The zSpace Education Solution

Framework for Student Success with zSpace in

St. Louis Public Schools

zSpace

SLPS Strategic Values

Highly Effective Educators and Leaders

Authentic Family and Community Partnership

Equitable and Multiple Sources of Data

Joyful and Engaged Students

Personalized Supports and Innovative Pathways

College and Career Ready Critical Thinkers

Values Across Our Student Goals

SAINT LOUIS PUBLIC SCHOOLS

Virtual Reality (VR)

Characteristics of VR

- Full immersion
- Isolation from surroundings
- Unique experience for each learner
- Requires a Head-Mounted Display (HMD)

zSpace

Augmented Reality (AR)

Characteristics of AR

- Real world augmented with digital content
- Can be a shared experience
- Delivered using a tablet or other similar device and text or code to activate content

zSpace

AR/VR with zSpace

Characteristics of zSpace

- Elements of VR and AR
- Collaborative
- Interactive
- Comprehensive solution including hardware, software, applications, and standards-based content

zSpace

What is zSpace?

High Definition,
Color 3D Display
with Head Tracking

Stylus Sensor
Module for
AR/VR Interaction

1 Year Warranty with Option
of Adding Additional Years
and EduCARE

Unique Stylus for
AR/VR Interaction

zSpace

St. Louis Public Schools

zSpace

St. Louis Public Schools

Gateway Middle School

zSpace

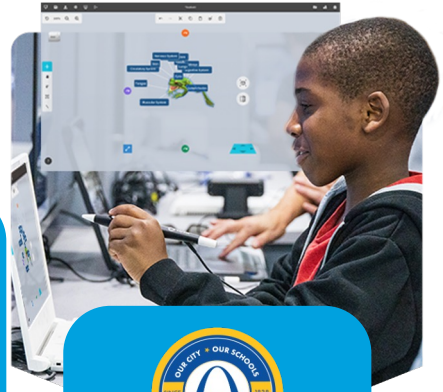
The zSpace Solution

Hardware

Software

Lessons, Activities, and Simulations

Professional Learning and Support



Success with zSpace

zSpace

Alignment to SLPS Strategic Values

Teachers will have access to a zSpace Professional Learning Specialist for ongoing professional learning to include:

- Monthly training sessions aligned to the SLPS Power Standards
- Job-embedded coaching

zSpace

Alignment to SLPS Strategic Values

The zSpace Professional Learning Specialist and Success Manager will support:

- Integration of simulations and activities with the SLPS curriculum with a focus on Power Standards
- Leaders in monitoring the effectiveness of the zSpace implementation

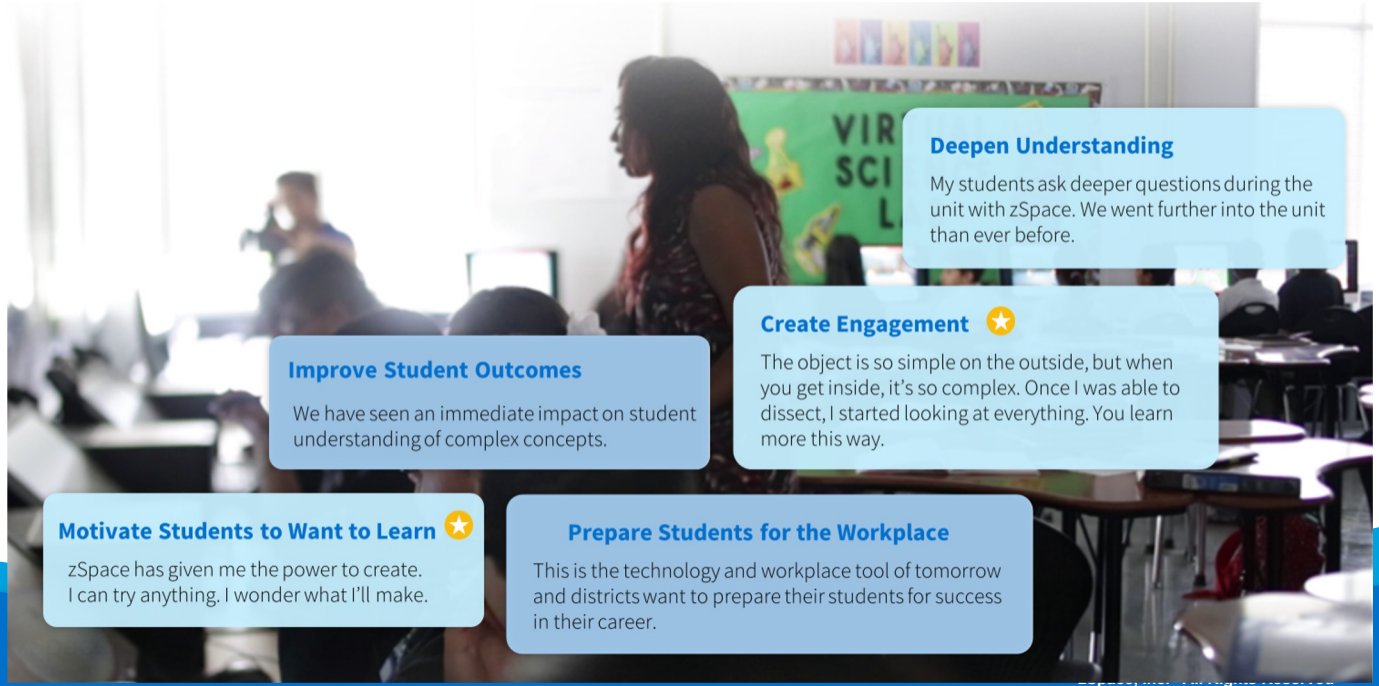
zSpace

Alignment to SLPS Strategic Values

Joyful and Engaged Students

Dr. Rebecca Hite, 2023

Research outcomes regarding zSpace include:



