METHODS OF COMMUNICATION | EDUCATOR

Links to Next Generations Science Standards |

MS-ETS1-1: Define the criteria and constraints of a design problem with sufficient precision to ensure a successful solution, taking into account relevant scientific principles and potential impacts on people and the natural environment that may limit possible solutions
MS-ETS1-4: Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved.

Links to Common Core Standards |

CCSS.ELA-LITERACY.RST.6-8.7: Integrate quantitative or technical information expressed in words in a text with a version of that information expressed visually.

S T E M

Supplement Video |
https://www.youtube.com/watch?v=bT34GvxPV8M
https://vimeo.com/161503328 (password: exploration)
Pacing | 1 class period (45 minutes each)
Background Needed | Basic concepts of teamwork, communication tools and ocean exploration
Assessment | Extended Response Rubric Provided
Materials/Resources |

- Methods of Communication PPT or PDF (http://nautl.us/1qMdqRg)
- Sample Photos of Poster Talk
- Internet connection and computer

Overview

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.

METHODS OF COMMUNICATION | EDUCATOR

Links to Common Core Math Standards |

CCSS.MATH.CONTENT .6.EE.B.6: Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.

CCSS.MATH.CONTENT .6.EE.9: Represent and analyze quantitative relationships between dependent and independent variables.

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 *Image of fangtooth fish*

Notes:

Communication can be difficult if you can't identify what you're seeing

Communication is easier if you show a photo or video

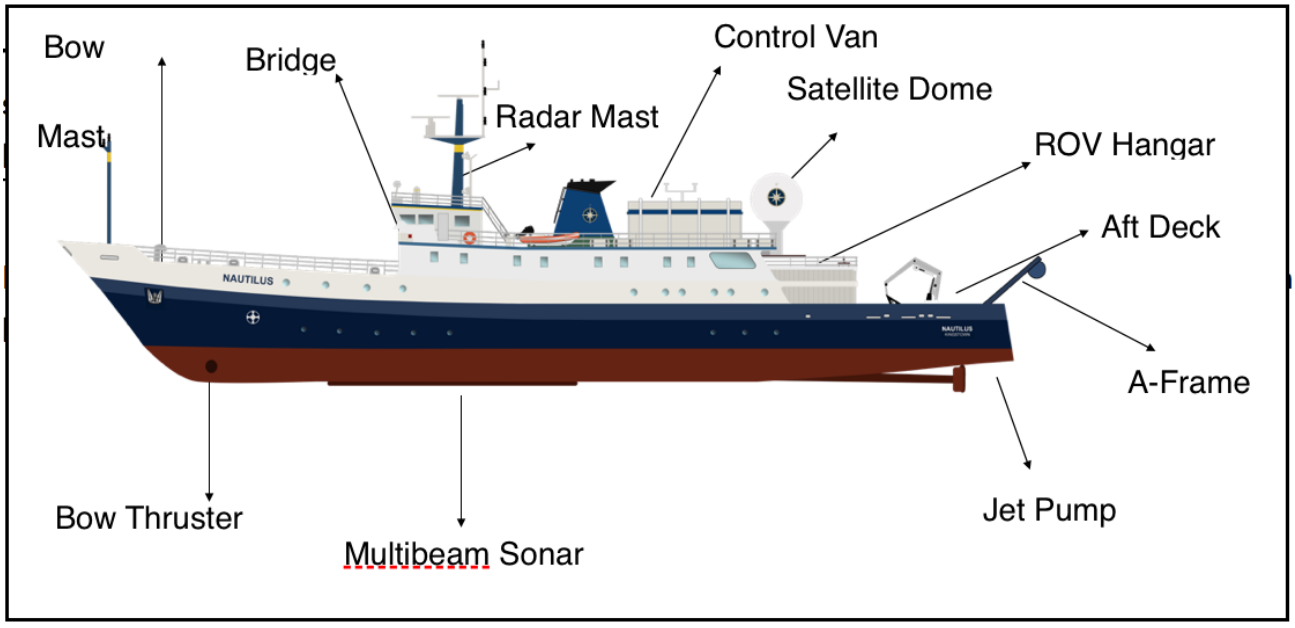
☐ Video Observations One

☐ 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.

