

Lesson Plan: Creating a Marine Team

Grade Level K – 6

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Subject Areas Language, Math, Science, Personal Planning, Social Studies

***Prev. Lesson** “Team Building and Intro to Seaquarium”

***Next Lesson:** “Mentoring”
“My Species Research Book”

Theme

Environmental Stewardship

Goal(s)

To experience hands-on opportunity to interact with and feel a sense of responsibility for the well being of animals in students’ local environment

Initial Questions

How can we create experiences that lead youth to ask deeper questions?

Activity

Organize student teams and determine roles needed to maintain a healthy Seaquarium that can be used as a teaching tool for the school community.

Big Ideas from the B.C. Curriculum

- Plants & animals have observable features
- Daily & seasonal changes affect all living things
- Living things have features and behaviours that helps them survive their environment
- Living things have life cycles adapted to their environment
- Living things have sense and respond to their environment
- Water is essential to all living things & it cycles through the environment
- Biodiversity

Content from the B.C. Curriculum

- Basic needs of plants & animals
- Names & adaptations of local plants & animals
- Classification of living and non-living things
- Behavioural adaptations of animals in local environment
- Natural and artificial sources of light and sound
- Metamorphic & non-metamorphic life cycles
- Energy is needed for life

The Lesson

Materials Required

- Seaquarium system filled with local creatures and plants
 - Data entry log sheets
 - Sampling kit – thermometer, hydrometer etc
 - Technical chapter of Seaquaria Teacher support manual
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Introduction What do you know about teams? E.g. How do they function best, why is it better to work with a team than alone, why can it sometimes be difficult to work on a team, what do we learn from working with a team, how can a team make an impact, what makes good leaders, why do we need different roles...?

Why would we have a team look after the Seaquarium instead of one person? E.g. different roles, different points of view, variety of levels of observational skills, etc.

Body 1) Put a copy of the daily data collection log (temp, salinity, feeding, water flow, etc.) on the overhead projector and engage the class in discussion about the importance of quality of observations and possible roles of team members. Be careful not to limit the space for them to record observations!

2) Lead a discussion about how the teams can share their learning with others. E.g. Weekly in class sharing, school announcements, buddies, assemblies, virtual displays near the Seaquarium, newsletter etc.

3) Form teams

Closing Set up the data logbook and schedule for teams. Challenge them to always be thinking about how their learning can spread beyond their classroom.

Reflection

Students *Related goal, metacognitive, or thinking about your thinking, new ideas*

How have they changed their thinking about local ecosystems?

How does this impact their thinking about global issues?

Sense of responsibility for accurate record keeping, tracking, identifying issues, reporting concerns to the right person

What do you think now?

Teachers *Where do we go from here? Future directions and strategies to get there?
Variations, lead up?*

Individual and team research project

Peer and buddy teaching

Presentations for peers, parents, and community (e.g. PAC meetings, Special Community Events (Oceans Day), School Board meetings)

Supplementary Info

A basic activity to get students familiar with the Seaquaria and its inhabitants is to have them take responsibility for the care and monitoring of the tank. This introduces the concept of **data recording and establishes a routine of checking on the function of the tank and interaction of its inhabitants.**

The simple task of feeding the creatures and making observations instigates students to ask questions, form hypotheses and look for answers.

Additional teaching notes:

Talk about habitat/environment in which these creatures live and introduce it by talking about:

The students' needs as human beings:

- a) home & clothing for protection & shelter
- b) clean air to breathe
- c) clean water to drink and bathe
- d) healthy & appropriate food
- e) someone to be responsible for us, until we can take care of ourselves
- f) sunlight to provide heat and energy

The needs of sea creatures are similar, but not the same:

- a) Home: usually rocks, sand or mud in their environment; clothing might be plants, animals, sand or pebbles they cover themselves with
- b) Air (Oxygen): most marine creatures don't have lungs. They get their oxygen from the water around them. Many of them just use their skin to take in oxygen from the water around them, while others have special organs to help them out (e.g. gills in fish, the "respiratory tree" in the Sea Cucumber's butt!). So we have to make sure their water is clean, cold and full of oxygen.
- c) Clean water: sea creatures live in the water, and get their oxygen directly from it, so it's very important that that water be clean.
- d) Clean & healthy food: These creatures don't all eat the same kind of food, and many of them get most of their food from the tiny creatures in the water that we can't even see. Some eat plants (herbivores), other live animals (predators), anything around, even if its dead (scavengers), plants &/or animals (omnivores), small living creatures in the water (suspension and filter-feeders).