zSpace

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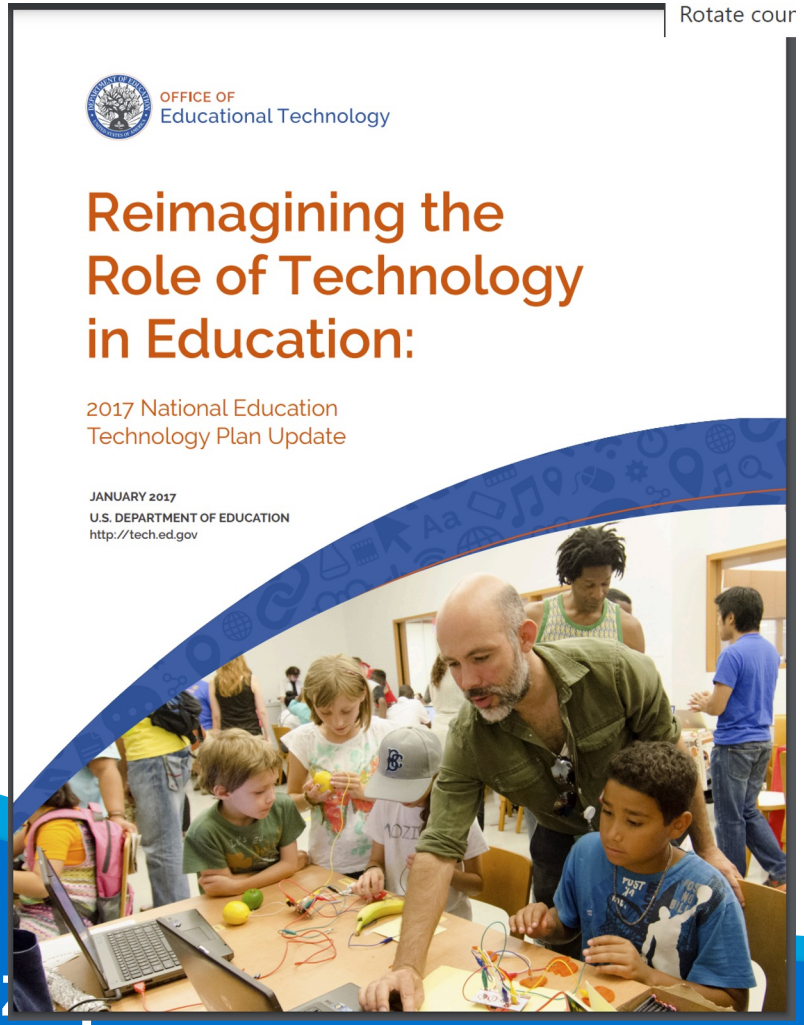

USDOE Education Technology Plan (2017)

Interactive three-dimensional imaging software, such as zSpace, is creating potentially transformational learning experiences. With three-dimensional glasses and a stylus, students are able to work with a wide range of images from the layers of the earth to the human heart. The zSpace program's noble failure feature allows students constructing a motor or building a battery to make mistakes and retry, learning throughout the process. Although the content and curriculum are supplied, teachers can customize and tailor lesson plans to fit the needs

of their classes. This type of versatile technology allows students to work with objects schools typically would not be able to afford, providing a richer, more engaging learning experience.

