In this module students will look at how people communicate in everyday life and the challenges of communicating through different methods. Students will apply these ideas to the concept of ocean exploration and examine the challenges of directing a team of explorers while working on the boundary of the unknown in the deep sea. Students will come up with their own conclusions and recommendations about the best methods of communication and exploration.

Objectives & Learning Outcomes
- Students will understand the types of communication used in science.
- Students will be able to explain the challenges of remote exploration of the world's oceans.
- Students will understand the need to use many technologies and data to convey what is occurring during a scientific expedition.

Guiding Questions
- How do people communicate?
- What challenges exist when trying to communicate complex ideas?
- How do scientists communicate with each other?
- What happens when you can’t properly communicate?

Activity/Tasks
Students will:
- Attempt to convey scientific ideas and vocabulary using different methods of non-verbal communication.
- Take notes independently on scientific video surveys and compare results.
- Apply their knowledge and new ideas regarding communication challenges to ocean exploration and telepresence.
**Educator: Lesson Procedure/Directions**

1. Prior to the start of the lesson, review the presentation (Methods of Communication PPT) and set it up on a class computer or projector.
2. Group students into pairs and distribute the student worksheet.
3. Guide students through the provided presentation and videos asking them to answer the questions surrounding methods of communication.

**Student: Lesson Procedure/Directions**

1. In your assigned partner groups, follow the instructions on your student worksheet to answer the question “How do we communicate?”.
2. Follow the presentation to work your way through the Partner Brainstorm with your group.
3. On your own, complete the final writing assessment and be prepared to share your thoughts with the class.

**Extensions & Adaptations**

**Introductory**
For students who are just approaching the standard or are ELL review the terms which will be communicated to define and clarify what each term signifies.

**Advanced**
Changing the terms to more advanced or specific scientific concepts will increase the challenge for students. Ask students to think of additional scientific scenarios in which communication is critical to the mission success. Give students the challenge to research historical scientific events that are examples of good communication and bad communication.

**Thinking Like A Robot**
Students can continue in the theme of communication and learn how engineers communicate with the robots they build.
Worksheet One Answer Key

Partner Brainstorm!
Define communication in one sentence:

✓ Possible answer:
   The successful conveying or sharing of ideas; exchanging or transmission of information

List the many ways humans communicate:

✓ Possible answers:
   Verbal/Auditory: talking, radio, music, walkie talkie, telephone, Skype, FaceTime, morse code, tin can & string, silence
   Written: texting, radio, calling, email, Instagram, letters, newspaper, symbols, Twitter, Facebook
   Non-Verbal: voice inflection, hand gestures, body position, touch, facial expressions, braille
   Visual: Instagram, television, light, smoke signal, flares

Once students have had enough time to discuss with their partners, ask them to write their lists on a board or poster paper to generate a class list of ways humans communicate. Discuss the list to see what types (visual, physical, digital, auditory, olfactory, etc) of communication are most common or least common in their lists.

Check off: Key word/phrase:

☑ Partner A: Communicate using speech What direction is the wind coming from?
☑ Partner B: Communicate using speech What kind of fish is that?
☑ Partner A: Communicate using writing: Drop the anchor
☑ Partner B: Communicate using writing: Man overboard
☑ Partner A: Communicate using gestures Five
☑ Partner B: Communicate using gestures Little
☑ Partner A: Communicate using gestures Warm
☑ Partner B: Communicate using gestures Deep
☑ Partner A: Communicate using gestures Rough
☑ Partner B: Communicate using gestures Different
☑ Partner A: Communicate using gestures Image of shark

Notes:
Specificity is important (species)
Other things can be communicated (size, markings, behavior, etc)
Worksheet Two Answer Key

Partner B: Communicate using gestures

Notes:
- Communication can be difficult if you can’t identify what you’re seeing
- Communication is easier if you show a photo or video

☐ Video Observations One

☐ Video Observations Two
- Students should notice many more elements and details due to the addition of sound.
**TELEPRESENCE:** Telepresence is a term used to describe a set of technologies, like live-synched interactive audio, high definition video, and other broadcast elements that enable people to feel or appear like they are in a location where they’re not physically located. Telepresence requires certain installations on a ship to make this connection possible.

