Lesson Plan Format for Science Teacher Education Candidates
Ithaca College School of Humanities and Sciences

Name	Caitlin Etri
Lesson Title or Topic	Introduction to Invertebrates
Grade Level	7th Grade
Course Name or Content Area	Life Science

Context

1. Explain the larger context in which this lesson fits. For example, explain what larger unit would be going on at the time of this lesson and how this lesson fits into the unit.
2. State the long-range learning objective/s to which this lesson contributes. The long-range objectives should deal with mastery of knowledge/skills that students will be able to transfer to real-life situations.
3. Describe the students for whom this lesson has been developed. Consider the personal, cultural, and community assets of your students.

This lesson will serve as the introduction to our invertebrate unit. Throughout the unit, students will be dissecting earthworms, while learning about invertebrate morphology, habitat, and their relationship with the ecosystem they thrive in. Today's lesson will focus on the overall categorization of invertebrates. Students will notice similarities and differences between groups of invertebrates, and will draw conclusions about how they are adapted for the environment they live in. Much of science revolves around grouping and sorting like structures and organisms. This process helps categorize information to aid in our understanding of the life around us. Students will be able to understand why scientists have grouped these organisms according to a variety of biotic and abiotic factors. Students will work collaboratively to determine the appropriate classification system, similar to the actions of real scientists. This lesson has been designed for a class of 13 students from a rural, upstate NY middle school. 4 students are academically advanced, 4 are at grade-level, 1 has frequent absences, and 4 have IEPs. These IEPs include a specific learning disability, language disorder, emotional disturbance and a health impairment.

Connections

1. Explain how this lesson connects to lessons or units before and after this lesson to form an internally consistent unit of study

Previous Lesson (unit)	Current Lesson	Next Lesson (unit)
Plants	Introduction to invertebrates	Earthworm dissection

Central Focus

Identify the central focus for the content/skill you will teach in this learning segment (a lesson or series of lessons). The central focus should address the important understandings and core concepts/skills you want student to develop in this lesson or series of lessons.

Invertebrates are critical organisms for our environment. These organisms play a large role in ecosystem dynamics, stabilizing and balancing the niches they thrive in. Students will gain a greater awareness and insight into many of these organisms. In particular, this lesson will focus on the large groups that categorize the many invertebrates. These groups are classified by a variety of likenesses that the selected invertebrates share. Students will be able to classify the organisms on a taxonomic tree and will be able to make connections between a selected organism's characteristics and relationship to its environment. Cooperative learning and group decisions are difficult tasks for real scientists, but it is my hope that my class will be able to collectively share and evaluate opinions based on their selected invertebrate.

State/National Content Standards (NYS/Common Core State Standards, NSES, NSTA, and NGSS)

List the number and full text of each standard that is addressed in this lesson.
Remember to include content and literacy standards, as appropriate to the lesson.

Stability and Change

- Small changes in one part of a system might cause large changes in another part. (MS-LS2-4),(MS-LS2-5)
- Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4)
- Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5)
- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)

CCSS.ELA-LITERACY.SL.8.5

Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.

CCSS.ELA-LITERACY.SL.8.1.D

Acknowledge new information expressed by others, and, when warranted, qualify or justify their own views in light of the evidence presented.

Objectives and Assessments

--Here list the short-range learning objectives specific to this particular learning segment. These objectives should be items that are observable and assessable.

--In addition, you will identify how you will know if the learning objectives have been met. List the types of assessments you will use to determine whether the objectives have been met. List the types of formative assessments you will use to monitor student learning of your short-range learning objectives for this lesson. What assessments will determine proficiency, excellence, or failure to meet the learning objectives?

--As you consider your assessments, you should think about the kind(s) of feedback your students will receive from you related to your assessments and how will you expect them to use this feedback.

