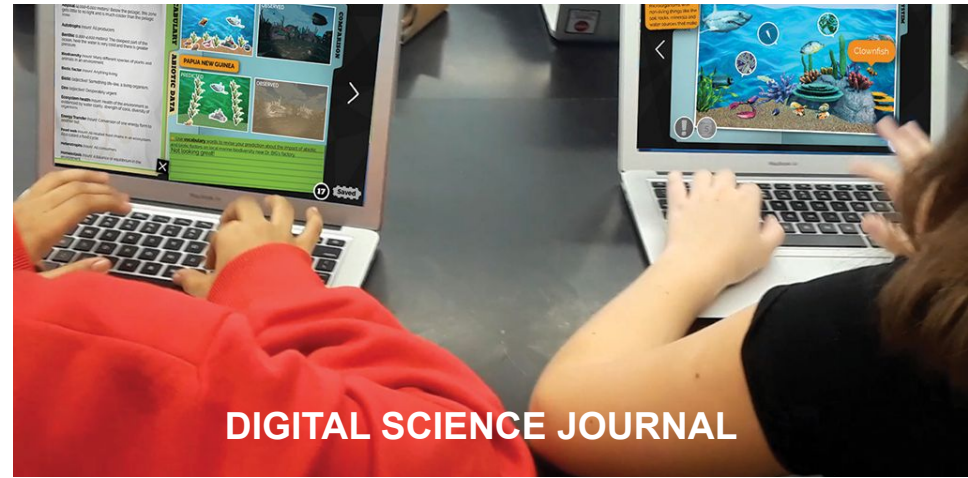


Introducing BioDive: MultiModal Experiential Learning



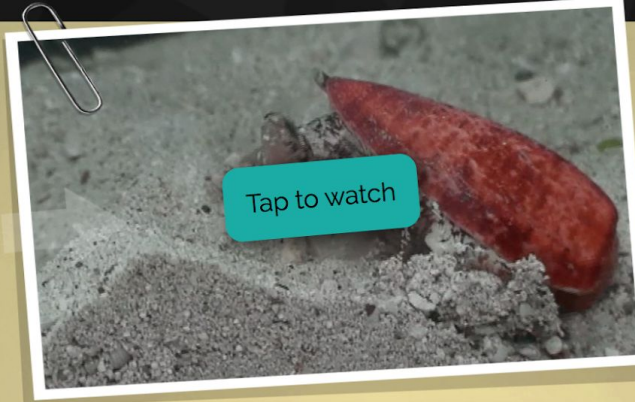
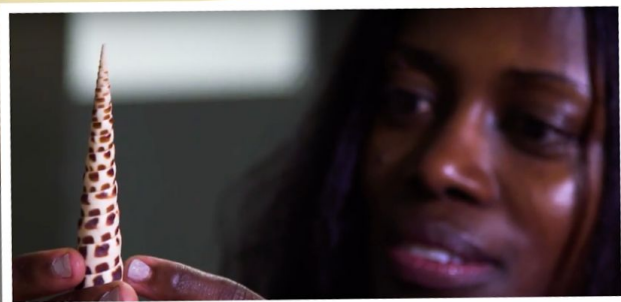
The three linked pieces enable students to learn and explore while teachers can monitor progress and offer feedback whether in person or remotely.

BioDive Digital Science Journal

Welcome *Scientist Ochoa Hendrix!*

Your first F&BI mission is to investigate mysterious venomous marine snails and document your observations here in the Digital Science Journal.

Click to watch the video on the right and then write down five questions you have about these mysterious creatures.



MISSION
BACKGROUND

Did you see how those deadly creatures captured their prey?

★ Write down at least five questions you have about these marine snails and their environment.