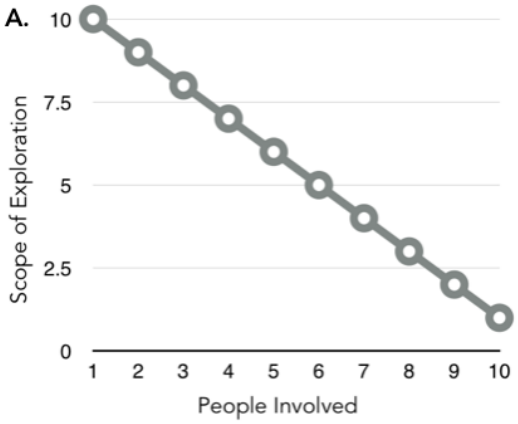
Draw a diagram of E/V *Nautilus* and label the parts that make telepresence and exploration possible. (Reference video: http://nautl.us/1sAhVja):



Worksheet Three Answer Key

Which graph shows the relationship between the two variables?

A.



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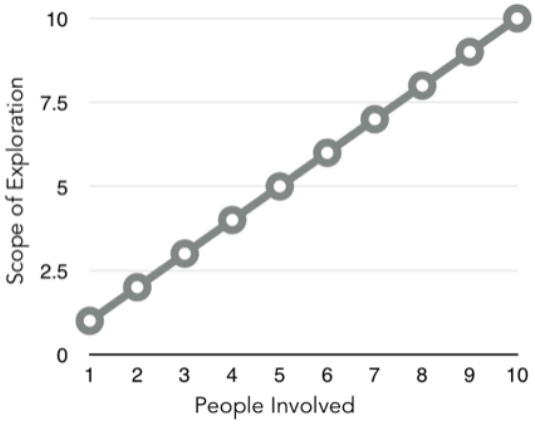

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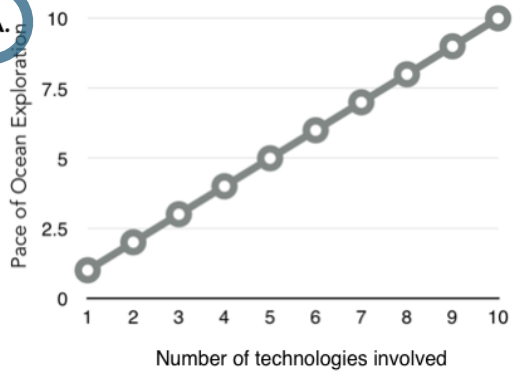

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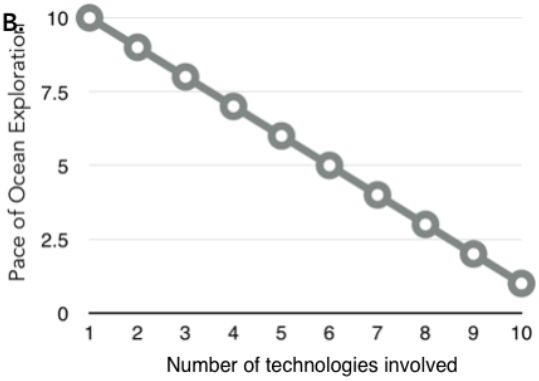

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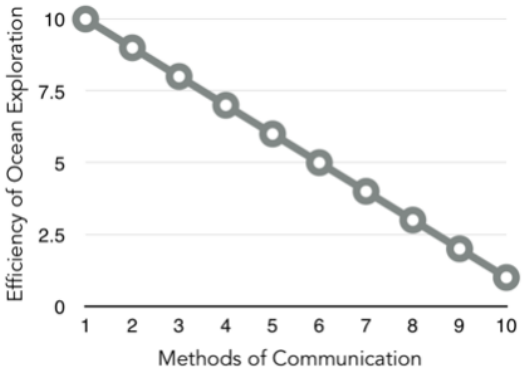