Learning Objectives The students will be able to … *Note: If you have more than 3 learning objectives, add a new row for each objective.*	**Formative Assessments** *What evidence will you gather during the lesson to monitor whether your students are developing the understanding/skills required to meet the learning objective you have identified?* *Note: **Every objective** should have a formative assessment.*	**Summative Assessments** *What evidence, by the end of this learning segment, will show that students understand and have met your learning objectives?* *Note: You might have duplicative assessments, or no summative assessments, for your learning objectives in this lesson.*
1. distinguish invertebrate phyla from each other based on their group characteristics.	1. Each pair of students will receive an envelope filled with small cards. Each card has a picture of an invertebrate organism with a name on it. Students will work together to group like organisms based on their physical appearances. This will be done by writing on colored post it notes how they choose to categorize their groupings. Each student must contribute at least 3 post it notes to the categorization process. This will give me an easy visual to assess how quickly the students are understanding the task and the material. I will visit each group to prompt with further questions to see how they are deciding to group organisms together. Once I check everyone's groupings, I will show the accepted version on the	1. Students will have a quiz at the end of the unit that asks for them to write distinguishing characteristics of a few phyla.

	smartboard. In addition, students will complete a graphic organizer that I will stamp when they have written down the correct information of phyla characteristics.	
2. Identify the important ecological role that their invertebrate organism plays in its environment.	2. Students will have a variety of resources to extract information from during group work. I will assess student understanding by listening to their informal presentations of the selected organism they decided to research. The ecological connection for their organism is also a column in their graphic organizer that they must fill out. Students will hand this in at the end of the lesson. This will allow me to assess how well they were able to use their resources properly, without help from home.	2. Students will design a model or diorama of their organism based off of researched scientific facts. Below the diorama, they will include an index card that specifically answers this learning objective.
3. explain how the characteristics of a particular phyla help define the categorization of their newly created organism.	3. Create an organism activity will allow me to see if students have understood the qualifications for phyla characteristics. As an exit ticket, each student will be required to write the reasoning for why their new organism fits into their particular phyla. This will be an independent assessment.	3.

Prior Knowledge	
What knowledge, skills, and concepts must students already know to be successful with this lesson?	How will you know if your students have prior knowledge, etc.? Where will you teach/re-teach if necessary?
Students will have previously categorized objects from a lesson in October. They have learned why scientists like to group like-organisms together. I expect them to be able to retrieve their knowledge from that unit on classification. In addition, students must be able to work collaboratively throughout this lesson. At this point in the year, my students have been socially engineered to work	I will review taxonomic grouping after students have attempted to group the organisms by themselves. When I put the scientifically accepted version on the smart board, I will review the reasons why scientists classify organisms and have the students relate their experiences from the activity to an explanation promoting grouping.

well in groups with one another.	

Academic Language	
Academic language function *Choose one of these higher order language verbs (or another appropriate to your learning objectives):* ***analyze****, evaluate,* ***explain****,* ***interpret****, describe, predict, argue,* ***or justify with evidence****. How will you help them do this* **verb** *(a.k.a academic language function) during or as a result of this lesson? (Include how you will use students' prior knowledge and your teaching in this lesson to facilitate and deepen student learning of this academic language skill.)*	
Students will be able to explain how the characteristics of a specific phyla help categorize their newly created organism. Students will use their experiences with the previous card sorting activity, to help guide their thinking process for the creating an organism activity. This part of the lesson will rely upon working collaboratively with their lab partners to agree upon a "new" organism that could be sorted into their phyla based on the necessary characteristics. Students will explain to the class the justifications/reasons for their decisions depending on how they decided to structure the organism. I will be sure to monitor student progress by visiting every group, checking for understanding through question prompts and stamping their graphic organizers. Although this lesson requires some reading, students will be put into groups to help each other succeed. Some students may read passages aloud, others can search for videos to find information. Scientists work collaboratively, and so will the students.	
Language demands - Function *Analyze, Explain, Interpret, Justify with Evidence*	Language supports
Explain	Students will be able to use the graphic organizer to scaffold their explanations regarding their new invertebrate decisions.

