Verizon PICO 3 Looking Inside Cells VR app User Guide

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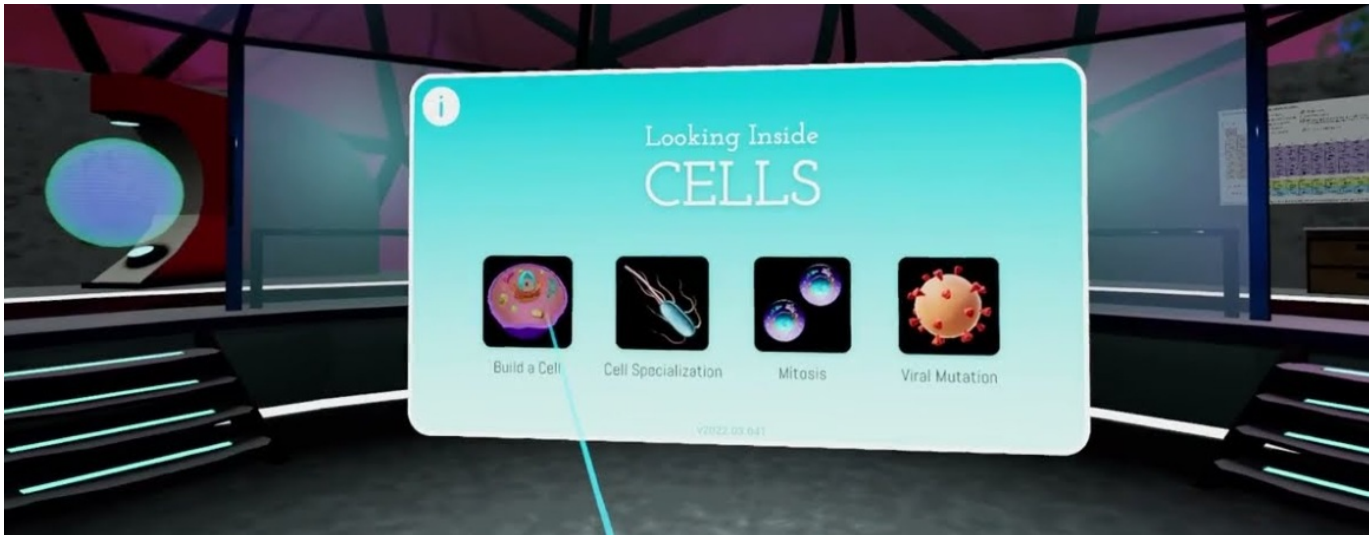


Contents

Introduction to Models

In this lesson, students use familiar examples of models to identify the potential uses and benefits of models in science, as well as the possible limitations of different model types. This is the first lesson in a three-lesson module.

Subject Area: Biology
Grade Level: 6 – 9
App: Looking Inside: Cells
Learning Standards: NGSS SEP-2 – Developing and Using Models, MS-LS1-2

How to Access the App

First, access the Looking Inside: Cells VR app via Verizon Innovative Learning HQ at **https://www.verizon.com/learning**. Then, experience the app via PICO 3 or Quest headset.

Overview

In the three-lesson module Cells and Models, students explore the use of models in science as they compare the benefits and limitations of various representations of an animal cell, including the Looking Inside: Cells app, and develop a cell model of their own. Optional extensions expand students' learning as they refine a cell model to illustrate cell specialization or explore modeling cell systems through the example of nerve cells.

Objectives

- Students will be able to identify at least three purposes models can serve in science.
- Students will be able to describe possible benefits and limitations a model might have.

Essential Questions

- What is a model?
- What can models help us do or learn?

Materials and Preparation

- Collect 3–5 examples of models for class discussion. They should be familiar to students and include a variety of types or formats (physical models, drawings, diagrams, etc.) Some possibilities:
    - Die-cast toy car
    - Globe
    - City map
    - Physical anatomical model, such as heart, eye, or other organs
    - Digital animation, such as planets orbiting the Sun
    - Diagram of a process, such as the water cycle
    - Scientific illustration of an extinct animal

Background

Using Models in Science

A model is a representation that illustrates certain aspects of an object, system, or phenomenon. A model might simplify a complex system, represent an object at a larger or smaller scale, or use analogy to compare a phenomenon to something more familiar. Models can be physical objects, drawings or diagrams, or sets of ideas that explain a process.

