**Lesson Plan Template**

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| **Name:** | | **405** | | | |  | **Course:** | | Biology | | |  | **Grade:** | 10 | |
| **Unit:** | | Principle of Cell Biology | | | | | | | | | | | | | |
| **Big Idea (Key concept):** | | | | Cell Cycle and Meiosis Phases | | | | | | | | | | |
| **Literacy Strategy(s):** | | | Concept map | | | | | | | | | | | | |
| **Lesson:** | | Cell Cycle Cut & Paste | | | | | |  | | **Date Taught:** | 12/14-16/10 | | | | |
| **Learning Objective(s):** | | | | | | | | | | | | | | | |
|  | Students will be able to | | | | Correctly arrange the terms and explain the relationships between the terms as they have them arranged. | | | | | | | | | | |
|  | Students will be able to | | | | Realize that the cell cycle and the phases of meiosis comprise a true cycle of the cell life. | | | | | | | | | | |
| **Idaho Standards (or National Standards if no Idaho Standards exist):** | | | | | | | | | | | | | | | |
| 1.1.2 Apply the concepts of order and organization to a given system.  3.3.1 Identify the particular structures that underlie the cellular functions.  3.3.2 Explain cell functions involving chemical reactions. | | | | | | | | | | | | | | | |

**Lesson in Context:**

Place the lesson in context by briefly describing the lesson(s) leading up to and following this lesson.

This activity comes at the end of another complex and vocabulary rich chapter dealing with the cell cycle and the phases of meiosis. The information from this chapter was presented to the students in the form of teacher presentations of power points and Cornell notes. In previous chapters students had voiced concerns regarding their ability to identify the important information from the text, so I generated the notes and shared them with the students. They copied the material as they saw fit from my notes in the appropriate format and were responsible for writing the summaries based on the essential questions for each section. They were also responsible for reading selected sections from the text and relevant provided outside resources. The intent for this activity is to help students develop the relationships between the individual components of the cell cycle and meiosis phases.

**Instructional Materials, Resources:**

List the materials that you will need for this lesson. Attach a copy of any materials students will use during the lesson; e.g., handouts, questions to answer, and worksheets.

I provided each student with the attached handout, which contained the instructions, terms, and rubric. They were also given a large sheet of construction paper, scissors and a glue stick. I also had small Ziploc bags available for students to take their cut out pieces home without risk of losing them. The most valuable resource was adequate class time and access to their peers for small group assistance.

CELL CYCLE CUT AND PASTE - cut out each of the words and arrange them on construction paper. Use arrows and label to show how each is related.

|  |  |  |  |
| --- | --- | --- | --- |
| anaphase | microtubulesss | cell division |  |
| centromere | prometaphase | chromosome |  |
| cytokinesis | chromatid | mitosis |  |
| growth1 | DNA | centriole |  |
| metaphase | growth2 | synthesis |  |
| interphase | telophase | nucleus |  |

spindle

prophase

RUBRIC *(paste this to your project)*

Organization (easy to follow and understand, terms grouped in ways that make sense.

\_\_\_5 \_\_\_4\_\_\_3\_\_\_2\_\_\_1\_\_\_0

Links (arrow show accurate relationships between terms, logical sequences)

\_\_\_5 \_\_\_4\_\_\_3\_\_\_2\_\_\_1\_\_\_0

Label links to explain relationships accurately.

\_\_\_5 \_\_\_4\_\_\_3\_\_\_2\_\_\_1\_\_\_0

# The Cell Cycle

**Procedures:**

In this section write a detailed explanation of each step of your lesson using the guidelines and components below. The lesson may span multiple days.