Safety *List here all safety issues and safety protocols required for this lesson and a procedure for checking safety equipment prior to beginning each lesson. You should identify procedures for the preparation, storage, dispensing, supervision, and disposal of science materials used in the lesson.*
N/A

Lesson Procedures: Instructional Strategies/ Learning Tasks *Describe, in detail, the steps you will follow in the lesson, attending to both what <u>you</u> will be doing and what <u>the students</u> will be doing.* ***Boldface*** *<u>all</u> procedures where you are* ***monitoring student understanding using formative assessments.***		
Opening: *How will you begin your lesson in a way that motivates and engages students in learning this lesson's content? (Motivation for lessons should be interesting, age-level appropriate, brief, and directly related to the learning objectives of the lesson.)*		
0-5 min	Open the lesson with this video clip: https://www.youtube.com/watch?v=RYVHK2vM1_Y (Cnidarian eating gobe fish). Ask students to write their reactions on a piece of paper. Have them share with a partner after a minute what they thought of the cnidarian organism. Have they seen anything like it before? Did they think it was harmless at first? Have students share responses with class.	
Time-based Lesson Planning		
Time (in minutes)	*List the next steps of your lesson. Provide detailed description of what teacher and students will be doing.* ***Boldface*** *those procedures where teacher is* ***monitoring student understanding*** *during the lesson. (Your planned formative assessments from above should show up In this section as part of your lesson procedures.) Add rows below as needed.* *Write lesson plan procedures so that another teacher could pick up your plans and actually accomplish your objectives for the class period.* ***(****Hint: The following procedural terms are too vague: introduce, discuss, review.* ***How*** *will you introduce something new?* ***How*** *will you organize discussion, and what questions will you ask?* ***How*** *will you conduct a review?)*	
	What are students doing	What are you doing
5-10	Students continue to share responses with	Show video again: Have students look for

	class about video. Have students share characteristics of Cnidarians they observed with the class.	characteristics that we might use to define what Cnidarians are. Students must write at least three down on their white boards.
10-15	Students receive envelope and begin to group/classify the pictures of given organisms. Students will write down how they are classifying the organisms onto post it notes.	Remind students of why scientists like to classify things. Give example of going into a grocery store: If nothing was labeled or organized, how difficult would it be if we needed to buy a certain type of food? Relate this analogy to organisms and taxonomy. Students will have previously learned about taxonomic groupings, but stretch their minds further to now group their own organisms. Distribute one envelope for every two people. *See attached pairings sheet. Note: pairings will be how students are arranged in the classroom. Students have assigned seats, so matching up students to begin this activity should allow for an easy transition, and not provide a distraction for students. Allow students 5 minutes to try and classify/group as many organisms as they can based on a variety of traits. Remind students to write down on post it notes how they are classifying certain groups by. Tell students that they are each responsible for writing at least 3 post it notes for the categories. Paired students will have different colors, so it will be easy for me to assess how well and how quickly they are understanding the task. The post it notes should be located above the card's grouping so it is easy to tell the traits they are classifying the organisms by.
15-20	Students continue working on categorizing their organisms. Students compare their categorizations against the scientifically accepted version. Students will be given group time to devise arguments if they decide their grouping should be validated. Students share their classification systems with the class. What differences are there among the student pairs? Is one grouping	As students are grouping the pictures, visit every group* and ask prompting questions about how they are classifying them. Allow an additional 3 minutes if students need more time. *Make it a priority to visit Hannah and Dennis' group first during this time. Since Hannah can get easily frustrated, it is important that she is aware of the task, and has little confusion. Once she feels competent in it, she can tutor Dennis if he still has questions regarding the

