Cell City

WebQuest Description: Students will use information about parts of a cell to develop relationships between organelles to create a city.

Grade Level: 6-8
Curriculum: Science
Keywords: organelles, cell structure
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Introduction

Cells are composed of many smaller parts called organelles. The organelles all perform a task or function for the cell. Much like the inner workings of a city, these organelles function together. You'll discover the answer to questions like: How do organelles differ? What organelles are common for all cell types? What shape does each organelle have? How many of each organelle are in a cell? How do these organelles work together?

Tasks

You and your group members are city planners and will work together to create a cell city. Each member will be assigned specific roles for the city listed at the bottom. You have been assigned the task of designing a city based off the functions of the cell. During this webquest, you will be given information on what each organelle does in the cell. Then you will create a plan for your city using the animal or plant cell as the basis for your city. Your city can be on Earth, another planet, and/or another time, you decide, and creativity counts! You may choose to design a 2D blueprint or a 3D model. All of your buildings and city parts must be labeled either by simply putting the name on each part/building or by designing buildings that look like that organelle. You also need to include a brief paper or powerpoint bullets on what each building does in the city and connecting it to how the cell functions in order to present your city to the class. You should also keep in mind how many of each organelle you should have as well as what size they should be in relation to each other when designing your buildings. You must use all the organelles that belong in the type of cell you chose and no extras that belong in the other type of cell. Good Luck!

For example: A plant cell city would include a brick wall around the city like the Great Wall of China to symbolize the cell wall, a nuclear energy plant to symbolize the mitochondria, a city or town hall to symbolize the nucleus, a post office to symbolize the Golgi apparatus, a water tower to symbolize the vacuole, a windmill to symbolize the chloroplasts, a road system to symbolize the endoplasmic reticulum, and so on.

City Roles:
1. Boarder Patrol - Cell Membrane
2. Boarder Barrier Specialist - Cell Wall
3. Welder - Cytoskeleton
4. Nuclear Engineer - Mitochondria
5. Economist - Chloroplasts
6. Mayor of City Hall - Nucleus
7. Water Tower Manager - Vacuoles
8. Post Office Administrator - Golgi Apparatus
9. Grounds Keeper - Cytoplasm
10. Lumber Yard Worker - Ribosome
11. Waste Management Operator - Lysosome
12. Road System Analyst - Endoplasmic Reticulum (smooth and rough)

Process

This project consists of 3 phases. Before you begin you should be in groups of 5. Phase 1: Each student will draw a number 1-5 from a hat to be assigned their specific roles with their organelle based on the following assignments of partner 1, partner 2, partner 3, partner 4, and partner 5 and each student will begin their research. Phase 2: The group will come together to discuss their organelles and take a short quiz near the bottom of this process tab. The group will then begin planning the development of their city. Phase 3: The groups will begin creating their model or blueprint. The groups will also include a brief paper or powerpoint bullets on what each building does in the city and connecting it to how the cell functions. Upon completion each group will present their city to the class.

Evaluation

Your project will be evaluated on the following:

Knowledge of Organelles and their Functions: This is where your knowledge is exhibited. Knowing the different kinds of organelles and what they do is imperative to starting this project. You wouldn't want to put a plant cell organelle in an animal cell! You also should be watching where you put cells in relation to each other in your city and how many of each you need to make your city run correctly. You only have one town hall or city government, right? Think about how to exhibit your knowledge of these organelles in this section. Analogies: This is where your higher order thinking is highlighted. The purpose of this project is to get you thinking about how the cell functions like something else, in this case, a city. We know we have cell walls in animal cells, how is that like a part of a city? Make sure your analogies make sense and that you have created one for each organelle. Quality of Project: This is where your
workmanship shows. Your project should have had enough time and thought put into it so it does not fall apart when it is moved. It should be sturdy and neat. If someone cannot read a description or understand what a 3D shape is supposed to be, they might not understand what is going on in your project. Also make sure that your labels are easily seen. Creativity and Uniqueness: This is where your ideas shine. Your project should be something from group collaboration that has a lot of thought behind it. In class, we will discuss different ideas for themes, etc. This should be a springboard to new ideas, not where the ideas end. Your project should show a solid theme throughout that connects the entire thing together. You should also take advantage of using several mediums like pen, pencil, markers, paint, modeling clay, buttons, toothpicks, etc. that makes your project unique and interesting. You want to draw people to your project by how different it is.