*I was vague in my instructions intentionally, as I wanted students to develop their own concept map linking the relevant terms. On the first day I allowed only a few minutes, with the opportunity for them to start the project with peer assistance, but without the possibility of completing it.*

*On the second class period students arrived ‘frantic’, a few students were able to create their concept map with little difficulty, and needed only a few minutes to place some straggling terms and add those explanations. A majority of the students were, in their words, ‘clueless.’ I had anticipated this and allowed the students to work in small groups to finish the construction of the posters. (For those that had already finished they had the opportunity to use this class time to work on the review packet, which the other students would have to complete outside of class.) This in class time was amazing, as students questioned, explained and further explored* *the relationships between the terms. Since there was not just one right answer they felt some freedom to be different by the placement of terms and the relationships that they identified.*

* **Engage/Introduction:** *(approximate time: 10 min )*
* Identify how you are going to introduce the task in a way that motivates students and elicits students’ prior knowledge and relevant experiences.

*I reminded my students of several concept maps that we had used previously and I reminded them how we had added to them to help us remember important pieces of information. I explained to my students that I wanted them to build their own concept maps for this chapter, using the terms on the page. I told them that each of their maps could look different and still be correct because I was going to be looking at the relationships between the terms that they identified and explained. I gave them the materials and allowed them a few minutes to get started.*

* **Explore/Learning Activities:** *(approximate time: 30 minutes )*
* Give detailed, step-by-step instructions on how you will implement the lesson plan and what students will do during the lesson. Include clear directions for activities.

*For students that were able to complete this outside of class I allowed them to begin working on the homework. The remainder of the students set work arranging the terms, asking their neighbors, comparing posters, and looking at their references. I facilitated this by monitoring to make sure students stayed on task and encouraging them to check their references. I repeatedly stated ‘that’ll work” as they asking me if their poster was correct. If I noticed problems I encouraged them to ask another student. With the list of terms provided students were able to complete the assembly portion during class, but not all students were able to write the explanations for the relationships as instructed and would need additional time outside of class to complete that portion.*

* **Explanation/Closure:** *(approximate time: 15 min )*
* Explain how you will guide students to share what they have learned and connect their learning to key concepts.

*The construction of the individual posters provided so much sharing and discussion between students that I questioned the need for a formal exchange of posters. As the class period drew to a close I reminded students to make sure each of the terms had the relationships (connecting lines) drawn and explained. As students completed the placements of the terms they were able to further share the relationship and explanations.*

*However, we will be exchanging the posters as a review activity in preparation for the semester exam.*

**Elements of effective instruction:** (Describe how the lesson addresses each of the following. If not applicable, explain.)

1. Describe how the lesson fosters intrinsic motivation to learn.

*Giving people glue stick and scissors always seems to get them going. Also, this was similar to a puzzle, which they typically enjoy. It was a bit overwhelming once they got all of the pieces cut out, but having the pieces to physically move helped them proceed.*

1. Describe how the lesson elicits students’ prior knowledge.

*Since all of the material had been previously ‘presented’ and addressed through the Cornell notes and summaries students were able to refer to those notes and the in class lectures as they constructed their concept maps.*

1. Describe how the lesson intellectually engages the students in making meaning of the targeted math/science content.

*During this activity they not only have to physically identify the relationships based on the meaning of each term, they also must explain the relationship on writing on the connecting line between the terms. I encouraged students to include pictures, particularly if that is how they remembered the particular piece of information. The dialogue with their peers provided opportunities to learn from each other and clarify any misconceptions in a non threatening atmosphere. Even students that were not speaking were able to overhear the discussions and benefit. All of those components together engaged to students to make meaning of the terms.*

1. Describe how students:

* *Science*: Use evidence to support and/or critique claims.

*During the discussions students would often use examples to explain their answers to their peers. They also would show each other the references that supported their reasoning.*

* *Math*: Explain and justify their reasoning.

1. Describe how the students engage in making sense of the material covered in the lesson.

*Small group discussions provided students the opportunity to make sense of the material and reinforce their learning by sharing their explanations with their peers.*

**Student Work:**

Include samples of student work from the lesson (include and clearly label examples of high, medium, and low quality). *Remove student names before submitting.*

*Student Poster A- This student is typically a high achieving student. She completed most of the poster outside of class and shared it with several students when they asked her questions. She did express her frustration with how it seemed unorganized, even though she worked very hard to keep in ordered.*