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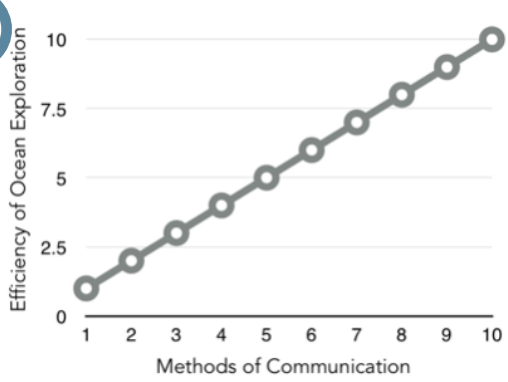


Worksheet Four Answer Key- *(see rubric for suggested scoring)*

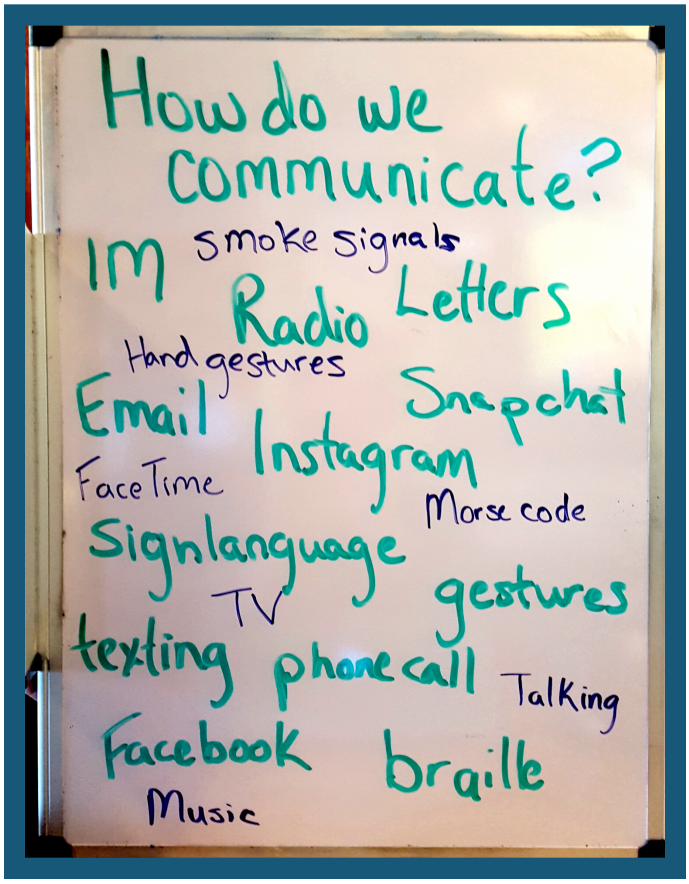
Write a paragraph explaining how telepresence technologies benefit ocean exploration and types of communication it makes possible.

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.



METHODS OF COMMUNICATION | STUDENT

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?

