

The Coral Game

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Objective: Students will learn coral reef ecology and the current dangers facing coral reefs.

TEKS: 7.3A, 7.3 C, 7.5B, 7.10B, 7.12A-D

Time Allotment: 1-2 day(s)

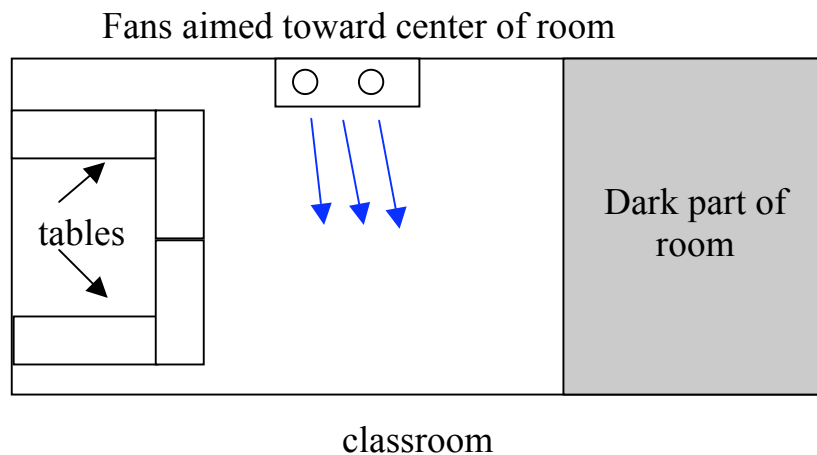
Materials:

ID cards for coral, fish, etc...
Fan

Tables (5)
Styrofoam strips

Chairs (5-7)
Styrofoam popcorn

Engage: Start the lesson by giving a brief explanation of cnidarians and a description of coral. For a more investigative approach, simply pass out the identification cards and tell the students that each is the species of coral on his or her card. Each student must follow all the rules on the card, and find a place in the classroom to colonize. (The rules for each type of organism are found on next page.) The room should be cleared except for 5-7 chairs which can be moved by the mound corals, one side of the room has all the lights turned off, and two fans directed toward the center of the room are mounted on a table along the outside middle of the classroom (see diagram below). Four tables should be then set up so that a little enclosure is formed off to one side of the classroom.



Rules: Plate Coral

- 1) All plate corals must lie down
- 2) Because of their high surface area, plate corals usually do not need much light
- 3) Plate corals are very fragile
- 4) Plate corals grow slowly

Rules: Mound Coral

- 1) All mound corals must sit in a chair
- 2) Mound corals need light but can deal with heavy sedimentation
- 3) Mound corals are tough and able to withstand heavy storms
- 4) Mounds corals grow slowly

Rules: Branching Coral

- 1) All branching corals must stand with their arms up
- 2) Branching corals need lots of light
- 3) Branching corals are very fragile
- 4) Branching corals grow very quickly

Rules: Sea Urchin

- 1) The sea urchin can move between sites
- 2) Sea urchins eat algae and may clean algae out of the system one piece at a time
- 3) The sea urchin only moves and eats at night

Rules: Damsel Fish

- 1) The damsel fish can move between sites
- 2) Damsel fish eat algae and may clean algae out of the system one piece at a time
- 3) The damsel fish only moves and eats during the day

Exploration: The dark side of the room represents deeper water where light is barely penetrating, the middle part of the room (with the fans on either side) is the abyssal slope where waves break and the most turbulent waters are found, the enclosure is a lagoon protected by the shallow shores of an atoll. For added effect you could name the individual parts of the room as well (i.e. Einstein's Lagoon, the abyssal plains of Darwin, etc.). Keep the lights on for 5 minutes (only one side of the room should have light) and then off for 5 minutes, tell the students this represents night and day. Each day you should check each of the students' location in the classroom. All students hanging out in the abyssal slope are shaken and unless they are in a chair (fairly sturdy) they will move and be considered broken and dead. Any students camped out in the deep ocean (dark side of the room) will be told that they are not getting enough light to survive, unless they are plate coral, and are therefore dead. Students that are not branching coral found in the lagoon can stay there until the raised arms of branching corals engulf them. Eventually all the branching corals will be in the lagoon, all the mound corals will be on the abyssal slope, and all the plate corals will be in the deep ocean.

Explanation: Now have the students explain why each of the different types of coral ended up in the specific area it did. Tell them that this is exactly the way ecology works and that coral will grow anywhere until a situation arises that causes it to die. Eventually, over hundreds of years, the different morphologies of coral will be segregated on the reef based on their body shape and life strategy.

Elaboration: The students are now ready for the second test. One student each will be an urchin and a damselfish. The teacher will talk about excessive algal growth and distribute foam strips of “algae” among all coral located in the lagoon and the abyssal slope. The deeper water is too deep for extensive algal growth. The urchin and the damselfish will be allowed to come out (damsel fish in the day and urchin at night) and eat the algae one piece at a time. If any coral gets more than three strips of algae on it, then the coral dies due to lack of sunlight. You can then bring up the topic of over fishing and eliminate the damselfish; slowly the students will notice that the urchin cannot keep up cleaning the algae, causing much of the coral to die. The teacher can also ask what dangers threaten coral existence. In the case of dredging, two events can happen. First, the dredge has cleared some of the valuable colonizing space (move the tables enclosing the lagoon in a foot) and watch the coral become more packed in their environment. Second, the dredging causes sedimentation. Throwing a bunch of Styrofoam chips of “sediments” at each of the coral formations can represent this negative impact. The branching coral and the mound coral will have the Styrofoam fall down about their feet while the plate coral will get an amount stuck to their bodies. The students will recognize the disadvantage of being plate coral in areas of high sedimentation. You can complicate the interactions more if you put a growth rate in the game. The branching coral grows quickly and so each student (coral) who has died can grow the next day while mound and plate corals have to wait a day or two to grow back.

Evaluation: Below is a list of questions that the students can answer individually or as a class. Most of the questions can be reasoned through by thinking about the classroom situation during the game. Inevitably, the corals with the most commotion will be the branching corals since they are in a tight group in the lagoon. The students could reason that they therefore have the highest rate of competition with one another. Questions like the ones included can be used as both further elaboration and evaluation of the students thinking toward the activity. Finally, students can write down what coral they were and discuss the advantages and disadvantages of being a particular coral.

Q) Why can't mound or branching coral grow in the deep ocean?

A) They would not get enough light

Q) Why can't branching or plate coral grow in the abyssal slope?

A) There is too much sedimentation (plate) and too many waves (branching).

Q) Why can't plate or mound coral live in the lagoons?

A) Too competitive

Q) What problems do you think coral encounter and how do you think they deal with these problems?

Light: Different body size to volume ratio

Sedimentation: Form bulky bodies or upright bodies to prevent sedimentation

Q) What man-made dangers do coral face? What coral do you think is most susceptible?

Disease: Branching

Eutrophication: Branching

Dredging: Branching

Over fishing: Branching...algae starts to overgrow

Increased Temp: All-coral; bleaching

Q) What natural dangers do coral face?

Storm Events: Plate and branching coral

Disease: Mainly branching

Q) Which coral do you think can grow the biggest?

A) *Mound or plate*

Q) What coral suffers from competition the most?

A) *Branching*

Q) Where do you think the most wildlife lives? Where are typical coral reefs formed?

A) *Branching*

Q) What do you think humans could do to help out the coral reefs that are suffering?