*Student Poster B- This student typically struggles with homework and verbalizes that he ‘doesn’t get science’. He said that he had worked with another student – a fellow wrestler- and they had completed the poster together. During the class time provided I prompted him to include several missing explanations, which he was able to find with little assistance (and minimal complaints.)*

*Student Poster C-This student has struggled throughout the school year. She rarely completes homework assignments, works very slowly in class, and does poorly on tests and quizzes. Though the format is different from most students, she does manage to identify the correct sequence of the major steps and accurately tie the supporting terms to at least one appropriate term with correct explanations.*

**Reflection:**

Complete the Lesson Reflection Form on the following page. Spend time to include details of how the strategy worked and what you may have done differently. This is the portion which will most help your colleagues in implementing their own version of your lesson.

**LIMSST Project Literacy Lesson Reflection Form**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Name:** | **405** |  | **Date lesson was taught:** | **12/14-16/10** |
| **Lesson Title/Topic Area(s):** | | | | |
| **Cell Biology – Cell Cycle & Meiosis Phases Concept Map** | | | | |

**Literacy Emphasis:**

(Please discuss the literacy strategy(s) you embedded in this lesson. How do the strategies support **student** thinking and meaning making? Be specific and use as much detail as possible.)

*This activity builds student knowledge from the basics of the definition for the individual terms up to the sequential order of the changes described by each of the terms and through to the analysis of the effect on each of the cellular components. Students are required to carefully evaluate the physical placement of each term and then explain the relationship(s) that they identified. Typically students recognize that some terms (such as DNA and spindle) could be explained or described differently in multiple different relationships on the map. They also incorporated verbal communication skills as they asked, answered and clarified with their peers while evaluating their neighbors’ posters.*

**Student Response to the Lesson:**

(Describe the nature of student engagement in the math/science content presented in the lesson. How effective was the strategy at supporting student reasoning? Describe evidence that the students were making sense of the content presented.)

*The small group discussions that resulted from this activity benefited all of the students involved. Those students providing the explanations deepened their knowledge while the students asking the questions received the clarifications that they had been unable to find on their own. The small group format allowed them to ask the questions that they would not have asked me. Also, the knowledge that there was not just one right answer gave the students the freedom to follow their own ideas.*

*Student reasoning was supported through their verbal exchanges, access to references, and their writing of the explanations. ‘Sean’ repeatedly asked ‘Olivia’ to explain things to him, telling her that she did a great job of making it make sense to him. She responded by telling him that when she understood something she was really good at explaining it to others. That is true for so many students, yet they seldom have the opportunity to teach and learn from each other in the classroom.*

*The evidence that students were able to make meaning comes in the form of the dialogue exchanged and the resulting posters.*

**Lesson Reflection:**

(What worked well with this lesson? What challenges did you encounter in this lesson? How would you change certain aspects of the lesson or the questions that you asked? How does this influence future lesson planning?)

*The most beneficial component of this activity was a result of the small group discussions. Through that level of student sharing all of the students benefitted. The materials were all adequate is size for most students, I would not recommend a small sheet of construction paper as this does not provide enough space for the explanations on the lines. Tape is preferable over the glue stick for durability.*

*I have considered constructing the concept map as we acquire the information; however, my concern is that it will not provide the ‘making meaning’ components that make this activity so valuable. Simply copying my concept map will not provide them with any ownership of the materials or the relationships of the terms. I will provide a concept map to my special needs students so that they can simply focus on identifying the relationships between the terms.*

*I collected the posters at the end of the class, but most students did not have time to explain the relationships. I intend to return the posters to the students so that they can complete this crucial component to the concept maps.*

**Relationship to Previous Instruction:**

(Have you taught this lesson/topic prior to the LIMSST project? If so, how did your teaching of this lesson differ from what you taught before? How did students’ reactions to this lesson differ?)

*I have not taught any lessons similar to this prior to the LMISST project. This content leads itself particularly well to the use of concept maps and flow charts, which inspired this activity. I have given students the concept maps from our textbook, and they typically do well with completing them. However, few students show any retention of the material and the connections in subsequent discussions and quizzes. I hope that this activity helps on the chapter test as well as the semester exam of this information.*