Draw a diagram of E/V *Nautilus* and label the parts that make telepresence and exploration possible. (Reference video: [http://nautl.us/1sAhVja](http://nautl.us/1sAhVja):)
Worksheet Three Answer Key

Which graph shows the relationship between the two variables?

A. 

![Graph A](image1)

B. 

![Graph B](image2)

Which graph shows the relationship between the two variables?

A. 

![Graph C](image3)

B. 

![Graph D](image4)

Which graph shows the relationship between the two variables?

A. 

![Graph E](image5)

B. 

![Graph F](image6)
Worksheet Four Answer Key- (see rubric for suggested scoring)

Write a paragraph explaining how telepresence technologies benefit ocean exploration and types of communication it makes possible.

Key points students should be able to make:

- Telepresence increases the pace, efficiency, and scope of ocean exploration.
- Enables scientists at sea to communicate with scientists on shore.
- Larger audiences can be included in exploration activities by asking questions online, live.
- More people can be involved in the exploration process for a fractional cost.
- Exploration technology allows a ship to gather more detail in less time.
- Open communication inspires the next generation of STEM students.

Example from a sample poster talk done on a white board:

Students can tally ideas they also had for a histogram of the most popular ideas.
Learning Goals

- Understand the types of communication used in science.
- Practice conveying various scientific ideas using different methods of communication.
- Apply your experience to understand communication challenges in ocean exploration and telepresence.
- Confidence analyzing relationships between dependent and independent variables.

Introduction

In this module you will examine how people communicate in everyday life and the challenges of communicating through different methods. You will then apply these ideas to the concepts of ocean exploration and the challenges of directing a team of explorers to discover the deep sea. You will come up with your own suggestions and ideas on the best methods of communication and exploration.

Guiding Questions

1. How do people communicate?

2. What challenges exist when trying to communicate complex ideas?

3. How do scientists communicate with each other?

4. What happens when you can’t properly communicate?
**Online Resources:**

- Methods of Communication PowerPoint
  http://nautl.us/27TbtnV

- Ship Tour Video
  http://nautl.us/1sAhVja

- Learn more about telepresence in this blog!
  http://nautl.us/1Rs5hY3

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**Procedure |**

1. In your assigned partner groups, follow the instructions on your student worksheet to answer the question “How do we communicate?”.

2. Follow the presentation to work your way through the Partner Brainstorm with your group.

3. On your own, complete the final writing assessment and be prepared to share your thoughts with the class.

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The illustration above shows how the Nautilus Exploration Program uses telepresence technology to communicate to audiences around the globe. Telepresence works by sending data and video from the ROV (remotely operated vehicle) up the fiber optic cable tether to the Nautilus. Data is transmitted from the stabilized satellite dome to a satellite in outer space and relayed to a receiving station on the US east coast. At the speed of light data moves to the Inner Space Center at the University of Rhode Island, our hub for global distribution. Anyone connected to the internet (classrooms or scientists) can then explore right along with E/V Nautilus and her Corps of Exploration.
**Worksheet One A**

**Name:** I Am Partner A / Partner B (circle)

**Partner Brainstorm**

Our one-sentence definition of communication:

Our list of ways humans communicate:

<table>
<thead>
<tr>
<th>Method</th>
<th>Easy</th>
<th>Medium</th>
<th>Hard</th>
<th>Too Hard</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partner A: Communicate using speech</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner B: Communicate using speech</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner A: Communicate using writing:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner B: Communicate using writing:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Partner A: Communicate using gestures</td>
<td></td>
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<tr>
<td>Partner B: Communicate using gestures</td>
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<td>Partner B: Communicate using gestures</td>
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<td></td>
</tr>
</tbody>
</table>

**Notes:**
Worksheet One B

- Partner B: Communicate using gestures
  Notes:

- Video Observations One

- Video Observations Two
Worksheet Two

**TELEPRESENCE**: Telepresence is a term used to describe a set of technologies, like live-synched interactive audio, high definition video, and other broadcast elements that enable people to feel or appear like they are in a location where they’re not physically located. Telepresence requires certain installations on a ship to make this connection possible.

