Humpback Whale: The Great Communicator of the Sea

Part A: Student Activity Sheet

Name _____ Date _____ Class _____

Scientific Name: *Megaptera novaeangliae* (Translation: _____)

Background
How do people communicate with sound? We can either use our voices or make sounds with body movements and/or instruments. How do humpback whales communicate with sound? They communicate by vocalization or make sounds with body movements. We communicate with each other mostly on land while the humpback whales always communicate with each other in the ocean. The ocean is a big place! Sometimes they need to communicate 1 mile or 5 miles away from each other in the ocean. So they rely on sounds to communicate. The only instrument they have for communicating sound is their body.

Part A: Choreographing Humpback Whale Movement Sounds
For the first activity, you and your pod will create and choreograph a message movement phrase using the five humpback whale movements and sounds that go along with these movements. Let's review the vocabulary of the humpback whale movements as a group: **breaching, pec slapping, spyhopping, tail slapping** and **lob tailing**. You will translate and choreograph these humpback whale movements and the sounds made by these movements to communicate with another *pod*.

Materials
Discovery of Sound in the Sea web site (http://omp.gso.uri.edu/dosits/dosits.htm)
Part A Worksheet: Choreographing Humpback Whale Movement Sounds
CD Player
Underwater sounds
6-8 feet of blue fabric in various shades (one for each group)
Camcorder, VCR and TV
Pencils
Index cards

Procedure
1. Close your eyes and listen to the sounds of the underwater environment. This is the place where the humpback whale lives. As a humpback whale, these are the sounds you would constantly hear in the background.
2. Open your eyes and play with the fabric - the water. Move it with a partner as you listen to the underwater sounds. Create wave movements - ***waveform picture***s - with the sounds. This is the setting in which you will be working.

3. Working in pods of two to three students, interpret each of the five humpback whale movements and the sounds that go along with these movements. Then redesign/translate the movements and sounds with your bodies.
4. Now think of a message that your pod would like to communicate non-verbally using these five movements and sounds with another pod who will interpret it.
5. Write the message on an index card. The message must include a minimum of three sentences and be in the present tense or present continuous tense. This is your blue print for translating your pod's message into a choreographed message movement phrase using the five humpback whale movements and sounds.
6. Explore the five redesigned/translated movements with your written message. Experiment with them. Rearrange and design them in any order to translate your written message. Remember, you can repeat movements.
7. Develop a sequence of the movements to a 4 or 8 count beat.
8. Practice the message movement phrase as a pod. Use underwater background sounds.
9. Camcord and videotape your message movement phrase.
10. Evaluate your message movement phrase on video. Ask yourselves: Does it "say" or express with movements and sounds the original message that we wrote on the index card or do movements and sounds need to be changed or rearranged?
11. "Reedit" your message movement phrase if you need to.
12. Practice your final movement phrase.
13. Perform your message movement phrase in front of the class using the underwater background sounds. Members of other pods could assist in creating the setting, the wave movements - *waveform picture*s - behind you with the long fabric strips.
14. The rest of the class must try to interpret the message that your performing pod members communicate to them through movement and sound.

Extended Activities

Practice your pod's message movement phrase together with other class pods, using the underwater sounds. Experiment with communicating amongst other pods. You may alternate pods for waving the blue fabric in the background as a "waveform picture." Collaborate with the other class pods. Repeat steps 7 - 12 in Activity A as a class. Perform your message movement phrases as a class to an audience.

Part A Discussion Questions

Humpback Whale: The Great Communicator of the Sea

Complete **Part A Worksheet: Choreographing Humpback Whale Movement Sounds** before answering the questions below.