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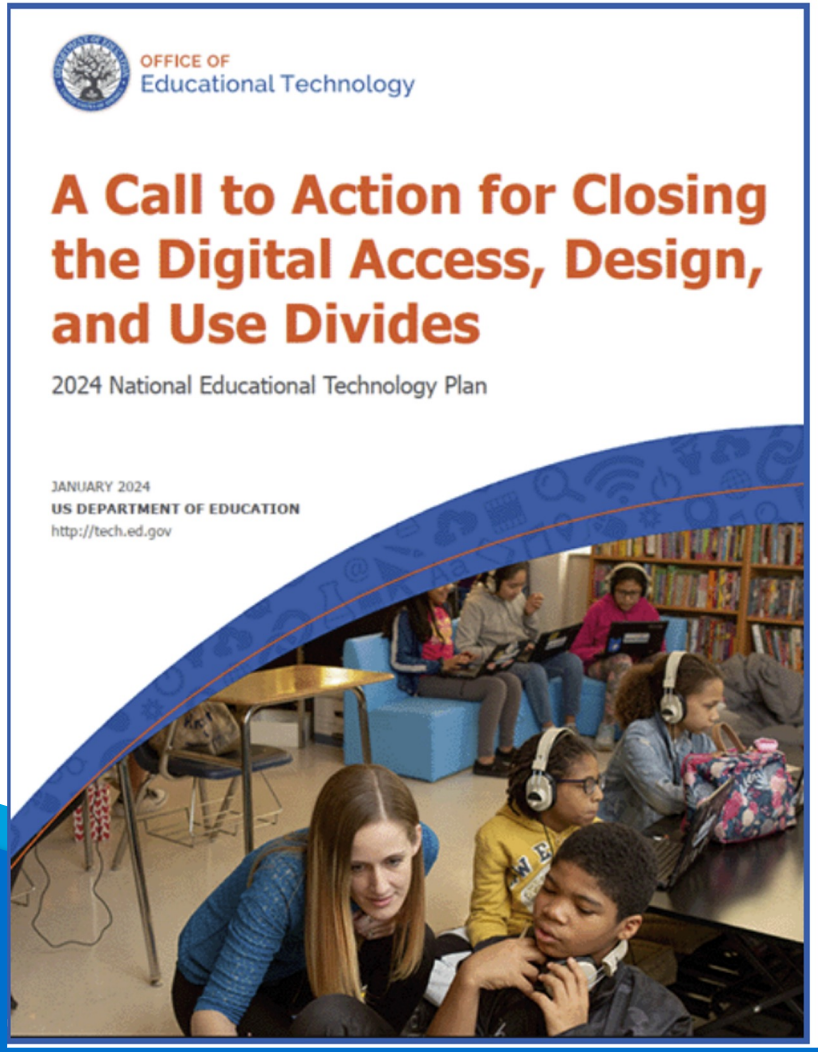
USDOE Education Technology Plan (2024)



Atlanta Elementary School Designs Problem-Based Learning for Students

Spaces like STEAM labs, maker spaces, and innovation creation labs allow students authentic learning experiences that expose them to career paths, as well as settings where they can acquire essential skills such as collaboration and problem-solving. These spaces allow students to learn through thought and action when exposed to authentic contexts.[65] [66] This thinking drove the transformation of Atlanta Public Schools' M. Agnes Jones Elementary School (M.A. Jones), a Title 1 school serving a majority Black student population. The school was committed to having students develop solutions to local problems. Starting in kindergarten, students learn the Stanford Design School's engineering design process and practice it in science, English language arts, and math.

Students also put the process into practice. When 5th-grade students discovered insects were destroying a community garden near the school, they used the design process to tackle the issue. Through research, they learned bats eat thousands of flying insects every hour. The students also used AR/VR technology and TinkerCAD in the school's Innovation Creation Lab to design and build bat houses to bring more bats to the area. Along the way, students learned relevant and applicable facts about gardening, composting, nutrition, wellness, and sustainability.

At M.A. Jones, teachers, coaches, and even custodians participate in professional learning because school leaders recognize that building capacity is the only way to make this type of learning sustainable. By leveraging the active use of technology for solving real-world problems, M.A. Jones educators are helping close the digital use divide.

65 Sheridan, K., Halverson, E. R., Litts, B., Brahms, L., Jacobs-Priebe, L., & Owens, T. (2014). Learning in the making: A comparative case study of three makerspaces. *Harvard Educational Review*, 84(4), 505-531.
66 Ryan, J. O., Clapp, E. P., Ross, J., & Tishman, S. (2016). Making, thinking, and understanding: A dispositional approach to maker-centered learning. In *Makeology* (pp. 29-44). Routledge.

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Alignment to SLPS Strategic Values

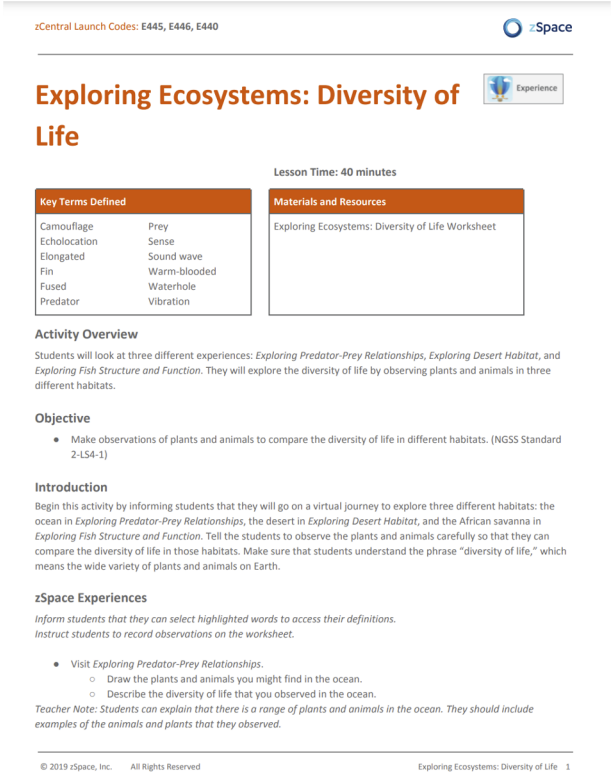
College and
Career Ready
Critical Thinkers

zSpace

6th Grade Science MLS (NGSS) Standard Prioritization[1]

