Biology Partnership Grant

Cell Organelle Review Stations

<table>
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<th>Identifying Information:</th>
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<tbody>
<tr>
<td>Erin Brack – Breakfast Point Academy</td>
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<td>Greta Draayom – Roulhac Middle School</td>
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<td>Velvet Gilchrist – North Bay Haven Charter School</td>
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<td>Rebecca Kildow – Breakfast Point Academy</td>
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<td>Brandi Kolmetz – Grand Ridge</td>
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<table>
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<tr>
<th>Title: Cell Stations</th>
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<td>Length: 3 or 4 50 minute class periods</td>
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| Course Level: 6th grade standards to be reviewed prior to 8th grade Science FCAT. |

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<th>Motivation:</th>
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<td>Students enter classroom and sit in pre-assigned pods. Student pods are organized in groups of four. (See attached) The teacher begins the class by asking the open-ended question: “Using prior knowledge, who in our school represents the nucleus? Explain.” The teacher allows for appropriate response time and allows for students to share. (Approximately 5 minutes) Following discussion students will complete a diagnostic pre-assessment of cell organelles. (Attached) (Approximately 10 minutes)</td>
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<th>Needed Materials &amp; Set-Up:</th>
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<td>The teacher will have the room set up for rotation stations (see attachment). Desks will be organized into working pods. Only 1 group (of 3-4 students) will be working at a station at a time. Groups will rotate through the stations as instructed by the teacher. Approximately 30 minutes will be allotted for each station. If extra time is needed the teacher can instruct the class when it is time to rotate. Models of both plant and animal cells are available for viewing but not specifically designated to a certain station. An interactive cell is also made available on the</td>
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SmartBoard for students to use as a review resource -
http://www.wiley.com/legacy/college/boyer/0470003790/animations/cell_structure/cell_structure.htm

All materials for the Cell Organelle Review Stations will be sorted and made available by the teacher.

- As a **community resource**, the school’s principal or other administrative figure will come by the classroom to discuss with Station 4 the job positions and duties at the school. This will help the students make a connection to parts of the cell and analogous positions in an institution. If a school administrator is not available, any manager (Tim Screws from Publix), business owner or ball park operator are possible classroom community resources as well.

**General Materials:**
Models of Plant and Animal Cells
Paper
Writing Utensils
Organelle Function Chart (attached)
Science Interactive Notebook

**Station 1: Shrinky Dink Cells**
- Shrinky Dink Paper (cut in ½ prior to class by the teacher)
- Sharpie Markers
- Plant and Animal Cell Template (4 copies or each)
- Tape
- Cell Organelle Diagram for Labeling (laminated for reuse)
- Toaster Oven
- Oven Mitt
- Cookie Sheet fit for toaster oven
- Aluminum Foil (cut into a piece the size of the cookie sheet)
- Baby Powder

**Station 2: Pop-Up Cells**
- Pop-Up Cell Worksheet (attached)
- Colored Pencils
- Scissors
- Glue
- Trash Can for scraps

**Station 3: Computer QuizLet**
- Computer Workstations
- Index Cards to make flashcards
- Internet Website to access Quizlet
- Highlighter to indicate missed Organelles on Organelle Function Chart
- Notebook

Station 4: Cell Analogy Book
- Notebook paper for comparison T-Chart
- Construction Paper
- Colored Pencils
- Organelle Function Chart
- Cell Book Examples (provided by the teacher – students may not use example concept)

Station 5: Cell Comparison Venn Diagram
- Interactive Notebook
- Model of Plant and Animal Cell
- Colored Pencils
- Venn Diagram Model

Station 6: Cell Organelle / Function SORT
- 4 pre-organized zip lock bags containing pre-cut and laminated pictures of the organelles found in plant and/or animals cells, the names of the organelles and the functions of the organelles

**Outcomes**

**Dimensions of K-12 Science Education Standards:**

Scientific and Engineering Practices: Dimension 1
Developing and Using Models. Science often involves the construction and use of a wide variety of models and simulations to help develop explanations about natural phenomena. Models make it possible to go beyond observables and imagine a world not yet seen.