	more effective than another?	task. Bring the entire class back together to show the scientifically accepted version of the categorizations. Have students compare their groups to the formalized version of taxonomic groups. Visit groups while they devise an argument regarding their classification system.
20-25	Students listen to "Create an invertebrate" activity. Students assemble into groups and brainstorm ideas for their organism. *Students will have assigned roles in their groups. 1. One will read the characteristics that their phyla possess. (This will be good practice for scaffolding verbal skills of bilingual students.) 2. Another student will be responsible for drawing the new invertebrate. 3. A third student will LABEL the physical characteristics that their organism possesses. These characteristics are what distinguish the organism from other phyla. (This is helpful for students who need to improve on their writing abilities.) 4. A fourth student will be responsible for looking up important information about their phyla on the internet.	Present instructions to class for second activity. In this activity, students will be divided into groups of 4. They will have the option to select which phylum they wish to investigate. *See attached sheet for groupings of 4 for this activity. *For EACH phylum, students must identify at least 5 distinguishing characteristics. Students will use graphic organizer to collect information on abiotic and biotic environmental components. DIRECTIONS: As a group, create a NEW invertebrate that would fit within this phylum based on the distinguishing characteristics. Students must provide a justification for their creation. Allow students to use markers and large easel pads to clearly illustrate their new organism.
25-30	Students continue to work collaboratively on activity 2.	Visit each group to make sure they are on task. Assist when necessary.
30-35	"	"
35-40	Before group presentations begin, students will independently complete a brief "exit ticket" where they will describe the reasons in which their new organism fits into their particular phyla. This may be done in drawings with labels or in complete sentences. Begin group presentations. Students will informally present their novel organism to the class. *Every group MUST provide a justification for *why* they have created the organism. What characteristics played a large role in forming the organism?	While students present their organism use the SmartBoard to project photos of the phyla for the rest of the class to learn from.

	Students who are not presenting will take notes on a graphic organizer. They will identify and write down the distinguishing characteristics of each phyla described.	
Closure: *How will you bring this lesson to closure? How will students reflect on what they learned today, and how will you prepare them for what's ahead?*		
40-End of Class	Student groups who have not presented should be prepared to present tomorrow. (Students with IEPs might benefit from this extended time if they are not ready for immediate presentations.)	

Differentiation

Universal Design

What general features of your procedures and/or assessment help support the learning of all students by making the lesson appropriate, feasible, and supportive for every student in the class?

This lesson has been universally designed for a variety of student needs. In my class, Barbara has a receptive language disorder, but she draws extremely well. She will thrive during the creative drawing segment of activity two. As a means of engagement, I have included a YouTube video on Cnidarians to start off the lesson. This serves as the lesson hook to motivate students like Jennifer and Gabriel who can become easily bored when not interested. Collaborative learning is a major component of this lesson. As a result of this process, students can serve as peer tutors to one another. There are multiple modalities of engagement, including group work, drawing, videos and presentations. Students can be creative in their expression of the novel organism. Retrieving information regarding the organisms can be through online text, printed sources, or videos. For students with reading difficulties, peers can work together to scaffold the reading process. The classification activity uses vivid images for students to characterize organisms based on their physical attributes. Students with limited reading literacy skills, (Ramaisa, Santos, Gabriel and Hannah), will feel competent during this activity. Post-it notes will provide a visual for organizing their thoughts in writing. Chandra will benefit from this organization process since she has difficulties organizing her work. The "create an organism" activity assigns an important role for everyone involved in the group. These roles highlight verbal, artistic, written and internet skills. Students will be given choice to pick a role that suits them best. This will give them purpose since their task was not directly assigned, but chosen by them. The graphic organizers included also provide students with an easy way to write down notes about their organism in a comprehensible format. Academically advanced students in this class have two important roles. The first, (as described in the pairings for the classification activity), places these students in the role of a peer assistant. Their high academic abilities and content knowledge will help clarify tasks for their partners. Partners will benefit from working with motivated, diligent students, as they serve as a positive role model. In the second activity, high academically achieving students will be paired in groups of 4 with another academically advanced student. In this role, they can use their internet researching skills (if they pick that position in the groups) to advance their group's understanding of their organism. The activity presents no limit to creativity, or research. These students can contribute their knowledge and understanding of the material to their quad.

Instructional Resources/Materials

List here the resources you will use to engage students in learning.
Include handouts, slides, supplies, images, grouping plans, manipulatives, equipment, or anything else that requires advance preparation. Written materials should be attached to this plan.

Invertebrate cards/1 envelope per group of 2 students
whiteboards
Colored Post it notes
Large easel paper
Colored markers
Access to internet
YouTube clip https://www.youtube.com/watch?v=RYVHK2vM1_Y
Invertebrate Lesson Pictures & Trivia Cards from http://www.sharemylesson.com/teaching-resource/marine-invertebrate-anatomy-50013570/
Graphic Organizers/Pictures/ Invertebrate resources
http://www.hmns.org/files/wow_invertebrates_middle_school.pdf
Netbooks for activity two with internet access for invertebrate resources

Theoretical Principles/ Research-Based Practices
What research/theory supports your lesson design? Explain.