Priority Standards***	Secondary Standards**
6-8.PS4.A.2 (MS-PS4-2)* Develop and use a model to describe that waves are reflected, absorbed, or transmitted through various materials.** **6-8.LS1.C.1 (MS-LS1-6/LS1-7) Construct a scientific explanation based on evidence for the role of photosynthesis and cellular respiration in the cycling of matter and flow of energy into and out of organisms.** **6-8.LS2.A.1 (MS-LS2-1) Analyze and interpret data to provide evidence for the effects of resource availability on individual organisms and populations of organisms in an ecosystem.** 6-8.LS2.A.2 (MS-LS2-2) Construct an explanation that predicts patterns of interactions among and between the biotic and abiotic factors in a given ecosystem. **6-8.LS2.B.1 (MS-LS2-3) Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.** 6-8.LS2.C.1 (MS-LS2-4) Construct an argument supported by empirical evidence that explains how changes to physical or biological components of an ecosystem affect populations. 6-8.LS2.C.2 (MS-LS2-5) Evaluate competing design solutions for maintaining biodiversity and ecosystem services. **6-8.ESS2.C.1 (MS-ESS2-4) Develop a model to describe the cycling of water through Earth's systems driven by energy from the sun and the force of gravity.** **6-8.ESS2.C.2 (MS-ESS2-5)** Research, collect, and analyze data to provide evidence for how the motions and complex interactions of air masses result in changes in weather conditions. **6-8.ESS2.C.3 (MS-ESS2-6)** Develop and use a model to describe how unequal heating and rotation of the Earth cause patterns of atmospheric ad oceanic circulation that determine regional climates. **6-8.ESS3.B (MS-ESS3-2)** Analyze and interpret data on natural hazards to forecast future catastrophic events and inform the development of technologies to mitigate their effects.	**6-8.ETS1.A.1 (MS-ETS1-1)** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **6-8.ETS1.B.1 (MS-ETS1-2)** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **6-8.ETS1.B.2 (MS-ETS1-3)** Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. **6-8.ETS1.B.3 (MS-ETS1-4)** Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

zSpace Model for Integration



zCentral Launch Codes: **E445, E446, E440**

zSpace

Exploring Ecosystems: Diversity of Life

Experience

Lesson Time: 40 minutes

Key Terms Defined		Materials and Resources
Camouflage	Prey	Exploring Ecosystems: Diversity of Life Worksheet
Echolocation	Sense	
Elongated	Sound wave	
Fin	Warm-blooded	
Fused	Waterhole	
Predator	Vibration	

Activity Overview

Students will look at three different experiences: *Exploring Predator-Prey Relationships*, *Exploring Desert Habitat*, and *Exploring Fish Structure and Function*. They will explore the diversity of life by observing plants and animals in three different habitats.

Objective

- Make observations of plants and animals to compare the diversity of life in different habitats. (NGSS Standard 2-LS4-1)

Introduction

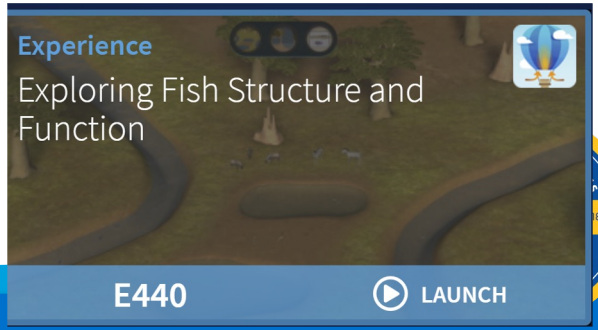
Begin this activity by informing students that they will go on a virtual journey to explore three different habitats: the ocean in *Exploring Predator-Prey Relationships*, the desert in *Exploring Desert Habitat*, and the African savanna in *Exploring Fish Structure and Function*. Tell the students to observe the plants and animals carefully so that they can compare the diversity of life in those habitats. Make sure that students understand the phrase "diversity of life," which means the wide variety of plants and animals on Earth.

zSpace Experiences

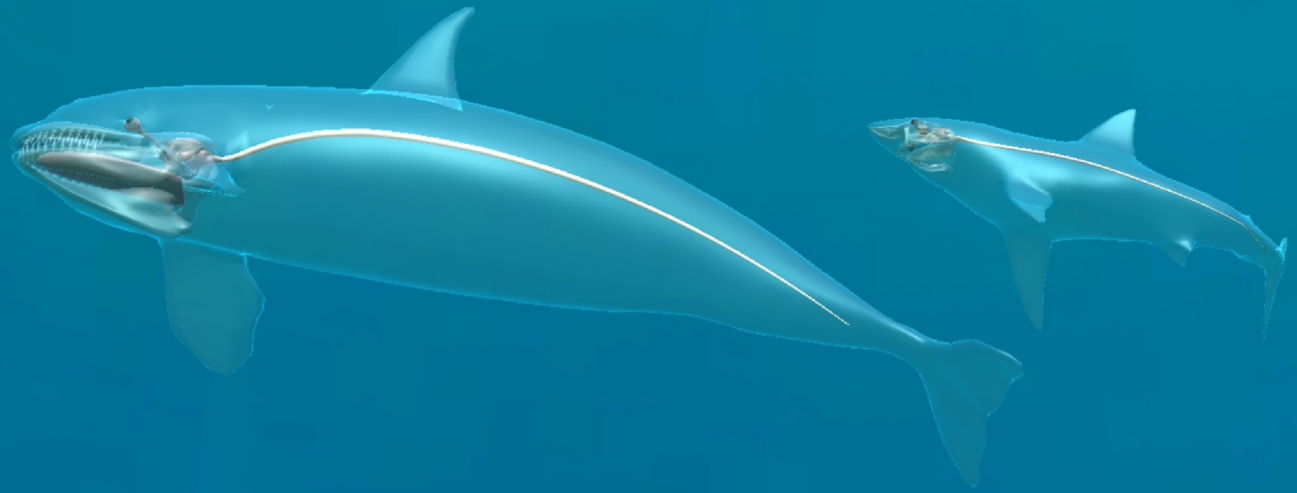
Inform students that they can select highlighted words to access their definitions.
Instruct students to record observations on the worksheet.