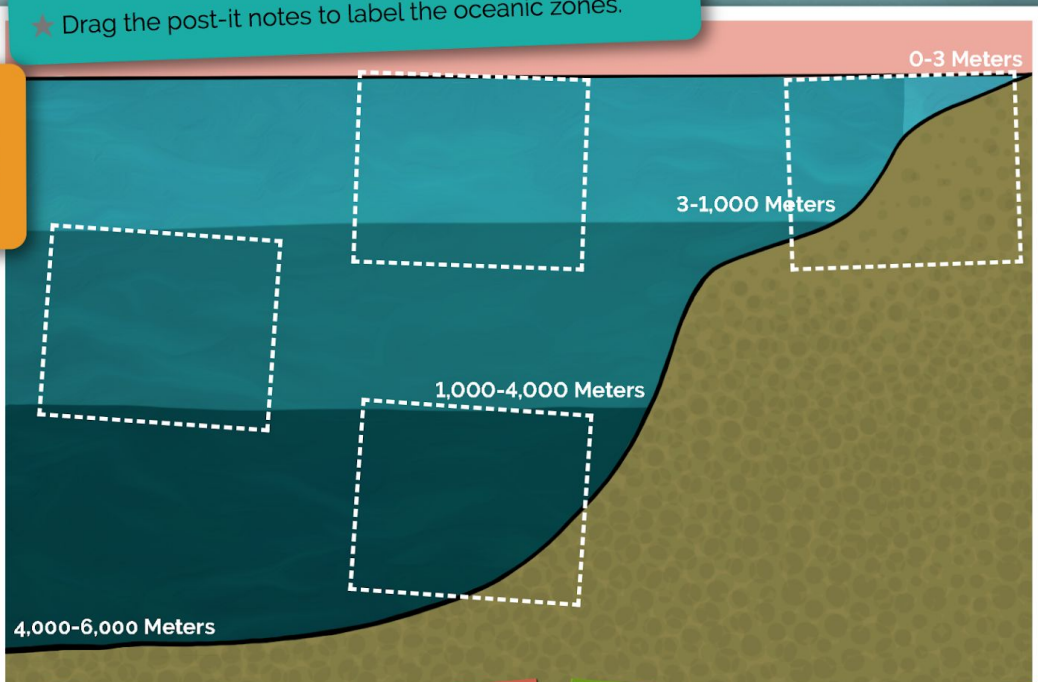
- 1.
- 2.
- 3.
- 4.
- 5.



Students begin in their individualized online journals with an anchoring phenomenon that drives the experience.

New industrial sites could threaten the habitats of our snails. How deep could the threat go? Let's learn about all the ocean zones.

★ Drag the post-it notes to label the oceanic zones.



OCEAN ZONES

Benthic
Below the pelagic, this zone gets little to no light and is much colder than the pelagic zone.

Abyssal
The deepest part of the ocean, here the water is very cold and has the greatest pressure of all the zones.

Pelagic
This is the open sea where sunlight still reaches seaweeds and other flora to provide food for many species of fish and mammals.

Intertidal
This is the seashore where the ocean meets land. It is above water at low tide and below water at high tide.

Student interactions in the journal provide a variety of ways to demonstrate knowledge acquisition.

Alert from HQ: Chief Scientist Holford needs an update on your analysis, Scientist Ochoa Hendrix. Please share your hypotheses with headquarters on the impact of the abiotic factors on the biotic organisms.

CULEBRA LAS PERLAS

ABIOTIC SURFACE DATA

TEMPERATURE 28.0°C 28.0°C

pH 8.5 8.5

SALINITY 32.0 ppt 32.0 ppt

WATER CLARITY Clear Cloudy / Poor

DISSOLVED OXYGEN 15 mg/L 6 mg/L

★ Chief Scientist Holford, there are 2 potential impacts on the abiotic data I've collected:

It appears that changes in dissolved oxygen at the Las Perlas site will cause a decrease in animals/plants.

Changes in water clarity at the Las Perlas site will cause a decrease in species variation.

Although there were no significant changes to 3 factors at Las Perlas site, I now predict that:

Changes in temperature in the Las Perlas site will cause less animals to live there.

Changes to the pH in Las Perlas site will cause less fish present.

Changes to the salinity in Las Perlas site will cause all life to die.

HYPOTHESES

Students collect data in virtual expeditions and then use data to make predictions in their journals.

