

<b>Date</b>	<b>Class Level</b> Fifth Class and Sixth Class	<b>Subject</b> Science
<b>Strand</b> Energy and Forces	<b>Strand Unit</b> Sound	
<b>Title</b> Exploring Communication and Echolocation in Cetaceans.		
<b>Objective(s)</b> Explore how sound travels through materials		
<b>Skills Required</b> Working scientifically: questioning, observing, predicting, investigating and experimenting, estimating and measuring, analyzing and communicating. Designing and Making: exploring, planning, making and evaluating.		
<b>Learning Objectives</b>  The child will be enabled to:  Observe how sound travels in waves  Learn what echolocation is and how marine mammals such as dolphins and whales use it to communicate underwater.  Learn how marine scientists have adapted this concept from nature.  Use sonar techniques to map an ocean floor.		<b>Learning Activities</b>  <b>Teacher directed approach and investigative approach:</b> Begin by demonstrating how sound travels in waves to the pupils and explaining sound production. This is easily demonstrated using a dropper and a bowl of water. The children drop water into the bowl and observe the ripples. Explain to the children that this is how sound moves under water. It travels in waves. This could alternatively be demonstrated using the vibration of sound from a speaker. Tip a speaker on its side so that the speaker is facing up. Place a piece of paper over the speaker. Place a handful of dry sand on the paper. Play some music through the speaker and the children observe how the sand moves over the paper. The teacher explains that it is the vibration of the sound which is distributing the sand.  <b>Talk and discussion and using the environment:</b> Explain how cetaceans (dolphins and whales) produce sounds like clicks and whistles to communicate under water.

*Please note that if internet access is available audio samples of clicks and whistles can be played in the classroom to demonstrate this.*

These sounds travel in a single wave from one animal to the next and help marine mammals communicate underwater where visibility is often very limited. These single sound waves can be demonstrated using a fun activity. One child is blindfolded in the centre of a circle of children. One of the children in the circle shakes a tambourine and the child in the centre must locate whoever made the noise. The child is relying on their ears detecting the sound wave to help them find the noisemaker.

**Talk and discussion:**

Echolocation; Explain to your students how echolocation is when an animal such as a bat or whale or dolphin emits sound waves and waits for the waves to bounce off an object or other animal and return to them (like an echo). The line of waves travels outwards and then bounces back to its original source.

Explain how marine scientists and oceanographers have adapted the idea of echolocation to create sonar technology. The surface of the ocean floor is not flat. It is as varied as the surface of dry land. The ocean floor is extremely difficult to map. Sonar technology is often used to map the ocean floor by measuring how long it takes sounds to travel to the ocean floor and bounce back again.

You could use this opportunity to teach the children ocean floor terminology such as plains, mountains, trenches and ridges. Photographs would be a useful

teaching aid. Often these features are deep under water and very difficult to map.

**Using the environment:**

*In this portion of the lesson the children will be standing on some pieces of furniture. It is important to ensure that the children are adequately supervised and that they are spoken to about mature behaviour prior to this activity.*

Divide the class into groups of 4 or 5 and head to a large space such as the hall or school yard. Encourage the groups to bring a variety of things which they could stand on for example chairs of different sizes, steps, tables and P.E benches. The groups will each be given a bouncy ball and a stop watch. The children drop the ball on a hard flat surface and another group member times the amount of time it takes for the ball to bounce back to their hands. They do this from a variety of different levels writing down the times as they go along.

**Talk and Discussion:**

The groups use their data to discuss what the ocean floor would look like. They could graph their data on a line or bar chart.

For more information on Ireland’s Whales and Dolphin direct your students to the Irish Whale and Dolphin Group (IWDG) website

**Resources**

Bowls of water

Droppers

Blindfolds

Tambourine

	<p>Speaker connected to music</p> <p>Paper</p> <p>Dry sand</p> <p>bouncy balls for each group ( all the same size for a fair test)</p> <p>Strong objects of different heights, such as different size chairs, steps, PE benches.</p> <p>Stopwatches</p> <p>Photographs of ocean features or computer with internet access</p> <p>Paper and pens recording data and graph drawing or computers</p> <p>Internet access to research Ireland Whales and Dolphins and dolphin clicks and whistles</p>
<p><b>Differentiation</b> Higher and Lower order questioning. Differentiate group activities and roles to account of individual needs, by support, task. Mixed ability pairing.</p>	
<p><b>Assessment</b> Teacher observation and questioning. Graph drawing.</p>	
<p><b>Linkage and Integration</b> Geography: The Real Map of Ireland. Oral language: Pupils use scientific vocabulary to describe what their ocean floor would look like. PE: Bouncing and Catching. Music: Exploration of sound. Maths: Data collection.</p>	