

Structure and function of cells and their organelles pbl

[Education](#)



LESSON PLAN Grade Level: 10 Th grade Biology NC Standard Course Study

Objective- Clarifying Objectives:

Bio. 1. 1. 1 Summarize the structure and function of organelles in eukaryotic cells (including the nucleus, plasma membrane, cell wall, mitochondria, vacuoles, chloroplasts, and ribosome) and ways that these organelles interact with each other to perform the function of the cell.

Bio. 1. 1. 2 Compare prokaryotic and eukaryotic cells in terms of their general structures (plasma membrane and genetic material) and degree of complexity.

Bio. 1. 1. 3 Explain how instructions in DNA lead to cell differentiation and result in cells specialized to perform specific functions in multicellular organisms.

COLLABORATION WITH CLASS TEACHER

In order to make learning experience richer and better , a collaboration is an good option.

Understanding the needs of individual students both gifted and regular ones.

Installation of video players or computers to facilitate learning.

Both instructor and teacher will share notes on growth of individual child and ensure that each student is learning something.

4 DAY PLAN

DAY 1

Objectives:

Students will know about the discovery of cells down the timeline.

Student will also learn about prokaryotic cells and Eukaryotic cells and some

will be able to classify organisms.

Students will learn to differentiate between animal and plant cells both structurally and functionally.

Students will be able to write down the importance of cellular activities.

Students will write down the functions of both animal and plant cells separately.

Instructions for Gifted Students

Instructions for Regular Students

Before the lesson begins Students are asked to collect information about cells by interviewing fellow students, friends and family. They must also add what they know about cells and their functions.

Before the lesson begins Students will write 1 page each on things they personally know about cells.

PROCEDURES

ACTIVITIES for Gifted Students

Activities for regular students

Models may be used to differentiate between prokaryotic cells and Eukaryotic cells. You may use a slides and microscope for the same purpose.

Instructor needs to verbally discuss differences in the structure and in the genetic material of the two kinds of cells.

Students must use Post-its to differentiate between prokaryotic and Eukaryotic cells and write down names of organisms and classify them as prokaryotic or Eukaryotic.

Models may be used to differentiate between prokaryotic cells and Eukaryotic cells. You may use a slides and microscope for the same purpose.

Instructor needs to verbally discuss differences in the structure and in the genetic material of the two kinds of cells.

Student will use Post-Its to write down the characteristics of both Prokaryotic cells and Eukaryotic cells. The difference between the two may be written down on the board.

A video from YouTube must be watched to help students understand the structural difference between the animal and plant cell. <http://www.youtube.com/watch?v=mnWm-RjBKcM>

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Prior to the video printouts containing the difference between the cells must be handed to each student to help them follow easily.

Quiz game- Give a specific time to read through cellular functions and cell metabolism from notes or book and answer a quick questionnaire.

Finding out the different functions performed by the cells in groups and comparing the list with the rest of the students.

RESOURCES:

1. Post-Its
2. Large labeled diagram to explain cell in detail.
3. Models of cells.
4. Printouts of differences between animal and plant cells for each student.
5. Color and pencil to draw diagrams.
6. Video downloaded from YouTube.
7. Slides and microscope.

8. Pre-prepared questionnaire for Gifted students.

Products:

Gifted: Gifted children will get a good grasp about the major divisions of cells and will be able to classify animals and microbes. They will be able to differentiate between the animal and plant cells. They will be familiar with cell functions and may even venture into cellular metabolism processes.

Regular: Students will be able to understand the difference between Prokaryotes and Eukaryotes. They will be able to recognize an animal cell from a plant cells based on structural differences. They will be able to write down a few cellular functions.

Assessment for Gifted Students

Assessment for regular students

Filling out a questionnaire on cells.

List all the new terms they learnt or the teacher may provide the terms and explain each one in own words.

EXTENSIONS AND CONNECTIONS

This class will be followed by a class focused on cellular structure and function at all levels.

DAY 2

Objectives:

Student will become conversant with the different organelles present in the cell.

Student will learn to identify and draw the parts of the Eukaryotic cell.

Some students will learn about different cell membrane models

Students will learn to take part in an activity as a group and help each other.

Students will understand interaction at the organelle level.

Student will learn about the various types of cells in the human body.

Instruction For Gifted Students

Instruction for Regular Student

Each student is to select a cell membrane model and read about it.

Students are divided into groups and asked to make a chart with pictures of cell organelles.

PROCEDURES:

Activities for Gifted Students

Activities for regular students

http://www.cellsalive.com/cells/cell_model.htm

and Guide them to understand the cell and their functions hands-on.

A video featuring the most important functions of a cell will be played to help students understand it better.

Each student must verbally present to the class the function of the organelle the student selected.

Based on this, the instructor may ask questions:

e. g. if the organelle is plastids:

What will happen if plastids are absent in plants?

The student will work in twos or threes and draw the organelle assigned to them. They must also write down the different structural features and functions of each organelle. For this they will be given a mere 10 minutes.

The instructor leads the class and discusses the interaction between the organelles to perform certain functions.

Each group will read out the structure and functions of the organelle

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assigned to them

Present pictures of the differentiated body cells (blood, neural), and ask each student to write down their identification. The one to get most answers correct with the shortest span of time receives applause.

Next the instructor discusses the interaction of the organelles to perform certain functions.

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Students are asked to write down names of different cells in the human body. (Nerve cells, blood cells etc).