- Visit *Exploring Predator-Prey Relationships*.
  - Draw the plants and animals you might find in the ocean.
  - Describe the diversity of life that you observed in the ocean.

Teacher Note: Students can explain that there is a range of plants and animals in the ocean. They should include examples of the animals and plants that they observed.



zSpace



2D

Sight | Smell | Hearing | Lateral line organ | Ampulla of Lorenzini

Orca

The orca has a well-developed sense of sight in and out of the water. However, these mammals rely on echolocation, rather than sight, to locate prey in the ocean in darkness and with poor visibility.

Shark

The great white shark has excellent vision at close distances to help it locate its prey. These sharks see in three dimensions and their eyes can see during the day, at night, and in low visibility.


2D


2D


2D
Waterhole
WET SEASON
Reset
River
DRY SEASON

7th Grade Science MLS (NGSS) Standard Prioritization[1]

Priority Standards***	Secondary Standards**
6-8.PS1.A.1 (MS-PS1-1) Develop models to describe the atomic composition of simple molecules and extended structures. **6-8.PS1.A.2 (MS-PS1-2) Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.** **6-8.PS1.A.4 (MS-PS1-4) Develop a model that predicts and describes changes in particle motion, temperature, and state of a pure substance when thermal energy is added or removed.** **6-8.PS1.B.1 (MS-PS1-5)** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved. **6-8.PS1.B.2 (MS-PS1-6) Construct, test, and modify a device that either releases or absorbs thermal energy by chemical processes.** **6-8.LS1.A.1 (MS-LS1-1) Conduct an investigation to provide evidence that living things are made of cells; either one cell or many different numbers and types of cells.** **6-8.LS1.A.2 (MS-LS1-2)** Develop and use a model to describe the function of a cell as a whole and ways parts of cells contribute to the function. **6-8.LS1.A.3 (MS-LS1-3) Use argument supported by evidence for how the body is a system of interacting subsystems composed of groups of cells.** **6-8.LS1.B.2 (MS-LS1-5)** Construct a scientific explanation based on evidence for how environmental and genetic factors influence the growth of organisms.	**6-8.PS1.A.3 (MS-PS1-3)** Gather, analyze and present information to describe that synthetic materials come from natural resources and how they impact society. **6-8.ETS1.A.1 (MS-ETS1-1)** Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions. **6-8.ETS1.B.1 (MS-ETS1-2)** Evaluate competing design solutions using a systematic process to determine how well they meet the criteria and constraints of the problem. **6-8.ETS1.B.2 (MS-ETS1-3)** Analyze data from tests to determine similarities and differences among several design solutions to identify the best

zSpace Model for Integration

zCentral Launch Codes: **AP27**

zSpace

Animal (Human) Cell Structures

Lesson Time: 40 minutes

Key Terms	
Cell	Nucleolus
Plasma Membrane	Organelles
Cytoplasm	Smooth/Rough
Golgi apparatus	endoplasmic reticulum
Mitochondria	Vacuole
Nucleus	

Materials and Resources
Animal (Human) Cell Structures session -- VIVED Science
Animal Cells Worksheet
Center with multiple resources about animal cells

Activity Overview

All living things are made of cells, the basic unit of life. Cells are so small that they are only visible through magnification. Yet despite their tiny size, they play a huge role in the normal functioning of an organism. Some organisms are unicellular (made of one cell) and others are multicellular (made of multiple cells). While there are many different types of cells, all cells have similar internal structures, or organelles, that carry out specific functions. In this activity, students will learn about animal (human) cells.