VOCAB

Vocabulary

Abiotic (*adjective*): Something that is not life-like, a non-living organism

Abysal (*4,000-6,000 meters*): Below the pelagic, this zone gets little to no light and is much colder than the pelagic zone

Autotrophs (*noun*): All producers

Benthic (*1,000-4,000 meters*): The deepest part of the ocean, here the water is very cold and there is greater pressure

Biodiversity (*noun*): Many different species of plants and animals in an environment

Biotic factor (*noun*): Anything living

Biotic (*adjective*): Something life-like, a living organism

Dire (*adjective*): Desperately urgent

Ecosystem health (*noun*): Health of the environment as evidenced by water clarity, strength of coral, diversity of organisms

Energy Transfer (*noun*): Conversion of one energy form to another

Food web (*noun*): All related food chains in an ecosystem. Also called a food cycle

Heterotrophs (*noun*): All consumers

CULEBRA



LAS PERLAS



VOCABULARY

ABIOTIC DATA

COMPARISON

Students create models based on their predictions, then revise their models after observing results.

★ Use **vocabulary** words to revise your prediction about the impact of abiotic and biotic factors on local marine biodiversity near Dr. BIG's factory. Water looks less dire than I thought it would!



Scientists in F&BI have worked collaboratively to gather abiotic data in the two other regions where Dr. BIG is producing his Slick Slick Soda. Use this data to identify patterns across all three regions.

	Eastern Pacific		Eastern Atlantic		Indo-Pacific	
	Culebra	Las Perlas	Senegal	Cape Verde	Solomon Islands	Papua New Guinea
TEMPERATURE	28.0°C	28.0°C	26.1°C	26.1°C	28.3°C	30.0°C
pH	8.5	8.5	8.0	8.0	8.1	7.6
SALINITY	32.0 ppt	32.0 ppt	35.5 ppt	35.5 ppt	34.0 ppt	34.0 ppt
WATER CLARITY	Clear	Cloudy / Poor	Slight Sediment	Cloudy	Clear	Cloudy / Poor
DISSOLVED OXYGEN	15 mg/L	6 mg/L	15 mg/L	2 mg/L	15 mg/L	15 mg/L

★ Can you identify any **patterns** within the salinity data across all dive locations? Do you think salinity impacted biodiversity?
Each area has the same salinity.

★ Can you identify any **patterns** within the temperature data across all dive locations? Do you think temperature impacted biodiversity?
I think temperature does affect biodiversity. When the temp is not just right it can be bad for animals.

★ Can you identify any **patterns** within the pH data across all dive locations? Do you think pH impacted biodiversity?
Yes, Eastern Oceans both areas had same pH, Indo was very different in both areas and from the other oceans??

★ Can you identify any **patterns** within the water clarity across all dive locations? Do you think water clarity impacted biodiversity?
All had some cloudy spots, eastern Atlantic was the only one that didn't have a clear.

★ Can you identify any **patterns** within the dissolved oxygen across all dive locations? Do you think dissolved oxygen impacted biodiversity?
They all had a reading of 15mg, Indo was the only one that both areas were 15mg.

IDENTIFYING PATTERNS

Students use tables to analyze data and identify patterns.

