Lesson Plan Title: Cell City

Identifying Information:
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SC6.L14.4 Cell Structure and Function Cell City 50 mins 6th Grade

Motivation:
Teacher will hold up a map of “Cell City” (attached) and say, “Here is a map of Cell City. Why is the power plant so important to the city?” Students will give their responses. The teacher will say, “Our cells are like little cities. What do you think is an important part of the cell?” Students will give their responses. The teacher will say “Today we are going to compare the functions of a cell’s organelles to the functions of businesses within the cell city. First I want to see what you already know about the functions of each of the organelles.” The teacher will hand out the pre-test (attached).

Needed Materials & Set-Up:
Cell City Map (one for the teacher and one for each pair of students), 8 index cards (3 x 5 size) for the organelle cards (one set for each group of two students and one set for the teacher) (one for each of the organelle structures: nucleus, mitochondria, Golgi complex, endoplasmic reticulum, ribosomes, cytoplasm, cell membrane and lysosomes), computer, projector, white board/screen, tape for teacher, paper to copy the maps on, copy machine to make copies, printer to print out the worksheets, pen for the teacher, pencils for students to fill out the pre- and post-test, Cell City Analogy Worksheet (attached).

- Before the lesson the teacher will need to make copies of the pre- and post-test and the map for the students. They will need to have one test per student and one map per pair of students. Teacher will also need to make copies of the Cell City Analogy Worksheet for each student. The teacher will also need to make sure that they create their groups before students come into the room. The groups are going to be pairs of two students. The teacher should also have the map pulled up on the computer and showing on the projector. The teacher will need to take the index cards and write each of the organelles on a different card. They will need to make enough sets of these for all the groups and one set for them.

- The layout for the room should be that the desks need to be grouped into groups of 4. This way there will be two groups at each set of desks. As the students enter the room, the teacher should direct them to the correct seat.

After the students are sitting in their groups, then the teacher will start the motivation section which is listed above.

Outcomes

Dimensions of K-12 Science Education Standards:
The first core idea, LS1: From Molecules to Organisms: Structures and
Processes, addresses how individual organisms are configured and how these structures function to support life, growth, behavior, and reproduction. The first core idea hinges on the unifying principle that cells are the basic unit of life.

**Next Generation Sunshine State Standards:**
SC.6.L.14.4 Compare and contrast the structure and function of major organelles of plant and animal cells, including cell wall, cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria, and vacuoles.

**Content Literacy Standards:** Comprehension and Collaboration

**Specific Learning Outcomes:**
- After reviewing cell structures, students will work in cooperative learning groups to build and label original “Cell Cities”. Analogous cell parts and city structures must be labeled with 100% accuracy.
- At the conclusion of the lesson, students will work in pairs to place organelle cards on appropriate businesses. Students will verbally justify the placement of each organelle and its relationship to the city structure with 80% accuracy.

**Presentation and Participation:** final
- Students will complete the motivation Pre-Test (attached). (Time: 5 minutes)
- Teacher will lead the lecture by discussing the eight cell parts listed in the materials section and below under Vocabulary-Cell Structure and Function (Instructional Strategy-Behavior; Time: 15 minutes)
- Students will review cell structures by using 3x5 index cards. (Teacher will make cards prior to class) (Instructional Strategy-Behavior; Time: 10 minutes)
- Working in pairs students will place index cards correctly on map. (Instructional Strategy-Cognitive; Time: 10 minutes)
- Students will verbally justify placements. (Instructional Strategy-Cognitive; Time: 10 minutes possible overlap with previous task)
- Students will complete Post-Test (attached). (Time: 5 minutes)
- For homework students will complete Cell City Analogy worksheet. (attached). (Instructional Strategy-other)

**Vocabulary-Cell Structure and Function**
1. Describe each of the following organelles and explain how their functions relate to the correlating city structure.
   - Nucleus – City Hall (Mayor) - Command center of cell; contains DNA that provides instructions for daily activities.
   - Mitochondria – Power Plant – Powerhouse of the cell; site of cellular respiration which supplies energy for the cells daily activities.
   - Golgi Complex – Fed-Ex Delivery Trucks- Delivery system; packages and transports various necessary materials for the cell.
   - Endoplasmic Reticulum – Post Office - produces and packages needed proteins.
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- Ribosomes – Pharmacy- uses DNA specifications to arrange specific chains of amino acids to produce proteins necessary for daily activities.
- Cytoplasm – City Park – Includes gelatin-like fluid inside the cell membrane and all organelles except for the nucleus.
- Cell Membrane – City Limits – selective and protective membrane that surrounds the cell.