1. Describe how you interpreted and translated the humpback whale movements and sounds made by these movements?

2. Were any movements or sounds performed by the different pods similar? If so, what were they?

3. Did a common movement or sound - a common language - develop between the pods? How do you think that happened?

4. What was the most difficult part of creating and choreographing this message movement phrase and why?

5. Which step in the procedure did you especially like and why?

6. How would humpback whales “hear” the sounds made by other humpback whales over great distances in the ocean?

7. What was the most important thing you learned from this experience?

Humpback Whale: The Great Communicator of the Sea

Part B: Student Activity Sheet

Name _____ Date _____ Class _____

Background
The male humpback whale is the singer of the sea. Each male humpback has a distinct and unique singing style. The female humpback whale has not been found to sing. The male humpback whale composes and repeatedly sings complex patterns of sound - songs ranging from 5 minutes to a half hour in length - to possibly try getting the attention of female humpback whales. He doesn't sing with words but he does vocalize, singing the same song repeatedly for over 24 hours at a time. His songs range in frequency from 20 - 9,000 Hertz, the widest range of vocal frequencies for any mammal. These songs can be heard for miles. He changes the song and tune almost every season. When singing, the male humpback stays still in the water, with his head down and flippers extended outward to the sides. His tail flukes point upward to the surface of the water.

Part B: Male Humpback Whales - The Composers of the Sea
For the second activity, you and your pod will create, compose and sing a song similar to a male humpback whale song. You will vocalize using non-words.

Materials
Discovery of Sound in the Sea web site (http://omp.gso.uri.edu/dosits/dosits.htm)

Part B Worksheet: What Do You Hear?
Tape recorder
Pencils
Paper

Procedure
1. Read about humpback whale singing in the Animals and Sound in the Sea - Vocalizations Associated with Reproduction section of ***Discovery of Sound in the Sea*** web site (http://omp.gso.uri.edu/dosits/animals/use/reprovoc.htm).
2. Listen to five different selections from various humpback whale songs as given by your teacher.
3. Fill out **Part B Worksheet: What Do You Hear?** after listening to each selection.
4. Gather with your pod and brainstorm five themes and humpback whale sounds for each theme using the sounds you wrote down on **Part B Worksheet: What Do You Hear?** as a reference to help you formulate sounds for each theme.

5. Create a sound phrase for each theme by determining the number of times your pod wishes to repeat the sound - either one, two, three, four or even five times per sound phrase.
6. Experiment with and add various pitches and rhythms for each sound phrase in #5. Use the adjectives you jotted down on **Part B Worksheet: What Do You Hear?** as a reference.
7. Tape your pod singing the sound phrases in each theme.
8. Listen to your sound phrases on tape and evaluate. Experiment with, edit and rearrange each theme to sequence them in an order that sounds the best to your pod.
9. Add a melody to the sequence.
10. Retape your sound phrases in the final sequence with your melody. Listen to and evaluate your final humpback whale “song.”
11. Practice and rehearse your humpback whale "song.”
12. Perform in front of the class.

Extended Activities

a. Add rhythm to your melody with percussive instruments and/or sounds (*i.e*. foot stomping, hand clapping, finger snapping, pencil tapping, etc.).

b. Through improvisation, create a skat melody from your sound phrases and humpback whale song. Brainstorm and add skat vocalizations starting with a consonant then a vowel sound (ie. cha, de, da, etc.) to your humpback whale sound phrases. Then change the sound phrases in your humpback whale “song” from the humpback whale style of vocalization (ie. “moop - moop”) to skat vocalizations such as “moop - cha - de - da.” Experiment with these new skat sound phrases. Determine the number of times your pod wishes to repeat each new skat sound phrase under each theme. Experiment, evaluate and edit. Add your original melody. Rehearse and perform.

c. Incorporate Activity A and B

Combine and integrate your message movement phrase and sounds with your final humpback whale song and/or skat melody. Experiment with placement and pauses within your humpback whale song and skat melody in relation to your message movement phrase and sounds. Evaluate and reedit if necessary.

Collaborate with other pods on your final product, final pieces of work, to create ensemble movements, sounds and songs. Rehearse and perform.

Part B Discussion Questions

Humpback Whale: The Great Communicator of the Sea

1. In listening to the humpback whale songs of the other pods, which
    a. song sounded the best and why?

    b. sound phrase do you remember best and why?

    c. skat melody sounded the best and why?

2. Did any pods create and compose similar sound phrases and/or melodies? If so, what were they?

3. Compare and contrast one of your humpback whale sound phrases with a similar sound phrase from another pod's song. Was there a similar theme? If so, what was the theme?