Models play a key role in the process of science. Scientists use models to:

- Represent objects or events that are difficult to observe directly
- Understand how the parts of a system or process interact with one another
- Make and test predictions
- Explain, support, or disprove ideas
- Visualize and communicate ideas to others

Evaluating and Refining Scientific Models

All models have limitations. A model does not exactly replicate the actual object or process it is representing; it highlights certain features while potentially leaving out or inaccurately representing others. The effectiveness of a model depends on how well it illustrates the specific aspect needed for a particular purpose. A street map, for example, accurately represents the relative distances and intersections between roads, but it does not show other features of the landscape, like elevation changes or individual buildings. It is an effective model for helping you navigate to a new place by road; however, if you need to know how many hills you will climb to get there, or what the color of the building is, you will need to use a different model.

Evaluating the benefits and limitations of models helps scientists understand what specific purposes a model is best suited for, and where it might be unreliable or inaccurate. This allows them to choose the model that best fits their purpose, improve a model by gathering and adding new information, or create a new model that focuses on a different aspect of the system they are investigating.

Scientists refine their models using scientific evidence. The process of science involves using a model to make predictions, comparing the predictions to the real world, adapting the model based on those results, and testing new predictions using the updated model. The scientific model of the atom, for example, has changed over time from a tiny, solid particle to a nucleus circled by electrons to a complex interaction of subatomic particles governed by quantum mechanics. However, each of these atomic models highlights different features of the atom and all can still be useful in different situations.

Modeling Cells
These lessons use cell structure and function as a vehicle for exploring the uses and limitations of scientific models. They are designed to build on students' understanding of the basic structures of a eukaryotic cell to investigate how different models represent those structures. The lessons will be most effective following an introductory study of eukaryotic cells.

Step-by-step classroom guide

Access: The Looking Inside: Cells app is not required for this segment.

Objective: Students will be able to identify at least three purposes models can serve in science and describe possible benefits and limitations a model might have.

Pacing: This lesson should take approximately 45 minutes.
Essential Question: What is a model? What can models help us do or learn?

1. **Engage: 10 minutes**

   Lead the class in a brainstorm or mind-mapping session around the following questions:

   - What do you think of when you hear the word "model?"
   - What is a model?
   - What examples of models can you think of?
   - Why do we make models of things? What do we use them for?

   Summarize the class's ideas about models:

   - What are our ideas about what a model is?
   - What can we say about what people use models for?

2. **Explore: 25 minutes**

   Ask students to examine several images or physical examples of models. For each one, have them record their answers to these questions:

   - What real thing does this model represent?
   - What does the model show us about the real thing (for example, what parts it has, or how they work)?
   - How is it different from the real thing (for example, a different size, or made of a different material)?
   - **Benefits:** What is one thing the model helps us understand about the real thing?
   - **Limitations:** What is one thing it doesn't show accurately? What would you not use it for (and is there a different model you would use instead)?

3. **Reflect: 10 minutes**

   Lead a class discussion synthesizing students' conclusions about models based on the examples they investigated. Compile a chart of the benefits and limitations students identify, for example:

   A model can…

   - Show things that are hard to see (too slow, too fast, too big, too small, too old, not invented yet)
   - Show the parts something has
   - Show how the parts of something fit together
   - Show a process – how something works or changes
   - Use familiar objects or ideas to show something unfamiliar

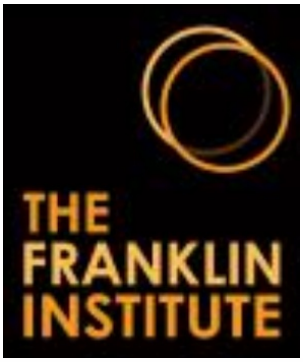
   A model might not…

   - Be the same size or shape as the real thing
   - Show every part of the real thing

- Include all the details of the real thing
- Work exactly the same way as the real thing

Compare the chart to the class's ideas from the opening brainstorm.

- How have our ideas about models changed?
- Is there anything we should add to this list from our original ideas?
- Save the chart in a student-accessible location for Lesson 2.



Documents / Resources

	Verizon PICO 3 Looking Inside Cells VR app [pdf] User Guide PICO 3 Looking Inside Cells VR app, PICO 3, Looking Inside Cells VR app, Inside Cells VR app , Cells VR app

References

- Homepage | VILS
- User Manual