Classwide Virtual Reality Experiences

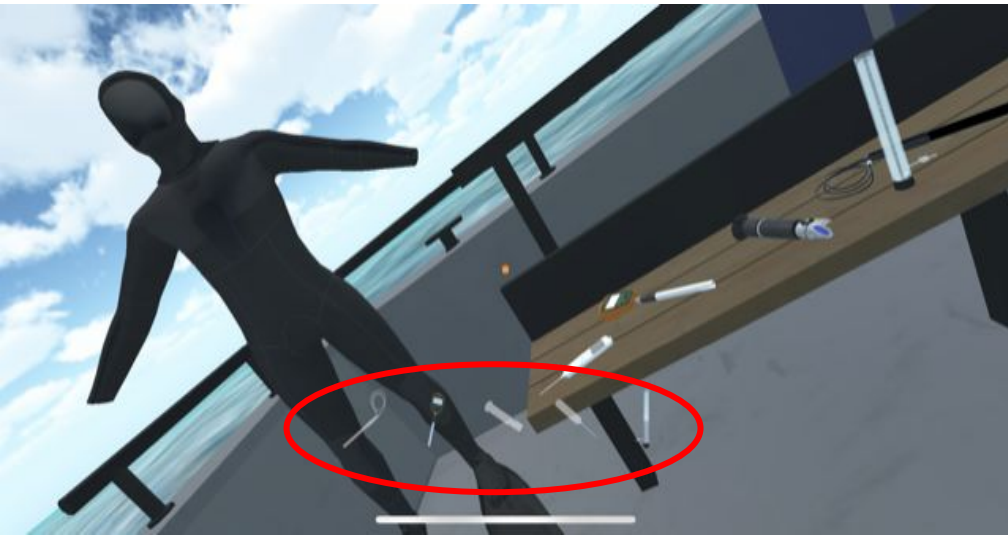


WebVR provides the VR experience without an extra device. Students access the VR on web-enabled devices (Chromebook/Laptop / Tablet).

4 VR scenes are interspersed throughout BioDive.



Each virtual reality experience has a clear goal.



Tracker along the bottom shows which measurements have been taken.

Educator Assessment Dashboard



**HUDSON MIDDLE
SCHOOL 6TH GRADE
SCIENCE PERIOD 2**
∞ VR EXPERIENCE CODE

5H3D9



SCIENCE JOURNAL

SAMPLE ANSWERS

Last Name	First Name	x /20	1	2	VR 1	3	4	5	VR 2	6	7	8	9	10	11	12	13	VR 3	14	15	16
Ochoa Hendrix	Jessica	12/20																			
Pollati	Christopher	19/20																			

The educator dashboard shows the full class progress and includes an answer key. Teachers can click on the squares to see student responses and to leave feedback.

Teachers communicate through the journal.
Students are notified when teachers leave feedback.

Tutorial	1
Mission Background	2
More About Snails	3
Ocean Zones	4
🚫 Ecosystem	5
🚫 Seas Under Siege	6
Trophic Level	7
Energy Pyramid	8
Biodiversity	9
Build A Model	10
Abiotic & Biotic	11
Dive Equipment	12
Dive Locations	13
Abiotic Data	14
Modeling Predictions	15
Hypotheses	16
Comparison	17
Identifying Patterns	18
Conclusion	19
Do More	20



Enter your comments here...

Drag the post-it notes to label the oceanic zones.

0-3 Meters

Intertidal
This is the seashore where the ocean meets land. It is above water at low tide and below water at high tide.

3-1,000 Meters

Pelagic
This is the open sea where sunlight still reaches seaweeds and other flora to provide food for many species of fish and mammals.

1,000-4,000 Meters

Benthic
Below the pelagic, this zone gets little to no light and is much colder than the pelagic zone.

Abyssal
The deepest part of the ocean, here the water is very cold and has the greatest pressure of all the zones.

4,000-6,000 Meters

+ Add Sticker

VOCAB

Dashboard

4

Saved

You are viewing answers of LaTanya Hutsona

Great use of context clues to determine the answer!



Teachers can provide feedback through chat boxes and stickers!

Educator Support Guide

Each lesson has an educator support guide which provides: context, background knowledge, SWBATs vocab, discussion questions and alignment to NGSS.



Context for Lesson:

Students are introduced to different ocean zones and observe how differences in abiotic factors influence the organisms that live in a habitat. Lesson 2 introduces the idea that industrial sites could threaten the venomous marine snails' habitat. This lesson increases student knowledge around oceanic zones, predator prey relationships, and provides concrete representations and manipulatives of food chains in a single ecosystem to prepare students to understand and describe the impact of abiotic and biotic variables on ecosystems.

NGSS Performance Expectations:

Contributes to MS-LS2-1: Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

Contributes to MS-LS2-2: Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

SEP:

Asking Questions and Defining Problems

Developing and Using Models

DCI:

LS2.A: Interdependent Relationships in Ecosystems

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

CCC:

Cause and Effect
Systems and System Models

Video Overview & Contact Us!



Contact us:

jessica@killersnails.com

Weekly PD sessions for
BioDive offered on Thursdays
at 1pm EST:

meet.google.com/bts-rged-nhe