Essential Questions

1. How are structures and functions related in nature?
2. What systems can be observed in multicellular organisms?

Objectives

- Conduct research about the animal cell's organelles using information from multiple print and digital sources
- Create a presentation identifying the animal cell's organelles and their functions

Introduction

To begin, ask the students: "What is a cell?" Students will share their ideas. Explain that a cell is the basic unit of life and that all living things are made of cells. Explain that although there are different types of cells, all cells have similar organelles that carry out specific functions. Tell the students that they will learn about animal (or human) cells today. Encourage students to take notes as they progress through the session. Notes can include answers to questions, any questions students have, and drawings.

zSpace Activity

Instructions for VIVED Science

1. Open the *Animal (Human) Cell Structures* session and follow the instructions.

zSpace

Cells and Mitochondria

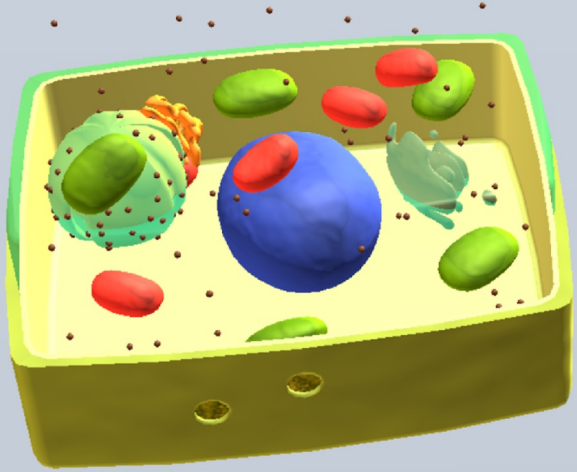
100%

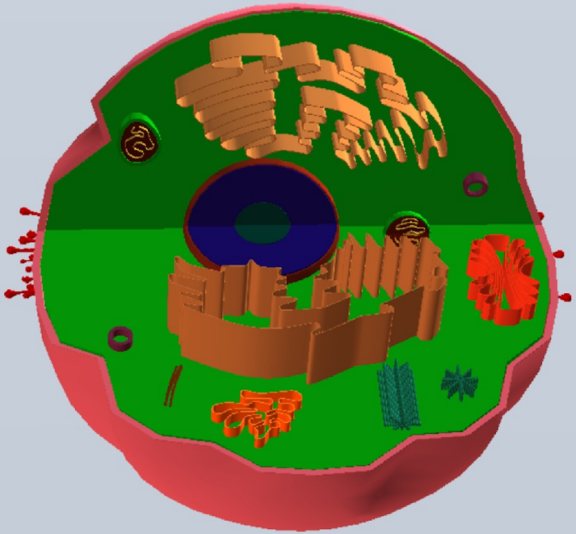
2D

FRONT

Eukaryotic Plant Cell

Eukaryotic Animal Cell





Cells are the building blocks of life. Here is a eukaryotic animal cell and plant cell. What is similar about these two cells? What structures and organelles do they share?

