know?</p> <p>What is a hot spot volcano?</p>	<p>[It erodes.] (Student may not understand that ocean crust gets ‘recycled’ through a subduction zone. We know because the melting magma rises up to form volcanoes)</p> <p>[It just comes up through the ocean floor] (While this is correct make sure that students understand that the subducting plate melts into magma and magma creates the sea floor as it cools and spreads.)</p> <p>[All volcanoes are hot spots] (While it is true that magma is very, very hot not all volcanoes are hotspots. We know that hotspots are ‘motionless’ weak points within the Earth’s crust.)</p>
Evaluation/Decision Point Assessment	Assessment	Student Outcomes
<p>Students may not understand that the hotspot stays in a static location where the crust moves over it and creates a hotspot volcano chain.</p>	<p>How do I know it’s the crust that is moving and not the volcano?</p>	<p>[I don’t]</p> <p>[The volcano is moving because it erupts]</p> <p>[If in the ocean it produces hot spot island chains just like we saw on the student sheet question]</p>


ELABORATION		Time: 10 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Show Formation of Ocean Crust Animation http://www.wwnorton.com/college/geo/animations/formation_of_ocean_crust.htm</p> <p>Show Formation of a hotspot volcano animation http://www.wwnorton.com/college/geo/animations/hot_spot_volcanoes.htm</p>	<p>What can comparing the magnetic stripes tell us? What do you already know?</p> <p>When a hotspot leaves a volcano behind what can the volcanoes tell us?</p> <p>What affect could a trench have on the environment inside the trench?</p>	<p>[That the stripes were made at the same time] (Students should be able to understand that it will also show the direction and speed at which the plates are moving. Therefore it will also show us where the continents were located at specific times)</p> <p>[When the hotspot was active] (Students should also understand that it will also show how fast and it what direction the plates are moving)</p> <p>[its hot](Despite being deeper into the Earth ocean trenches have high pressure inside them, due to the depth of the water, as well as very cold temperatures.)</p>
Evaluation/Decision Point Assessment	Assessment	Student Outcomes
The students may be confused as to where and how the hotspots are created	How do hotspots form?	[magma rises from the surface] (While this is correct it is important for the student to know that a hotspot is a weak point in the Earth's crust)

EVALUATION		Time: 5 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
The teacher will say “On your student sheet I would like you to answer the last section of questions and turn your sheet in at the end of class. It is your ticket out of the room.”		

DAY 2 ENGAGEMENT		Time: 5 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Play video “Marine Census” http://ocean.si.edu/ocean-videos/census-marine-life-video-release 3.32 minutes</p> <p>The marine census was released just last week! The teacher writes on the board any characteristics given by the students.</p> <p>Make sure to make the point that a limiting factor controls a process such as growth, population and size whereas an environmental factor is any factor (living or nonliving) that has influence on an organism.</p>	<p>If I wanted to sort different animals of the ocean how would I sort them?</p> <p>What factors determine these characteristics?</p>	<p>[Their names](Students may not understand the concept of different characteristics)</p> <p>[what’s a factor?](Students may not get the concept of a factor)</p>
Evaluation/Decision Point Assessment	Assessment	Student Outcomes
Geologic processes have an effect on ocean floor depth. Depth is the most important factor when determining the biology of the ocean. It has a direct result on water pressure, temperature and amount of sunlight each portion of the ocean receives.	Quick thumbs up, thumbs down assessment: The depth of the ocean is the same everywhere.	[Thumbs up or thumbs down] (Students may not remember that geologic processes have a direct result on the depth of the ocean. Trenches, made by subduction zones, are very deep while the shoreline is very shallow)

EXPLORATION		Time: 15 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p><u>Go over the following chunked directions with the students.</u> (Jigsaw activity)</p> <ol style="list-style-type: none"> 1. Each group gets one object. Each object has a description. Hold up your object and your description. (Demonstrate with them) 2. Each person should research one question on the student sheet. These questions are about a factor. (Demonstrate for them) 3. You will have 10 minutes to research the question and share the answers with your group. 4. The last 5 minutes you get up and pair with an expert from another group 	<p><u>Circulate among the students and ask:</u></p> <p>What are you researching? So what happens if you change the amount of light it gets?</p> <p>What happens when you change the temperature?</p>	<p>[Nothing] (Students may not understand that light is essential to the growth of algae which is the basis of almost all food webs in the ocean)</p> <p>[It dies] (While this may be true for some species most will survive or do better in a variety of temperatures)</p>
Evaluation/Decision Point Assessment	Assessment	Student Outcomes
If students do not understand the concepts of factors you will have to review the concept with them again	What do I mean when I say the word factor?	[temperature](Students may not understand that there are many factors. A factor is something that influences an outcome)

EXPLANATION		Time: 5 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Go over student results. Explain that a group, or population, of animals is affected by factors in the environment. When a factor limits their growth it is called a limiting factor.</p> <p>Time for a think, pair, share! Get one factor from your partner that you didn't have on your list before. Be ready to share with the class. You may want to use chart paper or the board to help students build their lists.</p>	<p>What are some factors that affect ocean life?</p> <p>How will these new factors affect wildlife in an ecosystem?</p>	<p>[water](Temperature, sunlight, salinity, turbidity, minerals in the water, etc)</p> <p>[They don't](Students should understand that limiting factors affect the population growth. Factors also change the population characteristics)</p>
Evaluation/Decision Point Assessment	Assessment	Student Outcomes
Ecosystems are affected by a variety of factors including geology, biology and chemical factors. Everything is interdependent on everything else.	So how many factors are there in an ecosystem?	[one] (Students need to be aware that everything is interdependent on many factors)

