

Title of Unit

Traveling Through Cells

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Abstract

This paper provides detailed information about the online learning module, for grades 4 and 5, developed in order to complete my Capstone Thesis for the MSET program at Ramapo College of New Jersey. This project is a unit on cells and cell organelles. It will consist of an online learning portal and a 3-D model building portion. It will also consist of a written research paper. It encompasses multiple grade levels and is interdisciplinary in nature.

Performance Objectives

- Students will be able to access unit materials through Google Classroom and through WordPress.
- Students will be able to utilize unit materials through Google Classroom and through WordPress.
- Students will be able to utilize research tools and materials to compose concise notes.
- Students will be able to use notes created from research to summarize the main idea and answer essential questions.

- Students will be able to label diagrams comparing the differences between Animal, Plant, Bacterium and Protista cells.
- Students will be able to utilize research tools and materials to compose concise notes.
- Students will be able to use notes created from research to summarize the main idea and answer essential questions.
- Students will be able to label the cell organelles which make Animal, Plant, Bacterium and Protista cells similar and different.
- Students will be able to synthesize information to create a concise research paper.
- Students will be able to produce a written research paper that follows specific guidelines to discuss the specific organelles of a Eukaryotic or Prokaryotic cell.
- Students will be able to build a cell model according to scale using diagrams, pictures and notes as reference.
- Students will be able to draw a blueprint of their 3-D model.
- Students will be able to compare and contrast Eukaryotic and Prokaryotic cells from their peers.
- Students will be able to discuss these similarities and differences using Scientific Talk.

Outcomes

- Students will be able to utilize technology to access a unit

plan's website.

- Students will be able to understand the requirements of the unit.
- Students will be able to describe the cell as a three-dimensional object.
- Students will be able to summarize the main idea from a video, articles, or books.
- Students will be able to compare and contrast Eukaryotic and Prokaryotic cells.
- Students will be able to compare and contrast Animal, Plant, Bacterium and Protista cells.
- Students will be able to compare and contrast the functions of cell organelles to the functions of the human body system.
- Students will be able to identify the function of cell organelles in Animal, Plant, Bacterium and Protista cells.
- Students will be able to identify the structure of cell organelles in Animal, Plant, Bacterium and Protista cells.
- Students will be able to synthesize information from various mediums.
- Students will be able to determine materials that will mimic the structure and function of cell organelles in a given Eukaryotic or Prokaryotic cell.
- Students will be able to determine materials that will mimic the structure and function of cell organelles in a given Eukaryotic or Prokaryotic cell.
- Students will be able to compare and contrast Eukaryotic

and Prokaryotic cells.

- Students will be able to discuss these similarities and differences using Scientific Talk.

Scaffolding Knowledge

- What defines a living thing?
- Why is each part of the cell essential to survival?
- How do plant and animal cells differ?
- How do bacterium and Protista cells differ?
- How do Prokaryotic and Eukaryotic cells differ?
- How do the functions of cell organelles help the overall cells?
- What structures (organelles) are in eukaryotic cells and prokaryotic cells?
- Are these organelles the same in each cells? How do they differ?
- Why is each part of the cell essential to survival?

Bloom's Taxonomy	
Level	Activity
Knowledge	<ul style="list-style-type: none">• Students will define vocabulary terms.• Students will complete fill-in-the-blank notes to learn about cells.
Comprehension	<ul style="list-style-type: none">• Students will paraphrase their learning in their summaries.
Application	<ul style="list-style-type: none">• Students will apply their

	knowledge of cells to answer questions posed by the teacher.
Analysis	<ul style="list-style-type: none"> • Students will compare and contrast the various types of cells. • Students will determine the various structures of the cells and their purposes.
Synthesis	<ul style="list-style-type: none"> • Students will construct a 3-D model of a cell. • Students will design the model by creating a blueprint model first. • Students will plan their design and model collaboratively in their groups.
Evaluation	<ul style="list-style-type: none"> • Students will evaluate the evidence collected through the unit to create an argument as to which cell is the most important. • Students will defend their argument and opinion using evidence collected.