4. Why do you think the songs from different humpback whales in the same area would have similar themes?

5. What are the two possibly purposes that scientists have determined for male humpback whales to sing?

6. Name other whales and mammals of the sea that can vocalize.

Humpback Whale: The Great Communicator of the Sea

Teacher Strategy Section

Scientific Name: Megaptera novaeangliae
(Translation: *Big Winged New Englander*)

Grade level: Elementary Grades K-5, Middle School Grades 6-8 (with modifications or extensions for grade levels and class or individual student needs)

Time Required: 2 weeks - semester

Educational Standards Addressed

I. National Science Education Standards	**Elementary Grades K-4**	**Middle School Grades 5-8**
Assessment Standards:	A	B
Content Standards:		
Science as Inquiry Standards	A	A
Life Science Content Standards	C	C
Science and Technology Standards	E	E
History and Nature of Science	G	G

II. New Standards	**Elementary Grades K-4**	**Middle School Grades 5-8**
Science		
Life Science Concepts	S2 a,b,c	S2 a,b,c,
Physical Science Concepts	S1 a,b	S1 c
Scientific Connections and Applications	S4 d	
Scientific Thinking	S5 c, d, f	S5 f
Scientific Tools and Technology	S6 3	S6 a, b, d, e
Scientific Communication	S7 a, b, c, d	S7 a,b, d, e
Scientific Investigation	S8 b, d,	S8 b, d
English Language Arts		
Reading	E1 a, b, c, d	E1 a, b, c
Writing	E2 a, d, c, d	E2 a, b, c, d, e
Speaking, Listening, and Viewing	E3 b, c	E3 b, c
Conventions, Grammar, and Usage of the English Language	E4 a, b	E4 a, b
Literature	E5 a	E5 a
Applied Learning		
Problem Solving	A1 a	A1 a
Communication Tools and Techniques	A2 a	A2 a

Information Tools and Techniques	A3 a, b	A3 a, b
Learning and Self-Management Tools	A4 c	A4 c
Tools and Techniques for Working with Others	A5 a, b	A5 a

III. The Rhode Island Science Frameworks		**Elementary K-2**	**Middle School 3-5**	**6-8**
A. The Nature of Technology				
Technology and Science	Benchmark:	1 of 2 2 of 2	1 of 4 2 of 4 4 of 4	1 of 2 2 of 2
Designs and Systems	Benchmark:	1 of 1		
Issues in Technology	Benchmark:	1 of 2 2 of 2	1 of 5 2 of 5 3 of 5 5 of 5	2 of 3 3 of 3
B. The Physical Setting				
Motion	Benchmark:	1 of 3 3 of 3		2 of 5 3 of 5 4 of 4
C. The Living Environment				
Diversity of Life	Benchmark:	2 of 3 3 of 3	1 of 2 2 of 2	2 of 5 3 of 5 4 of 5 5 of 5
Heredity	Benchmark:	1 of 2 2 of 2		
Interdependence of Life	Benchmark:	1 of 2 2 of 2	1 of 1	1 of 2 2 of 2
Evolution of Life	Benchmark:	1 of 1		2 of 3
D. The Human Organism				
Human Identity	Benchmark:	1 of 3 2 of 3	1 of 2	1 of 6
Basic Functions	Benchmark:	1 of 3 3 of 3		
Learning	Benchmark:	1 of 3 2 of 3 3 of 3		

IV. National Dance Standards	**K-4**	**5-8**
	Achievement Standards	
Content Standard #1	a,b,c,d,e,g,h	d,e,f,g,h
Content Standard #2	a,b,c,d,e,f	b,c,d
Content Standard #3	b,c	a,b,c,d
Content Standard #4	a,b	a,b,d
Content Standard #7	a	a,b,c

V. National Music Standards	**K-4**	**5-8**
	Achievement Standards	
Content Standard #1	a,b,c	a,b,c
Content Standard #2	a,b,d,f	b,c,d
Content Standard #3	a,b,c,d	a,b,c
Content Standard #4	b,c	a,b,c
Content Standard #6	a,b,d,e	b,c
Content Standard #7	a,b	a,b
Content Standard #8	b	a,b
Content Standard #9	a,b,c	a,b,c

VI. TESOL ESL Standards	**K - 8**
Goal 1	Standard 1,2,3
Goal 2	Standard 1,2,3
Goal 3	Standard 1,2,3

Objectives

1. Students will demonstrate a scientific knowledge of humpback whales through observation, research, and writings about their findings.
2. Students will demonstrate how humpback whales communicate with sound through both vocalization and non-vocalization sound movements.
3. Students will choreograph message movement phrases with sound incorporating the movements and non-vocal sounds of the humpback whale.
4. Students will perform their choreographed message movement phrases.
5. Students will imitate the vocalizations of humpback whales to create and sequence their own themes and sound phrases.
6. Students will compose their own humpback whale songs using their developed sound phrases.
7. Students will compose and sing a melody to accent their humpback whale songs.
8. Students will explore the use of scat vocalizations and vocables in various cultures.
9. Students will compose and sing scat melodies from their humpback whale songs.
10. Students will compose and sing response “skat conversations” between themselves and another pod’s humpback whale song.