**Crosscutting Concepts: Dimension 2**

6. Structure and function. The way in which an object or living thing is shaped and its substructure determine many of its properties and functions.
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.
Heredity: Inheritance and Variation of Traits across generations, focuses on the flow of genetic information between generations. This idea explains the mechanisms of genetic inheritance and describes the environmental and genetic causes of gene mutation and the alteration of gene expression.

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**Next Generation Sunshine State Standards:**
SC.7.L.16.1. Understand and explain that every organism requires a set of instructions that specifies its traits, that this hereditary information (DNA) contains genes located in the chromosomes of each cell, and that heredity is the passage of these instructions from one generation to another.
SC.7.L.16.3 Compare and contrast the general processes of sexual reproduction requiring meiosis and asexual reproduction requiring mitosis.
LA.6.2.2.3- Students will organize information to show understanding.
LA.6.4.2.2- The students will record information related to a topic including visual aides to organize and record information.

**Common Core Standards and Content Literacy Standards:**
Integration of Knowledge and Ideas
Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table). Integration of Knowledge and Ideas
Key Ideas and Details: Follow precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks.

**Specific Learning Outcomes:**
- At the conclusion of the lesson, 90% of students will increase content knowledge as determined by pre-test/post-test scores. (criterion)
- At the conclusion of the lesson, 100% of students will correctly complete each cell organelle station with 70% proficiency.
- At the conclusion of the final day, 85% of students will successfully complete their assigned exit slip questions.
Presentation and Participation:
(See attachment for cell station information sheets / directions – these will be copied by the teacher, placed in page protectors and placed at the appropriate tables throughout the cell organelle review)

Behavior: Recap Lectures, Small Group Discussion, Cooperative learning stations, Creating lists / Analogies, Following directions, Time management
Cognitive: Simulations, Summarizing and Note-taking, Conversations
Application/Process: Information management, graphic organizers / cell pop-up activity, Cell Book formation, Cell Cycle Sort Process, Quizlet games,
Other: Practice, Providing Formative Feedback, Questioning, Cooperative learning, Guided practice.

Day 1: (Teaching Strategy – Instructional Processes) The teacher will review the importance of being on task, working collaboratively, and abiding by classroom policies prior to beginning the review stations. The teacher will brief the students on safety concerns, especially with station 1 the Shrinky Dink Cell. Students will be given a brief overview of the activity performed at each station and reminded to follow directions as indicated on the station activity cards placed at each station. The teacher will divide the class into groups of 3 or 4 depending how many students are in the present. Each group will be directed to a start station – then rotate numerically with station 6 rotating to station 1. Students will be instructed that they will have approximately 20 minutes to complete the station before rotating to the next station. In order to maintain control and organization and assure that all students explore the 6 stations the teacher must regulate when students rotate and students may NOT work ahead. Students should be encouraged to quiz each other or discuss the functions of the organelles with their station mates if they complete a station with time remaining. When station activities are underway, the teacher will circulate the room to maintain organization and be available to answer and questions and provide clarification. Once students are engaged in the stations’ activities, the teacher will be available to operate the toaster oven and shrink the cells created at station 1.

In the given 50 minute class period, students will complete 2 of the 6 stations (Teaching Strategy – Behavioral – Time Management and Organization as well as Application of content and skills).
Day 2: The teacher will briefly recap the lesson’s purpose and engage the students with the interactive cell or a cell organelle song (Teaching Strategy – Cognitive Application of Content and Student Behavior – listening skills – 3 minutes). The teacher will follow that by directing students to start their 3rd station activity (Teaching Application – Behavior – 1 minute). Teacher will again circulate the room providing clarification of directions and providing formative feedback. Once the students at the Shrinky Dink Cell Station have finished creating their plant or animal cells the teacher will use the toaster oven to complete the shrinking process. Students will be asked to clean up their 3rd station and proceed to the 4th cell activity station. (Teaching Instruction – Application) Wrap-Up and Clean-Up procedures will be conducted the last 2-3 minutes of class.

