LESSON PLAN – STATIC SAMPLING AND BUILDING A VIRTUE

STUDENT LEARNING GOAL(S):

1. Students will be able to define and distinguish between static and active sampling
2. Students will demonstrate their ability to follow read and follow manufacturing procedures by successfully building a static sampling device called a VIRTUE
3. Students will deploy the devices made and collect data. Data collected will be analyzed by the students and compared

PREREQUISITES

This lesson requires students to drill holes with a drill, measure, and cut PVC pipe. You may have to pre-teach these skills. If this is the case, plan on about ½ to 1 h of time so that all students can acquire all the skills.

MATERIALS: (Will Build 12 4' Virtue Units)

- CD/DVDs – Bulk Pack (100) ~ $20
- 48" ½" dia. Wooden Dowel – 12 to 15, $ 2/each. Alternatively, Heavy-Duty Clothes Line
- Large Steel Washers or Nuts for weight – 20 to 30 depending on size (~$20) . Alternatively, small concrete weight with wire eyelet. (Cheaper) ~ $20 for 30 to 40 VIRTUE Weights. This requires separately making
- PVC Pipe – ½" inner dia. 4 x 12 ft, ~ $4 each. (Total $16). Need to size against the wooden dowel. Make sure the the PVC tube just slides over the wooden dowel.
- 12 in. zip ties – use to secure the hanging weight and lock the PVC on the dowel.

TOTAL = ~$100

SPECIAL EQUIPMENT:

- Variable speed electric drill with various drill bits.
- PVC Pipe cutter pliers. Can be found at hardware store. About $15. You can use a mitre saw instead, but the pliers are quicker, easier, and safer.
- Clamping mechanisms to secure the wooden dowel during the drilling
- Rulers – metric or English
- Markers

Lesson Steps:

1. Probe student's knowledge regarding "Static" versus "Active" sampling. What is the difference, what are the benefits? When is "Static" sample preferred?

2. Once students understand the definitions and differences, they are directed to the following website to learn about the static sampling device "Virtue". Note: This can also be done as a short class activity where the teacher shows the website/video.
https://science.gu.se/english/cooperation/virtue

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3. Have students break into groups of 2 (or possibly 3). 4 is not recommended as there isn't enough activities in the build to keep 4 students engaged. 2 is ideal.

4. Pint and hand out the instructions for making the VIRTUE. Instructions are on the VIRTUE website. https://science.gu.se/digitalAssets/1533/1533296_assembly-instructions-virtue-rack.-version-2015.pdf. Note: The instructions presented in this lesson have slightly different dimensions and build than those on the website. Modify as you see fit.

5. BUILDING: Have students start building the devices. This will take about an hour from start to finish provided everyone remains in engage and you have adequate # of drills/tools.
NOTES:

- When drilling the holes, make a pilot hole first to avoid splitting the dowel. The final hole diameter should be no more than 1/8 to 3/16 (~ 3mm) in diameter. The hole just need to be big enough to thread the zip tie through.
- Measure up from the end of the dowel, 0.5 – 3/4 inches for the pilot/zip tie hole for the bottom spacer/weight.
- The bottom PVC spacer should be 1-2 inches in length. The length isn't critical, but there needs to be some distance to keep it separated from the zip tie/weight.
- Spacer distance (between the plates) isn't critical, but should be consistent. Shorter spacing, more plates, longer spacing, less plates. 4 to 8 in. spacing is good.
- The final spacer should be between the locking zip tip should be between 1 and 2 inches. Drill the zip tie locking hole in the dowel just above the top of the spacer. Consider drilling a second attachment zip-tie hole above the first as a back-up un case the first zip-tip breaks. The locking zip tie should be left with some loop to be able to attached a rope for securing to the dock or pier.
- The DVD/CDs are somewhat fragile, consider dry fitting everything and then doing the final assembly just before deployment. Transporting a fully made VIRTUE can cause some of the disk to break. Either bring spares or final assembly at the deploy site.

6. DEPLOYING

- Select a site that is secure and easy to access but won't be damaged or meddled with by outsiders. Avoid locations where the device can be damaged by boats, excessive wave action.
- Site selected should have enough water depth at low and high tide to allow free swinging of the device.
- Attach a strong cord or clip chain to locking ring zip tie loop and then the dock. Attach a second back-up mounting rope to the second zip tie loop if desired.
- Place several devices in an area in case one or more gets damaged.

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- Students should let the devices sit undisturbed for at least 1 week. Placing several devices in specific location could allow monitoring the settlement of species over time. Each device could be pulled at weekly intervals.
- When collecting samples, carefully disassemble and place disks in small cooler filled with some ice and sea water. Failure to do so will result in rapid dry out and decomposition. Analyze disks quickly due to the above.

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