Answer with text

Enter text here

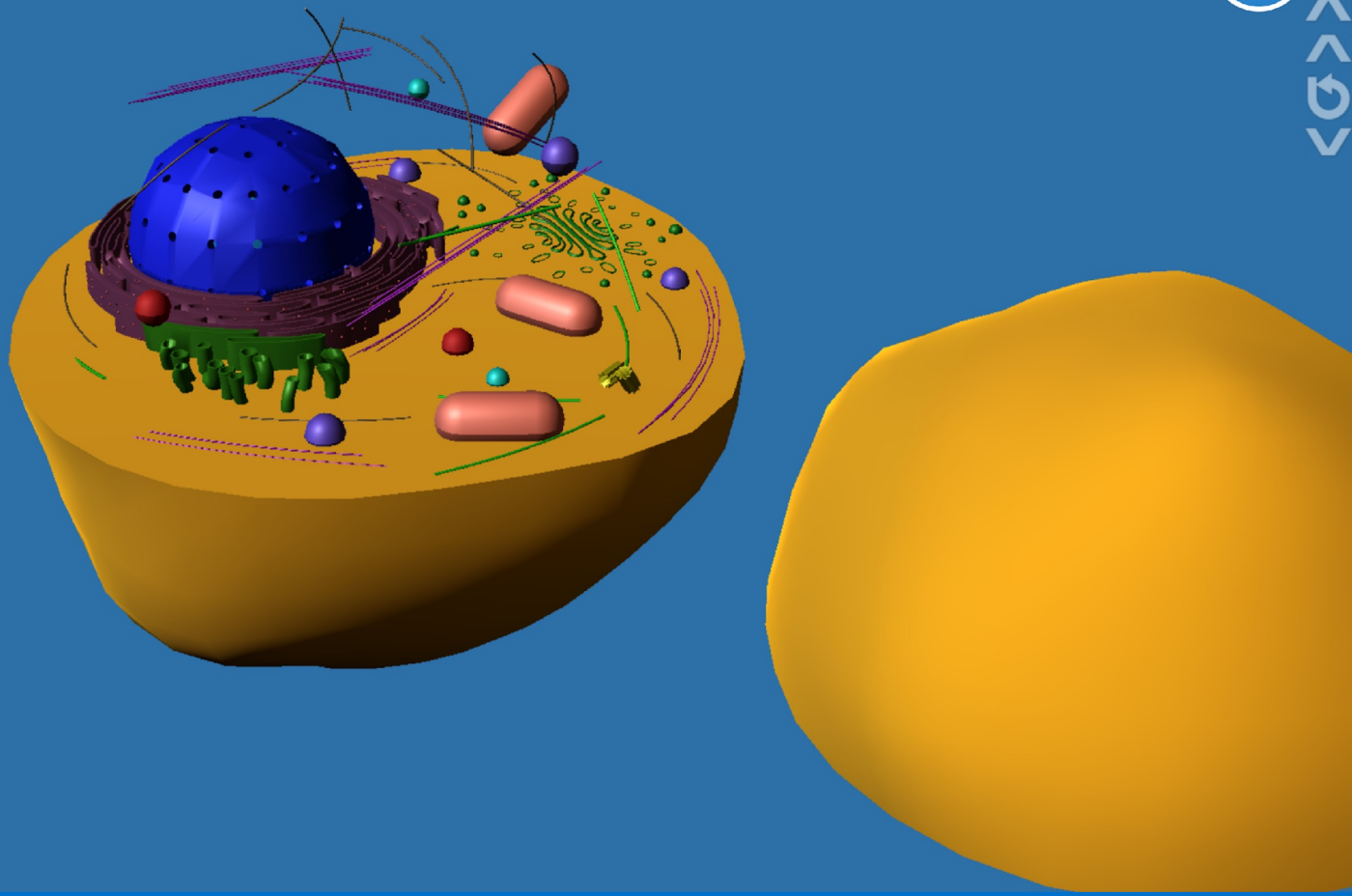
1/9

Animal (Human) Cell Structures

Underneath the outer covering, we can see a jelly-like material that holds the cell's organelles. What is the name of this jelly-like substance? Remove it.

- Slide 2
- Slide 3
- Slide 4
- Slide 5
- Slide 6

2D



Biology MLS (NGSS) Standard Prioritization[1]

Priority Standards***	Secondary Standards**
9-12.LS1.A.1 (HS-LS1-1) Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.	9-12.LS4.C.3 (HS-LS4-6) Create or revise a simulation to test a solution to mitigate adverse impacts of human activity on biodiversity
9-12.LS1.B.1 (HS-LS1-4) Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.	9-12.ESS1.C.1 (HS-ESS1-5) Evaluate evidence of the past and current movements of continental and oceanic crust and the theory of plate tectonics to explain the ages of crustal rocks.
9-12.LS2.A.1 (HS-LS2-1) Use mathematical and/or computational representations to support explanations of factors that affect carrying capacity of ecosystems at different scales.	9-12.ESS1.C.2 (HS-ESS1-6) Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.
9-12.LS2.B.2 (HS-LS2-4) Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.	
9-12.LS3.A.1 (HS-LS3-1) Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.	
9-12.LS3.B.4 (HS-LS3-3) Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.	
9-12.LS4.A.1 (HS-LS4-1) Communicate scientific information that common ancestry and bio evolution are supported by multiple lines of	

zSpace Model for Integration

zCentral Launch Code: **A112**

zSpace

Mitosis

Lesson Time: 40 minutes

Key Terms	
Anaphase	Metaphase
Chromosomes	Mitotic spindle
Cleavage furrow	Nuclear envelope
Cytokinesis	Prophase
Diploid cell	Somatic cell
Haploid cell	Telophase
Interphase	

Activity Overview

How does your body heal from a paper cut? How do your nails grow? Healing and growth are possible because of mitosis, the process of cellular reproduction by the somatic cells. In this activity students will examine each phase of mitosis and learn how the cell transitions from one phase to another.

Essential Questions

1. What is the cell cycle?
2. What is the purpose of mitosis?
3. What is the difference between a diploid and a haploid cell?

Objectives

- Explain the purpose of mitosis for living organisms
- Analyze the steps of mitosis
- Compare binary fission to mitosis

Introduction

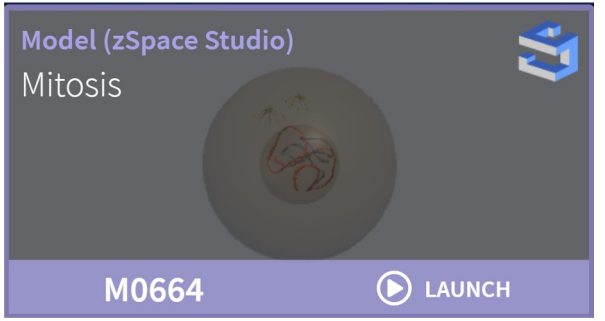
Before beginning this activity, students will need a working knowledge of plant and animal cell structure. In VIVED Science, two activities are available that will aid in building this knowledge: *Plant Cell Structures* and *Animal Cell Structures*.

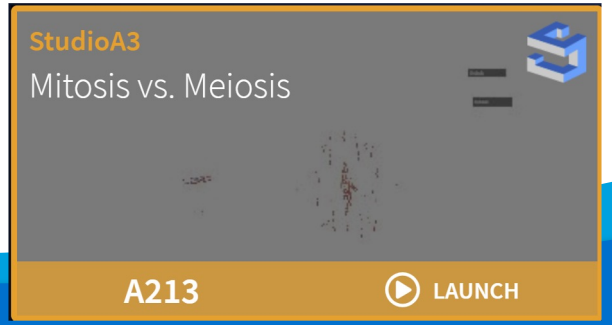
zSpace Activity

Activity Questions Provided in StudioA3

Answers may vary. Sample answers are provided below.