ELABORATION		Time: 10 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>Show students picture of measured and weighed manta ray</p> 	<p>What am I doing here and why?</p>	<p>[Killing a stingray] (Weighing and measuring a stingray. This is to keep track of its health which is a direct result of factors in its environment.)</p>
Evaluation/Decision Point Assessment	Assessment	Student Outcomes
<p>Students may not be able to extend the concepts of factors beyond the lesson.</p>	<p>What factors impact your health?</p>	<p>[McDonalds](Students should understand that shelter, food, stress, temperature and physical activity all affect their health)</p>

EVALUATION		Time: 10 Minutes
What the Teacher Will Do	Probing/Eliciting Questions	Student Responses and Misconceptions
<p>The teacher says, “Here is a giant manta ray. I want you to fill out the bottom of your student sheet with the answer to this question”.</p>	<p>What are the environmental factors affecting this manta ray?</p>	<p>[water] (While water quality is a factor, water is not)</p>

DO NOT PUT YOUR NAME ON THIS SHEET!



Circle one answer to each of the questions, wad the paper up and toss it in the basket!

1. The Earth's plates move because of what driving force?
a. Water b. Heat c. air currents d. erosion
2. Name one layer of the Earth's interior:
a. sky b. air currents c. mantle d. water
3. The extension of Earth's plates cause the following:
a. Rift Valley b. Earthquakes c. Mountains d. Hot Spots

Name _____

Date _____

Virtual Tour of the Ocean Floor: Plate Tectonics

Tectonic Activity Word Bank: There can be more than one!

Volcano	Rift Valley	Hotspot	Sea floor Spreading	Subduction zone
Earthquake	Mountain Range	Ocean Ridges	Hydrothermal Vents	

Section I: Use your electronic device to find information and a picture of the following places.

1. Kiarei community, Indian Ocean

What type of plate tectonic activity is occurring here? _____

Define the activity in your own words _____

How might this activity affect ocean life? _____

2. Marianas Trench, Pacific Ocean

What type of plate tectonic activity is occurring here? _____

Define the activity in your own words _____

How might this activity affect ocean life? _____

3. Hawaiian Islands, Pacific Ocean

What type of plate tectonic activity is occurring here? _____

Define the activity in your own words _____

Does the hotspot move or stay in one place? _____

4. The Mid-Atlantic Ridge, Atlantic Ocean

What type of plate tectonic activity is occurring here? _____

Define the activity in your own words _____

Is this ocean floor at the mid-Atlantic ridge younger or older than at the coast line? _____

Section II:

5. Name one layer of the Earth's interior:

a. sky b. air currents c. mantle d. water

6. The Earth's plates move because of what driving force?

a. Water b. Heat c. air currents d. erosion

7. The extension of Earth's plates cause the following:

a. Rift Valley b. Earthquakes c. Mountains d. Hot Spots

Revised Lesson:

Under the advisement of both my mentor and professor I would not create a 5E lesson for this particular class. However, I would follow the general format with more manipulatives and question/answer sessions. It is their recommendation to cover the TEKS with a guided idea not the structure of the typical lesson plan.

Lesson 2 Analysis Rubric

	C	B	A
Presentation	Analysis is readable, but contains some incomplete sentences and/or some instances of incorrect grammar and misspelled words.	Analysis is neat and readable. Very few grammatical or typographical errors.	Free of grammatical and typographical errors. Neat and easily read. Well organized and attractively presented so that all supporting materials are easily referenced.
Evidence of students having met learning objectives (Portfolio 1-1, 1-3, 3-2)	Evaluates whether stated objectives were met <i>based on limited use of artifacts</i> (<i>something students said, wrote or did</i>). Provides only a little evidence of students presenting their reasoning.	Evaluates whether stated objectives were met <i>based on some use of specific student artifacts</i> . Frequently describes how the evidence shows that the student really understood the target concept. Provides some evidence of students presenting their reasoning or discussing the results of their inquiry.	Evaluates whether stated objectives were met <i>based on rich and varied use of specific student artifacts</i> . Describes thoroughly how the evidence shows that the student really understood the target concept. In addition, essay provides cogent references to the research literature on student understanding of subject and learning theory. Provides ample evidence of students discussing the results of their inquiry or discussing their reasoning.
Revisions for future (Portfolio 4-1)	Includes some suggestions for improvements.	Includes suggestions for improvement with discussion of reasons why the changes would be good, based on observer feedback, self-reflection or research literature.	Includes thorough discussion of possible changes to lesson plan with evidence-based evaluation of the merits of each, based on observer feedback, self-reflection and research literature.
Rubric	A copy of the un-annotated rubric is included.	A copy of the rubric is included with the appropriate column circled or highlighted to indicate self-evaluation.	A copy of the rubric is included with the appropriate column circled to indicate self-evaluation. Brief indication of the evidence for column choice annotated on rubric.