

**2008
Winning Lesson Plan
from Fall City,
Washington**

*Echinoderm Dissection –
Marine Biology Unit*

By: Dana Stairs
Fall City Elementary

Subject: Life Science

Grade Level: 5

Duration: Six 50-Minute
Class Periods

Overview and Purpose

Students conduct an echinoderm dissection within the Marine Biology Unit, connecting science and language arts through experiential learning. In lessons preceding this lab dissection, we dissected earthworms to examine their internal anatomy and body systems, and focused on coral reef preservation efforts, and environmental impacts on the marine life ecosystem. Students began the lab knowing that environmental factors influence anatomical structure.

This unit is innovative because it provides students with the opportunity to compare and contrast the body systems of three unique members of the animal kingdom (echinoderms, earthworms, and humans). Hands-on dissection and examination of the earthworms and echinoderms provides a foundation upon which students can make connections and build upon during our Human Body Systems Unit. For the human body, we use online simulation and anatomical features as resources for exploration and comparison.

Highlighted in this essay is a specific echinoderm lab dissection activity that has an effective literacy integration component. I designed the starfish lesson plan so that it would tap into the wide array multiple intelligences students in my classroom possess. In order to provide equity for all learners, I made auditory, visual, and kinesthetic learning opportunities available. In the post-lab discussion and reflection we compared the digestive and reproductive body systems of the different animals and I used a constructivist teaching strategy to encourage students to feed their curiosity and desire for learning by continuing to ask questions and to begin preparation for the next session in which they were allowed to design and conduct their own investigation based on personal inquiry that had evolved from this unit.



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Educational Standards Addressed

Aligning curriculum and instruction to the Washington State Standards is imperative and easily accomplished through this unit.

Student Learning Targets/Objectives

- Learn how the environment influences the anatomical structures of Phylum: Echinodermata (article - *Spiny-Skinned Tide Pool Creatures*)
- Students will synthesize the science literature and form their own opinions and stance on the conservation issue
- Students will learn new scientific vocabulary through reading and laboratory experiments
- Students will read with comprehension an article about marine life conservation that focuses on starfish (echinoderms)
- Students will use “voice”, one of the features of 6 Trait Writing, in their reflective essays and oral debates
- Students will increase their reading fluency through partner “Reading Work-Outs”
- To be able to locate and identify the internal and external organs, and to be able to understand the dissection process and what materials should be used

Benchmarks, Frameworks, EALR’s

Science GLE 1.2.1

Analyze how the parts of a system go together and how these parts depend on each other

Science GLE 1.3.10

Understand that that an organisms ability to survive is influenced by the organisms behavior and the ecosystem in which it lives

Reading Benchmark 2

The student reads different materials fox a variety of purposes

Science GLE 2.1.3

Understand how to construct a reasonable explanation using evidence

Writing Benchmark 2

2) The student communicates ideas clearly and effectively

3) The student uses communication strategies and skills to work effectively with others

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Educational Standards Addressed (Cont'd)

Student Learning Targets/Objectives

- Practice gathering and recording data through experiential exercise and observation
- Students will be able to measure starfish rays in cm and mathematically convert to inches
- Students will ask questions and use these to guide their extension into the next session of planning and conducting science investigations around environmental factors that affect starfish
- Higher level thinking skills will be applied in the post-lab compare and contrast activity (comparing body systems of echinoderm, earthworms, and humans)

Benchmarks, Frameworks, EALR's

Reading EALR 1.4, 1 .5, 3.2

Uses book and text features flexibly to follow through a topic or justify an opinion

Writing Framework

The student can plan and deliver expository and persuasive speeches

Science GLE 2.1.1

Understand how to ask a question about objects, organisms, and events in the environment

Science GLE 2.1.2

Understand how to p h and conduct simple investigations following all safety rules

Science GLE 1.2.8

Identify and describe how the human body systems compare to the systems of other living organizes



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Materials

- 15 Preserved starfish (echinoderms)
- 28 Magnifying glasses
- Interactive whiteboard Flipchart with links to online dissection, Power Paragraph template, procedure, and student sheets
- 28 Pairs of rubber gloves
- 14 Metric rules
- 14 Dissection trays (can be substituted for sturdy sheets of cardboard)
- 14 Pairs of metal scissors with pointed tips
- 14 Sets of dissection tools (including scalpel and dissecting needles)
- 28 Pairs of dissecting forceps
- 28 Pairs of goggles
- 28 Packets of literature on echinoderms
- 14 Science station material boxes to hold all materials
- 28 Power Paragraph student sheets
- 28 Peer Evaluation Checklists A & B
- 28 Student Science Journals

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Procedure

This is what actually happened as my class did the echinoderm dissection lab.

