SCIENCE CAREER ADVENTURES

Developmental Biologist: Comparative Embryology

NGSS Standard: MS-LS4-3

Adventure Description:

In this adventure, you will think like a developmental biologist and build a VR headset for people to wear at a biology conference.

Activity

Step 1: Background on Developmental Biologists and Comparative Embryology (10 minutes)

- Show Video: Comparative Embryology.
- Explain to students that developmental biologists study how different organisms develop. One field of developmental biology is called comparative embryology. In this field, scientists compare embryos of different species. An embryo is an organism in the early stages of development.
- Explain to students that although two animals look very different as adults, like a tiger and a monkey, they could be related. Comparative embryology is important because it can help scientists to understand how different species are connected. For example, biologists have found that all animals with vertebrates most likely share a common ancestor because their embryos develop similarly.
- Next, explain that biologists and other scientists have begun using technology to better study embryo development. For example, some scientists have begun working with computer scientists to design VR headsets. Show Handout: What are VR Headsets?
- Have students brainstorm reasons why scientists would want to create VR headsets. Explain that VR headsets allow scientists to see things that they could not normally see easily. For example, VR headsets could be given to scientists at conferences so they can see a cell blown up to be the size of a basketball. VR headsets could also be worn by students in science class so they can do a frog dissection without hurting a real frog!

Step 2: Activity Set Up (5 minutes)

- Explain to students that they will design their own VR headset that fellow scientists can wear during a conference to learn about embryonic development of different organisms.
- Provide students with Handout: Steps to Create a VR Headset. As a class, review the steps.

Please contact Allison Bischoff, Director of Customer Service, at allison@rozzylearningcompany.com or 314-272-2560 with questions.

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- Note: Students can work individually, in pairs, or in small groups.
- Provide each pair with the following materials:
  - Assortment of recycled materials (cardboard pieces, egg cartons, etc)
  - Art supplies (crayons, markers, colored pencils).

Step 3: Sketching Images (15–20 minutes)

- Explain to students that they will first sketch images of different two embryos. For example, when people click on the first button, they might see embryos from tigers and frogs. When users click on the second button, they might see embryos from monkeys and dogs.
- Provide students with Handout: Embryonic Development. This handout has photos of the embryos of eight different organisms.
- Teacher note: Students can also research other types of embryos to incorporate into their VR headset.
- Have students complete Step 1 and 2 on the handout. As students are working, ask the following questions:
  - How are the two embryos you chose for each button similar and different?
  - Do you think the animals you chose for each button share a common ancestor? Why or why not?

Step 4: Building the Headset (20+ minutes)

- Explain to students that they will now complete step 3, building a prototype of their VR headset. Remind students that they should make sure all requirements are included in their headset.

Step 5: Class Discussion and Presentation (5 minutes)

- Have groups present their VR headsets to the rest of the class. They should also show the images that will be seen when a person puts on the VR headset.
- Have a concluding discussion about how comparative embryologists use clues from an organism's embryos to understand how they are related to one another. Explain that all vertebrates have a common ancestor that had a backbone, and there is evidence of this in the way that the animal's embryos develop.

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Materials List

Provided online:

- Video: Comparative Embryology
- Handout: What are VR Headsets?
- Handout: Steps to Create a VR Headset
- Handout: Embryonic Development

Not Provided online (each student or group needs):

- Building Materials (ie: cardboard, plastic containers, milk cartons, nuts and bolts)
- Art supplies (tape, glue, markers, crayons)

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