Food for thought: Would you want to put in a big red rock crab that tears apart and eats almost anything it finds into your tank?

- e) Someone to take care of us: that's our job as the marine team. We need to put the right mixture of animals and plants into the tank, and make sure that they have everything they need: clean water, oxygen, food, shelter and a school full of kids who are learning about them and learning to respect them, so they can teach the rest of the community how important this job is.

- f) Sunlight to provide heat & energy: In our tank we use light bulbs that produce light like the sun. It's important **not** to leave it on all day and night, since many of these creatures are sensitive to light, which gives them a lot of information about where they should be and what they should be doing. (Some creatures are active during the day, like most of us ("diurnal" rhythm) while others are active at night, when it's dark ("nocturnal"). Many of them like to be in the shade, and that's why they hide under the rocks, cobble, sand and other creatures. This also provides shelter from their enemies and the weather!

Marine Team responsibilities

By looking after the aquarium, the “Marine Team” is modeling a tremendous amount of responsibility and leadership for the rest of the students in the school. At the same time, you will be having fun and learning a great deal. Let’s all do a great job!!

- 1) Each team will have one (or two) leader(s) who is responsible for making sure that the team’s jobs have been done, including reporting any concerns to your teacher &/or the Seaquaria Team.
- 2) At a set time on your group’s day, your team will check the aquarium and fill in each column in the log book. You need to find a safe spot to keep your log book. Everyone needs to know where it is.
- 3) If there seem to be any problems with the tank, let your teacher know and, if needed, the Seaquarium Team, know immediately.

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- 4) Your team will decide which observations should be recorded, and whether there is something going on which should be announced to the rest of the school.
- 5) Each team will be responsible for sharing what you are learning with the rest of the school. You can decide how you want to do that (newsletters article, bulletin board display, tours, teaching a younger buddy class etc.)

* For example, if your team has a younger “buddy” class, they could teach them about the Seaquarium and do a quiet colouring activity with them afterwards (see Lesson Plan 8). A few sample templates of underwater scenes that were drawn by a local high school student are included at the end of this lesson plan and can be used in many other applications. We always have them on hand as a quiet, “wind down” activity after a frenzied time exploring the seashore or touch tanks in the classroom. At any level, students can create their own colouring templates to use in mentoring activities with younger students.

Marine Lab Logbook

Discuss the importance and responsibilities of the marine team, and why each piece of information in the logbook is important. The *electronic version of the data sheet template for the logbook is included in this manual and is posted online at Seaquaria.org* so that it can be adjusted to suit your students' level.

Recording Daily Observations

The following information (data) must be recorded every day. You are recording **scientific data**, just like scientists doing research do, in order to help them keep track of their ideas and prove them. In our case, this will help us all to learn a lot about the plants and animals that live in our neighbourhood oceans. We might even observe things that no one has ever noticed before, because there is still so much about all these creatures that hasn't been discovered. Finally, it will also help us to notice any problems that are developing in the Seaquarium before they get too serious, so that we are taking the best possible care of our "neighbours" in the Seaquarium. You can make copies of the Data Sheet in this manual for recording your findings.

Date	Include the day, month and year. <i>Note: data should be entered every school day.</i> If you won't be there, you should arrange for someone else to do it, but you must teach them how.
Time	Always fill this in and try to do the check at around the same time every day, so that it becomes more of a routine and you don't forget!
Group number	This could also be a name (like Monday, if your whole class is divided into groups and each one takes care of the tank on a certain day) or initials of one person who takes care of the tank. That way, if we notice interesting things about the tank when we look over the data sheet, we'll know who to talk to.
Temperature	The water always needs to be cold enough (around 10°C). You can read the temperature from the thermometer in the front of the tank. The temperature in the tank shouldn't be any higher than 13 or lower than 9°C . If there is a change of more than 1°C from one day to the next, you need to tell your teacher or the Seaquaria Team so we can figure out what the problem is. Also, if the tank is "sweating" too much, let us know so we can adjust the temperature on the thermostat.
Salinity	Use the hydrometer . The salinity should always be the same (and within the range of around 27- 29 ppt). PPT stands for parts per thousand. It's sort of like percentage, but out of 1000 instead of 100. For example, at 28ppt,