Introduction

- I had students make an entry in their Science Journals, answering the following question:
 - “What do you already know about starfish?”
 - “What do you want to learn about starfish?”
- Students were prompted to make a prediction and sketch a labeled diagram about what they thought they might see during the dissection. With each new group of students that came into my room for science, I continued to be surprised by their conjectures. Many students predicted that they would see only sand when they cut their starfish open.
- We recorded students' answers on the ACTIVboard and I prompted with more probing questions such as:
 - “What is another name for starfish?” (echinoderm, sea star, asteroidea)
 - “Which of the 6 kingdoms are starfish part of?” (Animalia)
- This ensued in a discussion around prior knowledge my students had from the Classification Unit first trimester.
 - “How many arms do they have?” (Five or more)
 - “Do they have mouths?” (yes, on their underside – in the very center)
 - “What kind of symmetry do they represent?” (Radial symmetry)
 - “Is a starfish?” (no). I found this to be a common misconception with my students.
- Students *partner read* the literary material on echinoderms. I explained to students that they were reading for fluency and background information in that timed 3 minute activity and should “put their thumb up if they need help from their partner in pronunciation of difficult science vocabulary.” (*3 min per partner*)
- After briefly reviewing the Power Paragraph activity on the ACTIVboard, the students began writing on their individual student sheets. The use of the interactive whiteboard is very effective when modeling writing and having students participate by walking up to the ACTIVboard and demonstrating their understanding of the concept and format that is being discussed. I encouraged them to continue reading and writing their paragraphs when they went home that night for homework.

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Procedure (Cont'd)

- We discussed and reviewed expectations for behavior during lab activity and I gave directions on how to conduct the lab. I reminded students to wear goggles and gloves for their own protection and explained the Peer Evaluation Checklists.
- My “Lab Assistants” (student-held classroom positions) distributed all materials, the starfish, and the Peer Evaluation Sheets, as the students cleared their desks.
- Each group of students identified the parts of the starfish using the starfish diagram and the checklist provided. Each student using the peer evaluation checklist took turns verbally identifying the external anatomy of the starfish. Their peers initialed each task on the checklist as it is accomplished.
- After viewing the external anatomy, the students measured and recorded actual length of the rays on the starfish in both centimeters and inches. This data was recorded on the Peer Evaluation Checklist A.
- Using the document camera, I modeled the dissection techniques and provided specific instructions—cut the tip of one arm first and then moving toward the center while being careful not to cut too deep, once in the center cut around the Central Disk and remove the skin, note the internal organs placement before removing, scrape out internal organs to view internal structure.
- As the students worked through the dissection they completed the Peer Evaluation Checklist A, locating and identifying the internal parts of the anatomy. The students’ partners initialed the checklist as each task as it was accomplished.
- We used the Computer Microscopes to get a close view (at the cellular level) after the internal dissection.
- In closing this lesson, I facilitated a feedback/reflections discussion that lead students to compare and contrast the body systems of both the earthworm and starfish.
- Evidence of student learning in this unit is gathered through the following assessment formats: KWL Charts – Whole Group; Classroom pre and post discussions; Staged debate on coral reef preservation; reflections on the debate; Peer Evaluation using a Checklists for Internal and External Anatomy Identification; Teacher Observation and Student Participation; Homework – finish Power Paragraph and write a separate reflective paragraph comparing the body systems of earthworms and starfish.
- Through rich post-lab discussion and written reflective paragraphs, it was evident that substantive and meaningful learning took place.

Culminating Activities

One week after the starfish dissection and summation of the Marine Biology Unit in class, we leave the school together to go to Camp Seabeck for an invigorating outdoor educational experience. While at Camp, students visit a real Marine Biology Lab, walk up and down the beaches examining sea life (observe living starfish), and attend outdoor education classes catered around the study of marine life. A culminating experience like Camp Seabeck is unparalleled. Of the mining students who did not arrive wanting to be scientists, they all leave camp with future goals to explore science as a career.

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Echinoderm Dissection

Student's Name: _____

Student's Name: _____

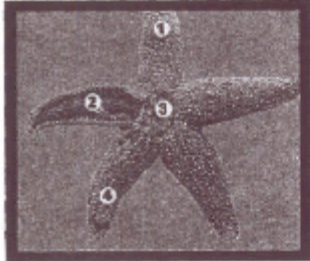
During your External Starfish Examination make sure to have your partner initial the box next to the part you have identified.

Starfish Anatomy	Initials
Tube feet	
Arm (ray)	
Central Disc	
Ambulacral grooves	
Mouth	
Stomach	
Spines	


How does your Starfish measure up?
Using the measuring tape provided, record the length of one arm (ray) on your starfish in inches and centimeters.

_____ Inches

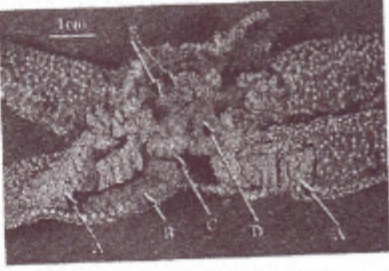
_____ Centimeters



During your Internal Starfish Examination make sure to have your partner initial the box next to the part you have identified.



Starfish Anatomy	Initials
Endoskeletal Plates	
Stomach	
Stone canal	
Gonads	
Digestive Glands	
Ampullae	
Ambulacral ossicles	
Water Vascular System	



Ambulacral ossicles - 4
Ampullae - 6
Endoskeletal Plates - 5
Gonads - 12
Stone Canal - 13
Stomach - 9 & 10
Digestive Glands - 11