Multiple Intelligences

Intelligence	Activity
Mathematical-Logical	<ul style="list-style-type: none"> • Students will enjoy measuring their organelles to make them accurate and to scale for their 3-D model.
Musical	<ul style="list-style-type: none"> • Students will enjoy listening to parody songs from Mr. Parr on

	YouTube
Verbal-Linguistic	<ul style="list-style-type: none"> • Students will enjoy the reading aspects of the unit. • They will also enjoy conducting the research and writing a paper.
Existential	<ul style="list-style-type: none"> • Students will enjoy seeing how cells fit together in the "big picture" of biology and in the natural world.
Naturalist	<ul style="list-style-type: none"> • Students will enjoy learning about cells in the natural world and how they interact with each other.
Interpersonal	<ul style="list-style-type: none"> • Students will enjoy working in groups throughout the unit.
Intrapersonal	<ul style="list-style-type: none"> • Students will enjoy being able to self-reflect on their own contributions to the group throughout the unit.
Bodily/Kinetic	<ul style="list-style-type: none"> • Students will enjoy building the 3-D cell.
Visual/Spatial	<ul style="list-style-type: none"> • Students will enjoy the coloring of the cells. • They will also enjoy the visuals and videos on the website.

Mind Styles

Style	Activity
Concrete Sequential	<ul style="list-style-type: none"> • Students will have step-by-step instructions so they can follow along.
Concrete Random	<ul style="list-style-type: none"> • Students will receive a general

	<p>time-frame to complete each section of the online learning module.</p> <ul style="list-style-type: none"> • Students will receive extra time to complete work (home, recess, lunch, before or after school).
Abstract Random	<ul style="list-style-type: none"> • Students will have class discussions and will be graded on participation and behavior during class. • Students will write and verbally communicate their thoughts about cells and their organelles.
Abstract Sequential	<ul style="list-style-type: none"> • Students will utilize video tutorials that will describe the procedures for completion of activities and use of the website.

Neurons

Neuron	Activity
Working Neurons	<ul style="list-style-type: none"> • Working Neurons will help students experience various forms of stimuli such as listening, discussing, touching, writing, drawing, painting and visually observing during this project unit. • Neurons will transmit signals which will help students complete classroom tasks.
Sensory Neurons	<ul style="list-style-type: none"> • Students will use their sensory

	neurons to view videos and visuals regarding placements of organelles in various cells.
Motor Neurons	<ul style="list-style-type: none"> • Motor neurons will help students design, draw, sculpt and/or paint their 3-D Cells.

Limbic System

Part of System	Activity
Amygdala	The amygdala will help students store names of cells and cell organelles in their memory. It will also help students store information in their memory about their structures and functions.
Cingulate Gyrus	<ul style="list-style-type: none"> • Students will use their Cingulate Gyrus when they feel excitement and eagerness to create their models. • Students will also feel challenged when creating their 3-D model.
Hippocampus	<ul style="list-style-type: none"> • Students will use their Hippocampus to retrieve memory of cell organelles when presented with a diagram. • Students will use their Hippocampus to retrieve information of past lessons.
Hypothalamus	<ul style="list-style-type: none"> • Students will use their

	<p>Hypothalamus when displaying excitement for the lesson.</p> <ul style="list-style-type: none"> • Students will also use it when displaying emotions of pride and confidence in their completed models.
Olfactory Cortex	<ul style="list-style-type: none"> • Students will use their Olfactory Cortex in order to view video tutorials and PowerPoint presentations. • Student's Olfactory Cortex will receive sensory information when students view diagrams and models.
Thalamus	<p>The Thalamus in the student's brain will relay sensory signals when they create their model.</p>

Standards Addressed

Subject	Standard
NGSS-Middle School Objective Statements	MS-LSI-1
	MS-LSI-2
NGSS Middle School-Science and Engineering Practices	Developing and Using Models
	Planning and Carrying Out Investigations
	Constructing and Explanations and Carrying out Investigations
	Engaging in argument from Evidence

	Obtaining, Evaluating and Communicating Evidence,
	Scientific Knowledge is based on empirical evidence
NGSS Middle School Disciplinary Core Ideas	LSI.A
	LSI.B
NGSS Middle School Cross-Cutting Concepts	Cause and effect
	Scale, Proportion, and quantify
	Systems and System Models
	Structure and Function
	Interdependence of Science, Engineering, and Technology
	Science is a Human Endeavor
NGSS Connections across Grade Bands	4-LSI-1
NGSS Science and Engineering Practices Across Grade Bands	Developing and Using Models
	Engaging in Argument from Evidence
NGSS Disciplinary Core Ideas-Connections Across Grade Bands	LSI.A
NGSS Crosscutting Concepts Across Grade Bands	Systems and System Models
NJSLS Science	5.3.4.A.2
	5.3.6.A.2
Common Core Connections to NGSS-Middle School	RST.6-8.1
	RST.6-8.2
	RI.6.8
	WHST.6-8.2
	WHST.6-8.7
	WHST.6-8.9