	<p>there are 28 parts of salts for every 1000 parts of water or 28/1000. Do you know what percentage that would be out of 100? The hydrometer must be rinsed out with freshwater from the sink every time you use it. Otherwise, salt will dry on the needle and it won't be accurate. (Why do you think that is the case?)</p>
Water Colour	<p>The water should be clear, with maybe a tinge of yellow to it. It is O.K. to be a bit yellow, since this means there is food dissolved in the water that the filter-feeders can use. But if it gets really cloudy (or "opaque" - you can't see through the water from one end of the tank to the other), that's not good. It probably means that the water isn't being filtered well enough. This could be caused by lots of different things, like one of the animals "spawning" (releasing eggs or sperm into the water), having too many plants and animals in the tank or over-feeding the tank (etc.) You need to make sure that your teacher has a looks at the tank if you think it's getting cloudy or too green.</p>
Water flow	<p>The water comes into the tank through the tube in one of the back corners (the one that is angled). The water should come out with a lot of force and should fill the whole pipe. If you put your hand near the opening of the tube, you should feel a strong current. If it starts to look or feel weaker, you need to let your teacher know right away. This could mean that something is stuck in one of the pipes or in the pump. When that happens, not enough water goes through the "chiller" that keeps the water cold, and the water temperature will start to go up (not good!).</p>
Air Flow	<p>There should always be bubbles coming out of the other pipe in your Seaquarium. This air flow is important because it helps the under-gravel filter (which filters and cleans the water, naturally) work properly. The air bubbles help set up water currents that go down through the shell gravel at the bottom of the tank. That gravel is full of tiny bacteria that use the waste material (e.g. poop) from the animals, so that it doesn't build up in the tank and cause poor water quality.</p>
Glass cleaned	<p>Every day you should wipe the outside of the glass with a towel has been dampened with freshwater from your sink. Then dry it off so that you can see clearly into the tank. You might also have to wipe off the inside of the lid once a week because the water sometimes splashes on the lid and some of the salt from the water crystallizes out and starts to form a crust on the inside of the lid. Caution: don't use anything except freshwater from the tap, to clean the outside of the</p>

	<p>tank or the lid (e.g. no soap or other cleaners). Also, see if a few people can bring in old towels from home, so you don't have to use paper towels and throw them away. The towels should be washed at least once a week, and you should leave them out to dry, so they don't stay damp and get musty. You can use them to dry your hands off when you're working on the tank, too. Maybe your teacher can put a hook up somewhere near the tank or in your classroom, to hang the towel when it isn't being used.</p>
Light on/off	<p>Make sure the light is turned on in the morning and ask your teacher to turn it off before he or she leaves in the afternoon or evening. The animals in your tank are very sensitive to light and the light/dark cycle tells them when to be active and when to be resting, just like us. Many animals rest during the daylight hours and become active at night ("nocturnal", like people who work the night shift), while others are active at the day and rest at night ("diurnal", like most people who work or go to school, do). If the light is left on all the time it can confuse them.</p>
Feeding	<p>If you feed the tank too much, or too often, the tank will start to turn green and cloudy very quickly. We will show you how to feed the tank, so that you can see just how much the right amount is. Your teacher will set up a feeding schedule for the first month, then you can follow the same pattern to set up the schedule for the months after that. Remember, sometimes the pattern is disrupted when there are Pro-D days or holidays. You and your teacher can plan a strategy to make sure that the Seaquarium is taken care of on those days.</p>

Observations, Questions, Important Information and Ideas to Share

This is probably one of the most important parts of your data sheet. You can write anything interesting that you see about the animals and plants living in the tank (like something laying eggs, hermit crabs fighting over a shell, how animals move around that maybe you didn't expect would move, etc.) or things that you're concerned about (like a particular animal that is being a bully or the fact that the water is suddenly cloudy etc.).

Write as much as you want – your observations could be absolutely new. If needed, a separate notebook for observations can be kept alongside the data collection sheets to keep the sheets manageable.