Draw a diagram of E/V Nautilus and label the parts that make telepresence and exploration possible. (Reference video: [http://nautl.us/1sAhVja](http://nautl.us/1sAhVja))
Worksheet Three

Which graph shows the relationship between the two variables?

A.  
B.  

Which graph shows the relationship between the two variables?

A.  
B.  

Which graph shows the relationship between the two variables?

A.  
B.  
Worksheet Four: Writing Assignment

Write a paragraph explaining how telepresence technologies benefit ocean exploration and types of communication it makes possible. Refer to attached rubric for assessment.
**Extended Response Rubric**

<table>
<thead>
<tr>
<th>OBJECTIVE</th>
<th>CRITERIA</th>
</tr>
</thead>
<tbody>
<tr>
<td>**Content and Vocabulary</td>
<td>**</td>
</tr>
<tr>
<td><strong>Exemplary</strong></td>
<td>Explanation uses appropriate vocabulary. Student is able to provide clear examples of the content or justify their response. Student is able to discuss application of the content. Response contains no content errors.</td>
</tr>
<tr>
<td>**Language and Conventions</td>
<td>**</td>
</tr>
<tr>
<td><strong>Exemplary</strong></td>
<td>Student produces clear and coherent writing in which the development, organization and style are appropriate to task, purpose and audience. Demonstrates an exemplary command of standard English conventions.</td>
</tr>
</tbody>
</table>

| Total Score: | Comments: |
HOW LARGE IS NAUTILUS NATION?

Tracking the reach of Ocean Exploration Trust’s education programs is essential in ensuring we are funded to continue making discoveries and inspiring the next generation of explorers.

Name: ________________________________

Email Address: ________________________

School’s Name: ________________________

Instruction date: ______________________

Subject area: __________________________

My Community (City, State): ________________________

Who did you engage in your teaching?

☐ Classroom
☐ After school program / Club meeting
☐ Fair / Festival / Event
☐ Museum / Science Center
☐ Other. Tell us more: ____________________________

# Students
# Community Members

Select all the OET materials you used in your instruction:

☐ STEM Learning Modules. Which ones? _________________________________________________________________

☐ Digital Resource Library materials. Which ones? _________________________________________________________

☐ Nautilus Live website: photo albums ☐ highlight videos ☐ live stream

☐ Meet the Team STEM mentor profiles

☐ Facebook (NautilusLive) ☐ Twitter (@EVNautilus) ☐ Instagram (@nautiluslive)

☐ Other. Tell us more: ____________________________________________________________
____________________________________________________________________________

What made working with OET resources valuable to your instruction (select all that apply)?

☐ Hands-on activities ☐ STEM career connections

☐ Easy to use lessons ☐ Standards-based lessons

☐ Website resource access ☐ Real world application of curricula topics

☐ Excitement of cutting-edge discoveries / Unfamiliarity of deep ocean

☐ Another reason. Tell us more: ____________________________________________________
____________________________________________________________________________

Using OET resources increased my confidence in teaching my science, technology, engineering, or math subjects. ☐ Yes ☐ No

OET provided me with helpful and relevant teaching resources. ☐ Yes ☐ No

Using OET resources increased my awareness of STEM careers. ☐ Yes ☐ No

If yes, how so? How can we improve?
____________________________________________________________________________

Please scan this document or snap a picture of it with your phone. Email the feedback or questions to education@oet.org. You can also submit feedback online: http://nautl.us/2cp3PNu

THANK YOU FOR ALL YOU DO!