Howard Gardner's multiple intelligences identifies the varying strengths of learners. It is important to accommodate t
color, movies and presentations is a vital component of this lesson.

References
Include here (1) the specific references for the research and theory cited in the section above, and (2) any professional resources from which one

Armstrong, T. (2009). Multiple intelligences in the classroom. ASCD, 3 ed. Virginia. Retrieved from:
http://books.google.com/books?hl=en&lr=&id=zCdxFRFmXpQC&oi=fnd&pg=PR7&dq=multiple+intelligences&ots=ga

Lesson Reflection
After the lesson has been taught, discuss any adaptations you made while teaching this lesson or plan to make if this lesson is repeated in the fu
students' learning?

N/A

Pairings for Cnidarian and Classification Activity:

1. Ariana & Gabriel
    a. I have paired Gabriel with Ariana. Gabriel is bilingual and has limited proficiency and literacy skills in English and Spanish, respectfully. By pairing him with Araina, if Gabriel is confused about a topic and has difficulties describing his thoughts in English, Ariana's bilingualism in Spanish and English will be a great contribution. Ariana will help Gabriel understand the material which will make him feel competent and interested. Therefore, both students will be actively engaged throughout this lesson.
2. Dennis & Hannah
    a. One of Hannah's strengths is tutoring her peers when she feels competent in the material, and mentally calm. I have arranged my lesson so I will be able to visit her group throughout to make sure she understands the task. I have paired Hannah with Dennis because he is on grade-level because of his hard work. This does not mean that he will necessarily understand everything immediately. Because of this, Hannah might feel very important and competent to help one of her peers clarify a task. They can work cooperatively together, and one will not dominate another.
3. Chandra & Michael
    a. Michael is a strong student in all subject areas. He has been specifically paired with Chandra because of her difficulties concentrating, staying on task and organization skills. By pairing Chandra with a motivated, determined student, I am hoping that he will be able to help guide her in a positive direction. He will be able to assist Chandra with many of these tasks. She will then feel proud and competent in her abilities as a student. Michael is a great role model for Chandra and can provide many helpful tools for her to integrate into her studies.
4. Barbara & Martha
    a. Martha is a strong student but only when she's interested. I have included a lot of engaging tools in this lesson that will hopefully draw many students in. This is the only girl-girl pairing in the class. Since Barbara has had a difficult history dealing with taunting from others, it is my hope that having a girl who is academically advanced will help Barbara feel comfortable and confident once she understands the materials. In high school, girls can shut down when boys take over in the class. I want Barbara to feel comfortable and safe in this classroom so she can work to the best of her ability.
5. Jennifer, Santos & Marcus
    a. Due to the fact that Marcus is often absent, I have included a trio pairing that is a positive duo relationship even if Marcus is not in class. Jennifer, an on-grade level student will work cooperatively with Santos. The two of them can assist Marcus if he is present in class that day. Marcus never does his homework, so I am hoping if he is engaged and working with motivated students, he will be encouraged to do the activities.
6. Ramaisa & Samuel
    a. Samuel is a very strong student in biology and Ramaisa is very diligent. Ramaisa struggles with some reading, but I am hoping that Samuel will be able to clarify and pose thoughtful questions during group work that will challenge Ramaisa academically in a positive way.

Quad groupings for create an organism activity:

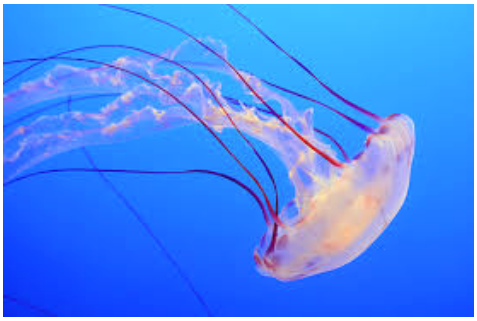
Groups 1 & 2

Groups 3 & 4

Groups 5 & 6

Pictures for grouping

Cnidarian



Mollusks

Echinoderms