RESOURCES:

Downloaded video explaining cellular function.

Colors and pencils for drawing.

In case there is dearth of time, you may handout previously printed pictures of organelles instead of asking students to draw them.

PRODUCTS

Gifted- Students will develop a thorough knowledge about cell membrane models and differences between each model. They will also be able to write down cellular functions of the body and functions of the organelles.

Regular- Will be able to state functions of most organelles and describe different cells.

ASSESSMENT:

Gifted Students

Regular Students

The student pair up, select a cell membrane model and make one using craft materials. They must afterwards make an oral presentation on the model.

Each student is asked to make a Word Document containing description and functions of at least 3 organelles.

EXTENSIONS AND CONNECTIONS

This lesson will be followed by an inquiry based and interactive lesson to help student brush up on whatever they had learnt previously.

DAY3

Objectives

Students will have the confidence to identify most of the organelles and state their function.

Students will have in-depth knowledge about cell-membrane models.

Students will be able to match functions with organelles.

Students will learn about the Cell Theory.

Instruction For Gifted Students

Instruction for Regular Students

Students are asked collect information about the cell theory and write them in their own words.

Students are asked to read about cell theory and brush up on their knowledge of the organelles.

PROCEDURES:

Activities for gifted students

Activities for regular students

A PowerPoint presentation is prepared to explain the Postulates of Cell theory.

The students are later on taken to the computer lab and asked to write 1 page on the topic and also include recent researches on cells.

A class game will be played. Divide the learning students into 2 groups. Both groups will create a match the column game which must be solved by the other group. In one column they write the name of the about 8 organelles and in the other column write the functions in a jumbled manner. The groups will exchange the sheet and try to match the organelles with their functions in 1 minute.

On the Spot game-

The student sit ready with Post-its and write down their names on each.

The instructor utters a list of about 5 cell organelles. The students must remember the list and write down the functions within a time limit.

Postulates of the Cell Theory will be discussed. Recent developments in cell studies must be discussed. For this you may use scientific journals and expose the students to scientific literature.

1. Answer a questionnaire. The questionnaire will contains questions related to cellular structure and functions e. g. What to do cell organelles do?

Which organelle helps in protein synthesis? Etc.

RESOURCES:

Sheets of paper for the game.

Notes printout about cell theory.

Printout of questions for students to answer.

PRODUCTS

Gifted: Students will be well versed with organelles and their functions. They will have good knowledge about Cell theory and its applications. Some will be able to understand developing cell technologies by evaluation of primary articles.

Regular: Students will be familiar with cell organelles and can identify most functions. They will understand the different cell membrane models. They shall also be familiar with understanding journal articles.

Assessment for Gifted Students

Assessment for Regular Students

Students are asked to download a primary journal on any cell technology/ they may find a journal at the library and write down a summary and end with an evaluation or opinion conclusion..

Students are given a choice between 2-3 articles from a journal and asked to write down a summary of the article in their own words.

EXTENSIONS AND CONNECTIONS:

This lesson should be taught before going into cellular reproduction or studies about DNA.

DAY 4

Objectives

Students will develop a basic knowledge about DNA and its function in genetic coding.

Students will learn about cell differentiation.

Students will be able to write down the varied functions of differentiated cells.

Instruction for Gifted Students

Instructions for Regular Students

Gather information on stem cell technology.

Read through notes provided on DNA and genetic coding.

PROCEDURES:

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Activities for Gifted Students

Activities for Regular Students

Video showing cellular differentiation and specialized cells.

The students are allowed to ask questions which the instructor answers.

1. PowerPoint presentation and video to explain cell differentiation and role of DNA. The teacher must hand out notes containing information about cell differentiation and indicate the different types of specialized cells.

<http://www.teachersdomain.org/resource/tdc02.sci.life.stru.different/>

The students are divided into groups of 2 groups and asked to present a debate - Stem cell technology? Pros and cons.

Put up a chart containing pictures of specialized cells and ask students to identify them. Students of Grade 10 will be able to identify and name most of the specialized cells.

Ask each of them to write down functions of any one of the specialized cells.

Explain meaning of Stem cell.

RESOURCES:

Chart containing pictures of specialized cells.

Notes printout about cell differentiation and specialized cells.

Downloaded video of cell differentiation.

Pre-prepared PowerPoint presentation on the same topic.

PRODUCTS

Gifted: Students will be able to explain cellular differentiation and state the functions of the differentiated cells. They will also be able to explain Watson - Crick Model of DNA and have a knowledge about DNA's role in the differentiation. Furthermore, they will be able to write down applications of

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stem cell technologies and their importance in the medical field.

Regular: Student will learn the importance of cell differentiation and they will be able to list the functions of the cells. They will be able to define stem cell technology.

ASSESSMENT:

Gifted Students

Regular Students

Choose any article from the internet on either DNA technology/ stem cell technology/ cell differentiation mechanisms and prepare a PowerPoint presentation to be shared with the class.

OR

Write a 5 page report on what they now know about cells and compare this with the report they had prepared at the beginning of the entire lesson.

Students are given a newspaper cutting on stem cells and asked to write 1 page opinion about the article.

OR,

Write a 5 page report on what they now know about cells and compare this with the report they had prepared at the beginning of the entire lesson.

EXTENSIONS AND CONNECTIONS:

This lesson should be taught before going into cellular reproduction or studies about DNA.