1. Mitosis is a process of cell division that makes body cells. Like the parent cell, the daughter cells will have two copies of each chromosome. Cells that have two copies of each chromosome are called diploid cells.





zSpace

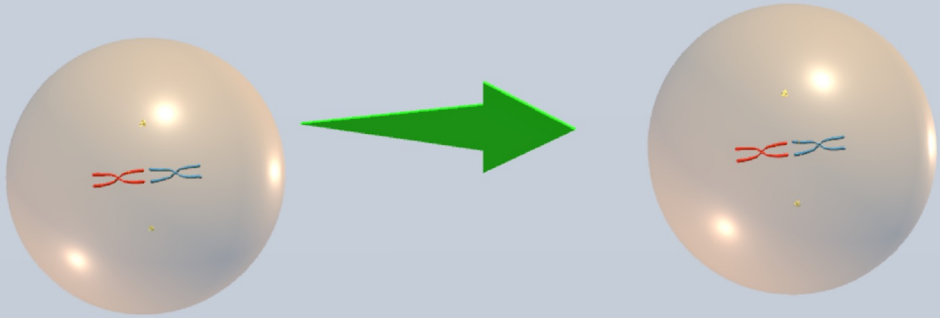
100%

2D

FRONT

Parent Cell

Daughter Cell



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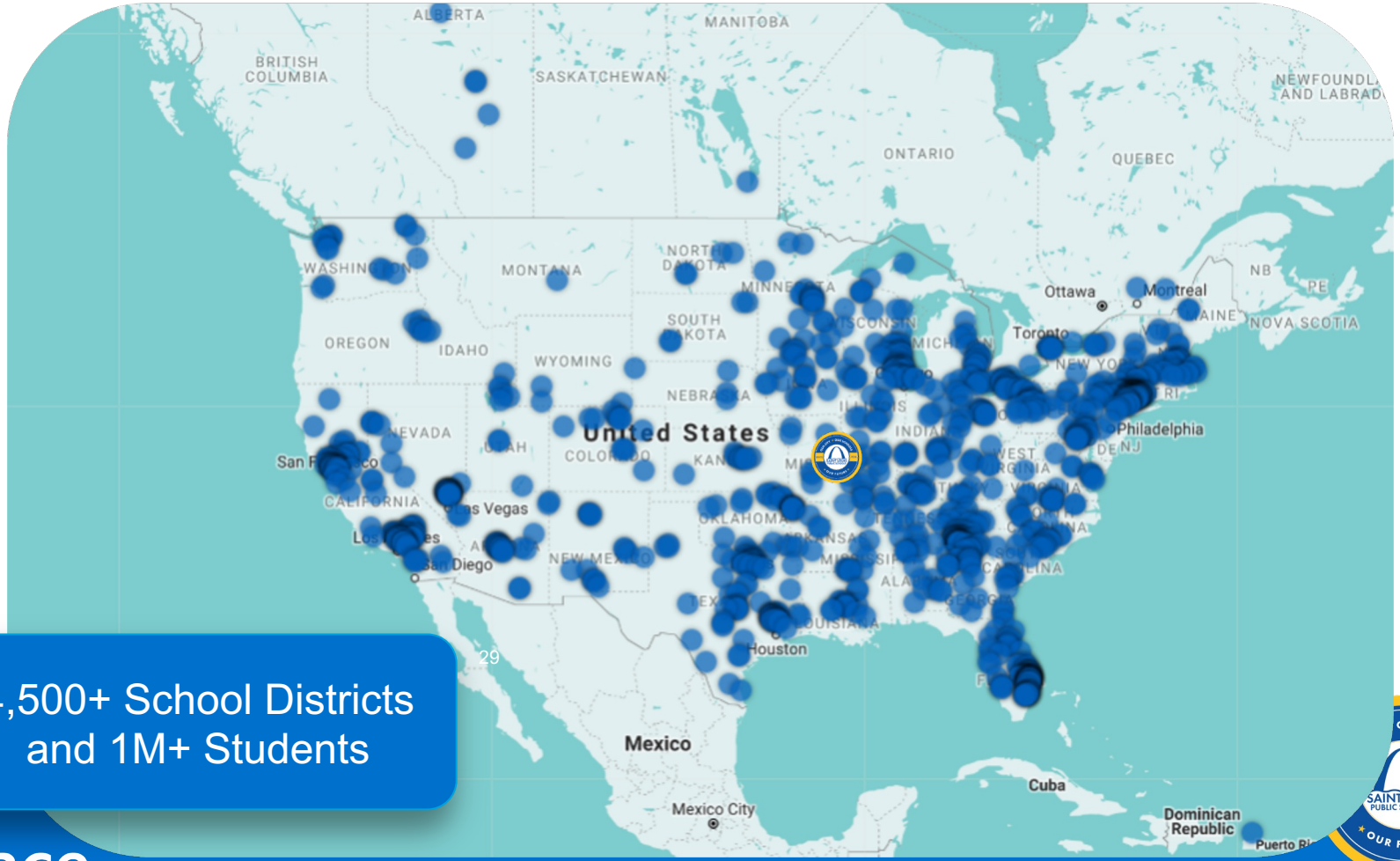

4,500+ School Districts and 1M+ Students

zSpace