Questions:

Cell Structure and Function
2. Describe each of the following organelles and explain how their functions relate to the correlating city structure.
- Nucleus – City Hall (Mayor)
- Mitochondria – Power Plant
- Golgi Complex – Post Office
- Endoplasmic Reticulum – Fed-Ex
- Ribosomes – Pharmacy
- Cytoplasm – City Park
- Cell Wall/Membrane – City Limits
- Lysosomes – Garbage Disposal

3. Explain why larger central vacuoles and cell walls are present in plant cells but absent in animal cells.

4. Explain why all prokaryotes are unicellular but not all unicellular organisms are prokaryotes.

5. Unlike prokaryotic cells, eukaryotic cells are able to form multicellular organisms. Why is this so?

6. Compare and contrast the cytoskeleton of a cell with the human body skeleton.

7. Describe the structure of the cell membrane and explain how it is able to regulate the flow of water, nutrients and waste into and out of the cell.

8. Explain how the size and shape of a cell would determine its function.

Reflection:
1. Pre-Test will be given prior to beginning this lesson, but feedback will not be shared with students until they have completed the lesson post-test. When both tests have been
completed, both will be given back to students and the answers will be reviewed with the whole class. Students will be given the opportunity to ask questions about the test and compare their original scores with the post-test scores.

2. Group/Individual Activity – Build Your Own Cell City – Progress Check/Performance Assessment

3. Cell City Analogy Worksheet – End of lesson summative assessment (see attached) to be given as homework prior to (the night before) the post-test. When students come into class to take the post-test, teacher will review the assignment and ask students to grade their own. This will give the teacher an idea of strengths/weaknesses of specific students and address those concerns prior to administering the post-test.

Safety:

1. You must stay with your “buddy” at all times! If you have a question, raise your hand and I will come to you!
2. Absolutely NOTHING airborne!

All safety rules will be explained or demonstrated for students prior to beginning this activity. However, the above rules apply to all class activities and therefore, should be very familiar to all students.

Transformative:

1. Accommodations for a student that is a visual learner, -a student that has trouble with oral/verbal lectures. The learner will be given a visual aid of the cells and their functions- a worksheet with pictures of the actual buildings of the surrounding city of Marianna. Photos of cells and summaries of their functions in the cells and examples of functions that students can relate to. 2. Student that has trouble understanding directions- give step-by-step directions. Outline the steps in writing or use pictures and let their elbow partners help explain the directions as well. 3. ESOL/LEP students- teacher needs to understand the challenge of different lesson deliveries methods of meeting the ESOL/LEP learner’s needs. The use of bilingual cell cards complete with photos and terms in both English as well as Spanish (or any other language as based on the needs of all ESOL/LEP students at your school.) i.e.

- Núcleo - City Hall (Alcaldía)
- Las mitocondrias - Planta de Energía
- Complejo de Golgi - Oficina de Correos
- retículo endoplásmico - Camiones de correo
- Los ribosomas - Farmacia
- Citoplasma - Límites dentro de la ciudad
- pared celular / Membrana - Límites de la Ciudad
- Los lisosomas - Eliminación de Basura

See English Terms on page 2
Utilize: (seems like this cannot be done until the lesson is taught at least once?)

The strengths of this lesson are the hands-on connections that the students can gained of the numerous cell parts and their roles that they play within the cell. The use of their ‘own’ city/town and buildings that the students are familiar with helps create the connection of parts and roles.

This lesson will help address the misconception that many students have –that the cell is a big-bag-of-stuff and they do not realize the vital role of each organelle plays.

Another misconception to be addressed is students do not make a connection between a single cell as a part of a multicellular organism. This can be fixed- teacher explains how the city of Marianna works as a whole unit to meet the needs of diverse population.

Anticipated student response- students trading red/green cards in a loud manner-fix-have students nod quietly if a match, if not move on quietly.

Anticipated student response-students will not be able to make connections between the function of a map location to the function of a cell structure-fix- teacher will model the correct way-I do-We do-You do.

After looking at the post-test results that data will be reviewed and an item analysis will be done. This item analysis of the student post-assessment will demonstrate the effectiveness of the lesson. Based on the item analysis, remediation of content will be addressed. The students may have difficulty making connections of the cell organelle and their functions to the city buildings and their respective roles in the city.

The recommended revision to address the above is to have the teacher do a “think-aloud “ and use the concept of making word connections, ie: In the cell the mitochondria is the ‘powerhouse’ and in the city the role/function of Gulf Power is to be the powerhouse.