<table>
<thead>
<tr>
<th>Category and Score</th>
<th>Beginning (10pts)</th>
<th>Developing (15pts)</th>
<th>Very Good (20pts)</th>
<th>Exemplary (25pts)</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of Organelles and Functions</td>
<td>Shows little or no knowledge about organelles including number of, shape, size, and/or how they function in cell and/or with relation to each other. Organelles were missing or the wrong ones present.</td>
<td>Most of the organelles are included, but 2-4 mistakes were made in the number of, shape, size, and/or how they function in cell and/or with relation to each other. 2-4 organelles were missing, no wrong ones added.</td>
<td>All except one or two of the organelles are included. One minor mistake was made in the number of, shape, size, and/or how they function in cell and/or with relation to each other. No wrong organelles added.</td>
<td>All of the organelles are included and the number of, shape, size, and/or how they function in cell and/or with relation to each other is correct. No wrong organelles added.</td>
<td>25</td>
</tr>
<tr>
<td>Analogy</td>
<td>No analogies were used. Students just labeled buildings with organelle names and did not connect it to city analogy.</td>
<td>Some analogies were attempted but were confusing or incorrect.</td>
<td>Most analogies used were correct, but some were missing, incorrect, or confusing.</td>
<td>All analogies were correct and led to deeper understanding of organelles and their functions.</td>
<td>25</td>
</tr>
<tr>
<td>Quality of Project</td>
<td>Project looks unfinished, falls apart easily, and/or exhibits low quality work with little time devoted to it. Bullet points are missing.</td>
<td>Project is missing key parts, unfinished, or difficult to understand. Three to five of the bullet points are missing or incorrect.</td>
<td>Project is finished, but has a few questionable areas in terms of neatness and stability. Bullet points are included but one or two are missing or incorrect.</td>
<td>Project is neat, finished, stable, and easily understood. Bullet points are concise and explain project thoroughly.</td>
<td>25</td>
</tr>
<tr>
<td>Creativity and Uniqueness</td>
<td>Project looks similar to one online. Does not show solid theme throughout. Uses simple medium like pencil only. Uses bare bones of what is asked for in task.</td>
<td>Project uses ideas from group discussion. One or two mediums are used. Uses one theme.</td>
<td>Project uses several mediums available. Theme is different than talked about in class discussion and connects throughout project.</td>
<td>Project uses multiple and unique mediums and/or theme. Goes beyond information given in task description.</td>
<td>25</td>
</tr>
</tbody>
</table>

**Conclusion**

After completion of your projects, look back at how you arrived to your final product. How are analogies helpful? What did you learn that was the most interesting? What was the hardest part of this project? As you think about cells, I hope now you will appreciate all the little guys that work so hard to make them function. Remember that even though they all have their own roles, organelles are connected to each other and they all are the reason for the cell functioning. For more information on this topic, check out these websites:

- [http://learn.genetics.utah.edu/content/begin/cells/](http://learn.genetics.utah.edu/content/begin/cells/)
- [http://www.kidsdiscover.com/cells-for-kids](http://www.kidsdiscover.com/cells-for-kids)

**Teacher Page**

This is about organelles in plant and animal cells geared toward 7th grade or the middle school classroom. It should take between 3-5 days to complete this assignment. Each student should have access to their own computer for one of those days, but can share the other days.

**Standards**

Seventh Grade- Georgia Performance Standard
S7L2. Students will describe the structure and function of cells, tissues, organs, and organ systems.

b) Relate cell structures (cell membrane, nucleus, cytoplasm, chloroplasts, mitochondria) to basic cell functions.

**Credits**

This webquest has been modified from the following webquest created by Heidi Burns


**Other**

Suggestions for modifications:

- Low achieving students: Have them work with high achieving students. You may want to assign a specific 2D or 3D assignment and provide the specific materials needed. Allow them more computer time to complete and fully understand their portion of the assignment.

- High achieving students: Have them work in smaller groups to take on more responsibilities for the project.
Tips and Tricks:
Students are more excited about this assignment when they are shown examples of a variety of ways to complete the assignment. Use Google images (such as a cake or something you don't have available to show) or show them old projects.