Day 3: Again the teacher should start the class with an engaging recap of the previous day and the lesson’s purpose. At this time the teacher may wish to play a cell organelle song or rap such as the following: http://www.youtube.com/watch?v=-zafJKbMPA8 or Glenn Wolkenfeld’s Cell Song also found on youtube.com. Students will be directed to go to their 5th cell activity station. The teacher should follow a similar procedure as the previous two days – making any modifications to make the stations operate with ease. Upon completion of the 5th station, students will finish the cell organelle review at their 6th and final station. Students will incorporate their review with their interactive notebook kept in science class. Students will be instructed to clean up any scrap paper, put away all writing utensils used, stack construction paper neatly and leave the activity station just as they found it.

Questions:
(5 higher order—analysis, synthesis, evaluation)

Engagement:
1. Explain why you think cell look so different from one another. (provide students with pictures of multiple cells to look at)
2. Does each organelle in a cell preform the same functions to make the cell operate properly? Explain and justify your answer using specific examples of how different organelles have specific tasks – just as different parts of your body have different roles to make you function properly.
Analysis:
3. Explain the differences in structure between a plant and an animal cell. Justify your answer by providing specific differences found in each type of cell.
4. A solar panel collects sunlight and converts it to heat or electrical energy. Explain and justify how a solar panel is similar to the chloroplast found in plant cells?

Evaluation:
5. Where is water stored inside the cell? Explain why this organelle is much larger than the same organelle in an animal cell.

Reflection:
- Formative assessment is attached. The teacher will conference individually with students regarding Pre-test/Post-test scores.
- Students will receive feedback on their Cell Station Lab via student worksheets/products
- The five questions in the section “Questions” will be distributed on exit slips to evaluate student progress. Exit slip information will be evaluated and returned to students.

Safety: CLASSROOM POLICIES

At the beginning of the school year the class will participate in a lab safety lesson created by Flinn Scientific. Students will formally be introduced to all safety procedures and guidelines for any and all labs conducted in science by the science teacher. In addition to a summative assessment on Science Lab Safety, students will be asked to sign a lab safety contract (attached). Parents/Guardians will also be asked to sign the safety contract. No science student will be allowed to participate in science activities until this contract has been signed by both the student and a parent or guardian.

Classroom policies are posted by the teacher on a lab safety bulletin board at the front of the room visible to all students. Lab Safety icons and rules are also posted on the bulletin. The following rules are verbally conveyed to the students as they begin class on a regular basis.

1. Conduct yourself in a responsible manner at all times in the laboratory. Frivolous activities, mischievous behavior, throwing items, and conducting pranks are prohibited.
2. Lab and safety information and procedures must be read ahead of time. All verbal and written instructions shall be followed in carrying out the activity or investigation.

3. Eating, drinking, gum chewing, applying cosmetics, manipulating contact lenses, and other unsafe activities are not permitted in the laboratory.

4. Working in the laboratory without the instructor present is prohibited.

5. Unauthorized activities or investigations are prohibited. Unsupervised work is not permitted.

6. Entering preparation or chemical storage areas is prohibited at all times.

7. Removing chemicals or equipment from the laboratory is prohibited unless authorized by the instructor.

SAFETY POLICIES SPECIFIC TO THIS LESSON:

The teacher will verbally instruct all students to follow basic science classroom guidelines – specifically focusing on the following:

1. Students must STAY at their designated activity station until instructed to rotate.

2. Horseplay or off-task behaviors will NOT be tolerated.

3. Scissors must be used in a proper manner.

4. Students must work collaboratively and respect others’ ideas and opinions.

5. Students should not operate the toaster oven for any reason. The teacher is the only individual to shrink the shrink dink cell.

6. Shrinky Dink plastic must be kept away from the heat source unless it is being shrunk by the teacher.

7. Students should be cautious of any rough edges the plastic may have after being shrunk.

8. The Shrinky Dink will be hot for a few minutes after it is finished with the shrinking process. Students will not be allowed to collect their cells until approval is given by the teacher.