Background Information

I. Researching the Humpback Whale

Students will research the behavior and characteristics of the humpback whale. They will research the anatomy of the humpback whale, how they produce sound through vocalization and movement, the oceans in which they live, their migration patterns, etc. using the ***Discovery of Sound in the Sea*** web site (http://omp.gso.uri.edu/dosits/dosits.htm) and books noted in **References.**

Students will attempt to answer the questions noted below as they research, discover and explore the humpback whale:

1. How big are humpback whales?

2. Compare their size to another animal or thing

3. How do they move? What are the special movements that they produce to communicate?

4. Define and describe these special movements they use to communicate:
    a. lob tailing or peduncle slapping
    b. pec slapping
    c. tail flapping

    What are some of the possibly reasons scientists say they produce sound with these movements?

5. Define and describe:
    a. breaching
    b. spyhopping

6. How do they hear?

7. How do they vocalize?

8. How do they see? Which sense is stronger their sight or hearing?

9. Describe how they eat through their mouths.

10. Describe how they breathe: spout breathing.

11. Describe their diving capabilities.

12. Describe their migration patterns.

13. Where in the world can they be found?

14. Describe any special characteristics, for example their tail flukes, their non-vocal movements, etc.

Write a minimum five paragraph report on your research.

Whale Watch Field Trip

Bring class on a field trip to a whale watch. Have students write an observation report about the whales that they saw. Have them include in their report any specific characteristics or behaviors that they noted while on the whale watch (*i.e*. a humpback whale pec slapping, description of its fin, the color of its tail flukes, etc.)

Introduction to Activity A: Choreographing Humpback Whale Movement Sounds

1. How do people use sound to communicate? Brainstorm ideas on board.
   We can use our bodies as instruments.
   We can use our voice. We can talk. We can sing. Give example of singers.
   We can also use our hands and feet to make sound.
   We can clap our hands, beat hands on chest or stomp our feet.
   We can do combinations of clap hands, stomp feet, beat hands on chest and/or use our voice at the same time.
2. What things can we use around us to help communicate our sounds? Brainstorm ideas on board.
   With all these things we can create a pattern of sound to communicate.
   We can repeat that pattern of sound over and over again.
   We can add a rhythm and a pitch in a sequence to create a melody of the sound.
3. What would we want to communicate with all this sound? Discuss
   Messages, greetings, getting attention, warnings, thoughts, "Where is there water or food?," "How do I get to . . . ?," "You are on my turf!," "Is any one out there?," etc. . .
4. Do we always understand the sounds that we are communicating to each other?
   Say: "Ti kanete" Pause. (Greek for "How are you?")
   Say: "Come sta" Pause. (Italian for "How are you?")
   Say: "Comment allez-vous" Pause. (French for "How are you?")
   Say: "Que pasa" Pause. (Spanish for "What's happening?")
   Say: "Aloha kaua" Pause. (Hawaiian for "Greetings"or "May there be friendship between us."
5. What did I just say to you? Did you understand any of the words? Translate and discuss.
6. What if we just did a movement or gesture with our body?
   Demonstrate a "hi" wave. Ask: What does it mean?
   We can add our voice to it and say "Hello", "Bonjour," "Kalimera," etc.
   Demonstrate a" bye" wave. Ask: Does it mean the same as a "hi" wave in our culture?

Demonstrate shaking hands. Ask: What message am I communicating? Can I add a sequence of sounds to it?
Shake hands and say "Hello, how are you?" at the same time. Now what am I saying?
Demonstrate a slight bow. What message am I communicating? Can I add a sound sequence to it? Now what am I saying?
Make a knocking sound. What message am I communicating now?