	SL.8.5
Common Core Connections to NGSS-Elementary	W.4.1
	SL.4.5
ISTE Technology Standards for Teachers	1.a
	1.b
	2.a
	2.c
	3.d
	5.d
ISTE Technology Standards for Students	1.a
	1.c
	1.d
	2.b
	3.a
	3.b
	3.c
	6.c
	7.b
	7.c
NJSLS-Technology	8.1.5.A.1
	8.1.5.A.2
	8.1.5.A.3
	8.1.5.A.5
	8.1.8.A.1
	8.1.5.C.1
	8.1.5.D.2
	8.1.5.D.3
	8.1.5.D.4
	8.1.5.E.1

	8.1.5.F.1
	8.2.5.C.1

Teacher Preparation

Materials

- Chromebooks-1 per child
- Pens/pencils
- Notebooks/printable handouts/folders
- Craft supplies-styrofoam, clay, markers, colored pencils, cryaons, construction paper, etc.

Printable Handouts

- Fill-in-the Blank Notes:
 - What Are Cells?
 - Types of cells?
 - Eukaryotic Cells
 - Animal Cells
 - Plant Cells
 - Prokaryotic Cells
 - Bacteria Cells
 - Protista Cells
- Rubrics
- Directions for Written Paper
- Directions for 3-D Model
- Project Checklist

Key Terms

sdafasf

Lesson Outline

The following is a suggested outline of how to run each lesson. This can be modified according to each teacher's district and classroom set up.

1. Focus and Review

Students will discuss each cell and cell organelle in a separate lesson. Students will view video tutorials that will describe the use of the unit web quest and its navigation. Students will also view videos that will describe each cell and its organelles. Students will complete the research and use class time in order to discuss their findings with a group of student peers.

2. Teacher Instructional Process

The teacher will utilize the videos in the web quest as well as diagrams and visual reproductions of cells in order to bring the topic to life for the students. Students will be asked one essential question at the start of each portion of the unit and then again asked follow-up questions regarding specific themes that were discussed throughout each unit portion.

3. Guided Practice

The teacher will walk around the classroom/computer lab

and answer any questions, as well as motivate students by offering ideas that will further their art making process and push students to challenge themselves. The teacher will consistently ask student questions that they will need to provide an answer through their research. The teacher will also provide students with rubrics and clear project guidelines for each project.

4. Independent Practice

Students will complete their initial research on the different types of cells first. Then students will continue to learn more in depth about the cell organelles, their structures and functions, and how they work within a specific cell. Students will utilize the information that they gathered in order to make a decision on which type of cell they would like to create for the final project for that portion of the unit. Lastly, students will reflect upon their science experience as well as their final product. Students will self-reflect, self-evaluate and will also write a scientist's statement describing their experience. Students will repeat this process with each cell and cell organelle.

5. Closure

When complete, students will create one last scientist statement discussing their work as one large body of work. Students will showcase their models in an exhibition for the entire class.

Alternate Outline Accommodations

Students who are below/above grade level will be presented with many ways of completing their written work (individually and collaboratively in groups). Students who are below grade level will have an opportunity to complete written assignments verbally as well in order to gain a grade for those assignments if they are struggling with lower writing skills. Students will have an opportunity to have additional time to complete their work. Students will be able to complete their work before or after school, during lunchtime and at home over a weekend utilizing family's help. Students who are above grade level will be able to challenge themselves by completing more assignments for each section, and to increase their knowledge by conducting research using higher end websites.

English Language Learners will have the opportunity to work in groups and complete research and models in a group environment. Students will utilize friends who can translate and help them complete their written assignments. Students will have an opportunity to complete written assignments verbally as well in order to gain a grade for those assignments if they are struggling with lower writing skills. Finally, students will have an opportunity to have additional time to complete their work. Students will be able to complete their work before or after school, during lunchtime and at home over a weekend utilizing family's help.

Suggested Follow-Up

If students need more practice on skills, teachers should visit the Teacher Resource Page for more detailed information.