9. Glue and other classroom materials are for educational purposes only and should be used respectively.

10. Sharpie markers are permanent and will be used for creating the cell on Shrinky Dink paper only.

11. All materials must be cleaned and stored in an organized fashion upon the completion of each station.

12. Students must maintain a respectable volume when working in small groups.

Transformative:

A. ELL Student
• Teach vocabulary using flash cards or personal glossary of organelles
• Monitor comprehension
• Extra time to complete assignments
• Peer assistance with review station activities
• Modified written instructional materials inserting native language
• Limit number of problems/questions according to proficiency
• Visual models to complete station activities (cell pop up, shrinky dink cell, Venn diagram station activities.
• Encourage use of reference materials to complete station activities—posters of plant and animal cells—organelles labeled

B. ESE students
• Monitor comprehension
• Extra time to complete assignments
• Ask higher level questions and use thinking skills strategies Frequently.
• Assistance with instruction activities using kinesthetic activities with scissors, glue and markers to complete.
• Promote cooperation among small group stations of cell pop up, shrinky dink cell, Venn diagram station activities.
• Encourage use of cell posters for reference for identifying organelles
• Teach with visual models of each station activity.

C. Intensive level students
• Monitor comprehension
• Use simple vocabulary in directions and instructions (i.e. find highlighted terms and vocabulary index cards)
• Extra time to complete assignments.
• Use kinesthetic activities with manipulates (scissors, glue and markers)
• Encourage use of cell posters for reference for identifying organelles
• Assistance with station activities, cell pop up, shrinky dink cell, Venn diagram station activities.
• Teach with visuals models of each stations product. (cell pop up, shrinky dink cell, Venn diagram station activities.)
**Utilize:**

**STRENGTHS:**
- Students are given the opportunity to review for the Science FCAT through a variety of interactive cell organelle - structure and function - activities.
- Students will be working in small groups to complete the interactive, inquiry based activity. Therefore, they have lab partners that they can collaborate with in reaching a conclusion about cell organelles and their functions.
- Students will be able to make a real-world connection when constructing the cell analogy book as they will be comparing the functions of the cell’s organelles to the functions of parts of an institution, business, or other real-world entity.
- Students are presented the parts of the cells using a variety of manipulative models. The use of models helps students understand things like cells that are too small to observe directly. Models also use a variety of colors to make the organelles more distinct.
- Students will be given the opportunity to take a practice test using quizlet.
- Quizlet allows students to compete against each other in cell organelle matching games. Creating a sense of competition usually stimulates good results.
- The CELL SORT allows students to see visuals of the cell organelles. Like the larger cell models, the smaller visuals help paint a mental picture in the students’ heads.

**CHALLENGES:** Challenges presented in this lesson are based on teacher observation throughout the review activities AND student assessment data from the pre-test and post-test.
- Students may have trouble pronouncing and remembering the scientific names of the organelles. Station #3 the Quizlet game has an option for the students to get the pronunciation of the organelle. Students will also create flash cards with the name of the organelle on one side and its function on the other. Pairs of students can use the cards to quiz each other is time permits at other stations.
- Students who struggle to see the differences between plant and animal cells can use 2-column notes to help them organize the differences they identify. The use of colorful models is also helpful when overcoming this challenge.
- **TIME** is a huge challenge. Some students will spend more time than others, specifically when it comes to coloring/cutting activities. The teacher must be conscious of the time and facilitate the activities accordingly.
- Following written direction: Although students are given a briefing for each station, they are likely to forget the demands of them as the rotate through. A written copy of directives must be provided for students at each and every station. The teacher needs to encourage students to read the directions provided for them and rely on their partners for assistance.
- Shrinky Dink Mishaps: Shrinky Dink cells might flip and shrivel when being heated. The paper is supposed to fall back flat as the process continues but the plastic may stick to itself if it touches. The teacher can follow “heating tips” included in the papers heating instructions if this happens and pull the plastic apart using oven mitts and allow more time for baking.
- Classroom management: Science is active. Noise is expected. When students are excited and engaged they tend to create organized chaos. The teacher needs to make sure control is maintained and the purpose of the lesson remains evident.

*Re-teaching Opportunities – Due to the fact that this is a re-teaching opportunity for student, further remediation and reteaching opportunities will be incorporated into future lessons. Reteaching can take place through the use of Bell Work or by using a remediation station when doing small group directed instruction for other lessons. The teacher should allow for students to ask questions and receive clarification during class time and after school throughout the week’s lesson. Tutoring sessions may be made available for students taking the 8th grade FCAT to revisit standards such as parts of the cell. If students do not show mastery on the post-test, the teacher may wish to invite the individual students to remediate on an individual basis prior to the FCAT.*