7. In what cultures do we find any of these movements? Brainstorm.
   We might not always understand the sounds that are being communicated to us. Why? Sounds whether vocalized or made with our bodies mean different things to different people in different cultures.
8. How can we use any of these sounds to communicate with someone else far away? Brainstorm
9. What if the person was 1 mile away, 3 miles away, 10 miles away or 50 miles away? How could we communicate now with sound? Brainstorm
10. How did people in various cultures around the world communicate 1 mile, 2 miles, 10 miles away from each other with sound before the Industrial Age?
    They used drums, drum rocks, sticks, bells, whistles, blowing through horns or hollow branches, gongs, etc . . .
11. Why would they want to communicate with each other at these distances? Brainstorm

Any or all of the above questions can open up dialogue and discussion with your class about how humans communicate with sound. These concepts and questions can be modified for various grade levels and student needs (*i.e.* ESL, etc.). After setting up the background for humans communicating with sound, introduce humpback whale movements and sounds. Review the research gathered by the students on the anatomy, behavior and characteristics of the humpback whale.

Demonstrate a message movement phrase before students begin the procedures in Activity A. Then ask: What am I trying to say with my body? What is the message? Write the message on the board. Teach the message movement phrase to the students and have them practice it.

Vocabulary for Activity A

message movement phrase: in dance, a movement phrase is a sequence of steps having a beginning, middle and end. For Activity A, the students will create a sequence of steps depicting the movements of humpback whales with a beginning, middle and end. The movement phase will express a non-verbal message.

pod: group of animals that swim, travel and work together as a team such as dolphins. Humpback whales do not travel in pods. But for these activities, the word **pod** rather than team appears to be more appropriate.

waveform pictures: see Science of Sound in the Sea section of *Discovery of Sound in the Sea* web site (http://omp.gso.uri.edu/dosits/science/measurng/2.htm).

Assessment
Students will:

1. Complete **Part A Worksheet: Choreographing Humpback Whale Sounds** (Note: Worksheet is in separate file)
2. Answer Part A Discussion Questions
3. Choreograph a message movement phrase
4. Perform the message movement phrase in front of an audience

More Extended Activities for Activity A:
I. Compare and contrast sounds and movements a variety of animals use to communicate.

List a variety of animals. Non-vocal
Set up four columns: Vocables Interpretation Movements Interpretation

Chart the vocal sounds they make and /or the non-vocal movements they make to communicate.

Introduction to Activity B: Male Humpback Whales - The Composers of the Sea

1. What is language? How many languages are in the world? How do we know what is being said if we don't know the language?
   People have created different languages around the world using sound or body movements to communicate. We try to translate and interpret either with our bodies, voice or objects around us.
2. Humans can communicate with each other using their voices. How can I get your attention using my voice? What can I say?
   Hello
   Bonjour
   Come sta
   Ti Kanete
   Que pasa amigo
   Did you understand every word I said?
   But you did know that I was trying to communicate to you.
3. What if I said it in a melodic sound? What happens to my voice now?
   Can we communicate like this - get attention like this? (Choose a song with foreign words, *i.e.* Edith Piaf)
4. Can you answer with a short melodic phrase?
5. Why do we sing?
6. Where do we hear people singing or communicating with each other through songs?
7. What are we saying, what messages can we communicate when we sing?

Brainstorm messages.
Name some popular songs. Why are they popular? What are their themes?
Brainstorm popular songs and popular themes on board.
Name some popular melodic phrases from some of these songs.
Name some popular singers. Why are they popular? What makes them popular?
Brainstorm these popular singers and the themes they sing in their songs.

8. Do we always need words when we talk or sing to communicate?
   Can we just use our voice to sing but not use words?
9. What sounds can we make or sing with our voices that are not "words?"
   Give an example of a non-word - a vocable. Brainstorm other vocables.
10. When do we use vocables or in what setting would we hear vocables? Discuss.
    We can hear vocables with singers.
    Play examples of vocables with a melody.
11. Do you know any singers who can sing without using words but can still get their point across?
    Some jazz singers can scat, using their voice as an instrument to create a melody.
    They can imitate the jazz instruments. Each scat jazz singer has a distinct, unique style.
    Scat jazz singers (Ella Fitzgerald, Louie Armstrong, Bobby Mcferrin) and Native-American singers are examples of people communicating using vocables in a melody.
    Skat singers have a conversation between themselves - their voices - and an instrument.
12. Introduce Bobby Mcferrin song: *Mere Words* (do not say title yet)
    Do you understand what he is saying?
    Continue playing.
    Do you understand what he is saying now?
    Which is the voice part and which parts are the instruments?
    What is he saying?
    Give title of song: *Mere Words.*
    Now do you have an idea of what he might be trying to say?
    What is the theme of this song?
13. How do humpback whales use song to communicate?
    We learned that humpback whales use non-vocable forms of movement to communicate whether it be for food, attention, warning, aggression or navigation.
    Male humpback whales also use vocables to communicate. They create and sing lengthy songs that go on for hours using vocables. They are unique in that they are the composers of the sea.
14. Have students listen to a clip of a humpback whale song. (***Discovery of Sound in the Sea*** Audio Gallery - http://omp.gso.uri.edu/dosits/gallery/intro.htm)
    Discuss what it sounds like? Compare it to other animal sounds or musical instruments. Ask students:
    Does the humpback whale need words to sing?
    What do you think the humpback whale is saying without words?

What do you think is the theme of his song?
What do you think is the message that he might be trying to communicate to other humpback whales from as far away as 50 miles?
Can you answer him with a short melodic phrase?
How would your answer sound like?
Can you create a pattern of sound in a melodic phrase that you can repeat?

Any or all of the above questions can open up dialogue and discussion with your class before you begin Activity B. These concepts and questions can be modified for various grade levels and student needs (*i.e.* ESL, etc.). Review the music terms: **melody, rhythm and pitch** from the students' music classes. Also, collaborate with the music teacher in advance, to familiarize your students with and prepare them for identifying sounds made by the various musical instruments noted on **Part B Worksheet: What Do You Hear?**

For humpback song selections use the humpback whale song in the ***Discovery of Sound in the Sea*** Audio Gallery or the *Rapture of the Deep* CD listed under references.

Assessment
Students will:

1. Complete **Part B Worksheet: What Do You Hear?** (Note: Worksheet is in separate file)
2. Answer Part B Discussion Questions
3. Compose song
4. Perform song in front of audience

More Extended Activities for Activity B:

I. Read *The Whale's Song.* Propose: If you were Lily, how would you respond to the whales singing? Brainstorm. Have students listen to music clips of instruments and skat vocalizations by various jazz musicians and skat singers. For instance, Miles Davis' trumpet and the skat voices of Bobby Mcferrin, Ella Fitzgerald, Adelaide Hall, etc. Then have students listen to a clip of a song composed by a humpback whale. Have them compare and contrast the sounds. Create a skat conversation between actual humpback whale songs and student voices. Then create a skat conversation between student composed humpback whale songs and student voices. (Collaborate with Music Teacher on *call-response* exercises to warm up students' voices.)

II. Can the human voice be capable of imitating an instrument? Have students listen to Bobby Mcferrin (*Selim*) or other skat singers vocalize an instrument. Ask whether it is an instrument they are hearing or a human voice. Discuss how the human voice can be capable of imitating an instrument. Give examples of other skat singers imitating instruments. Students will choose and imitate an instrument. Students will collaborate

and compose a skat melody based upon their “instruments.” Then rehearse and perform the skat melody.

References
Refer to ***Discovery of Sound in the Sea*** web site (http://omp.gso.uri.edu/dosits.htm)
Refer to web sites noted in Bibliography

Books:

Crystal: The Story of a Real Baby Whale by Karen C. Smyth
Do Whales Ever by Nathalie Ward
Humpback Goes North by Darice Bailer with tape (great for ESL students)
IBIS: A True Whale Story by John Himmelman
The Whale’s Song by Dyan Sheldon
Whale Journey by Vivian French

Music CD’s:

Rapture of the Deep, Compass Recordings, 2001 (whale song recordings)
Lifescapes: Whale Song, Compass Productions, 2002 (underwater sounds)
Bang!zooM, Bobby Mcferrin, Capital Records, 1995

This activity was developed by Rhode Island school teacher Elizabeth D'Abbraccio during the *Discovery of Sound in the Sea* Teacher Institute. University of Rhode Island, Office of Marine Programs, 2002.