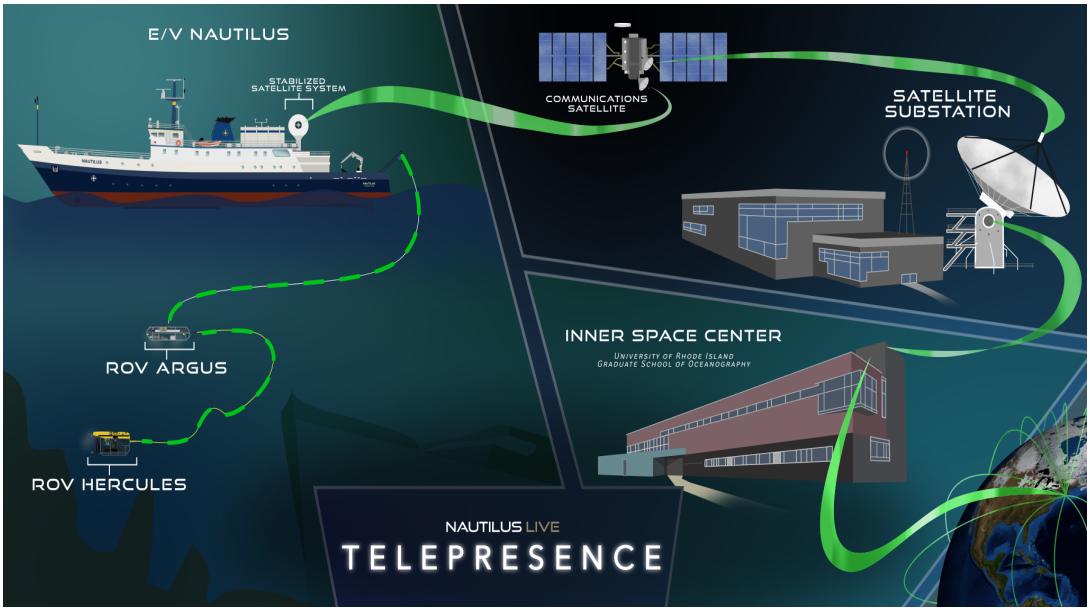
4. What happens when you can't properly communicate?

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

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.



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:

Check off as we go:	**Circle One Option**			
☐ Partner A: Communicate using speech	Easy	Medium	Hard	Too Hard
☐ Partner B: Communicate using speech	Easy	Medium	Hard	Too Hard
☐ Partner A: Communicate using writing:	Easy	Medium	Hard	Too Hard
☐ Partner B: Communicate using writing:	Easy	Medium	Hard	Too Hard
☐ Partner A: Communicate using gestures	Easy	Medium	Hard	Too Hard
☐ Partner B: Communicate using gestures	Easy	Medium	Hard	Too Hard
☐ Partner A: Communicate using gestures	Easy	Medium	Hard	Too Hard
☐ Partner B: Communicate using gestures	Easy	Medium	Hard	Too Hard
☐ Partner A: Communicate using gestures	Easy	Medium	Hard	Too Hard
☐ Partner B: Communicate using gestures	Easy	Medium	Hard	Too Hard
☐ Partner A: Communicate using gestures	Easy	Medium	Hard	Too Hard

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)

Worksheet Three

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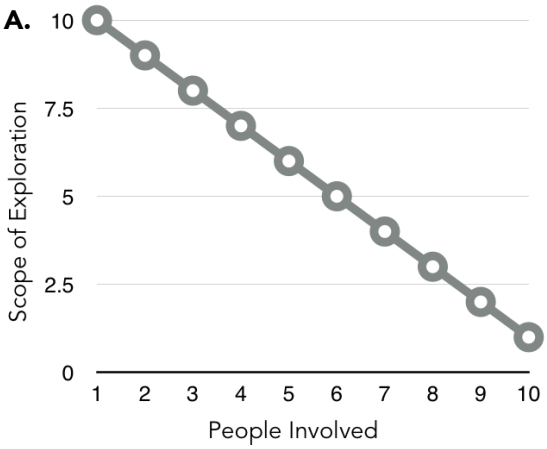

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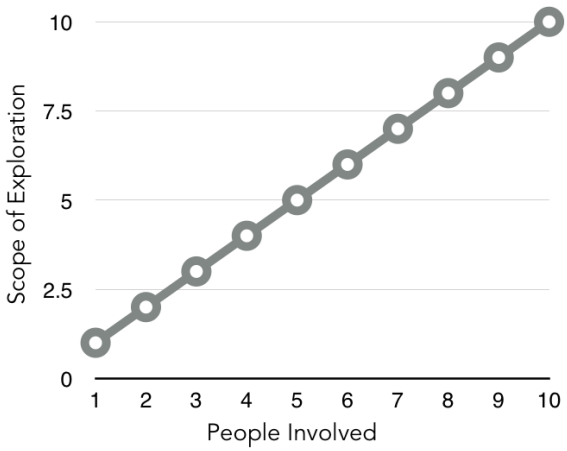

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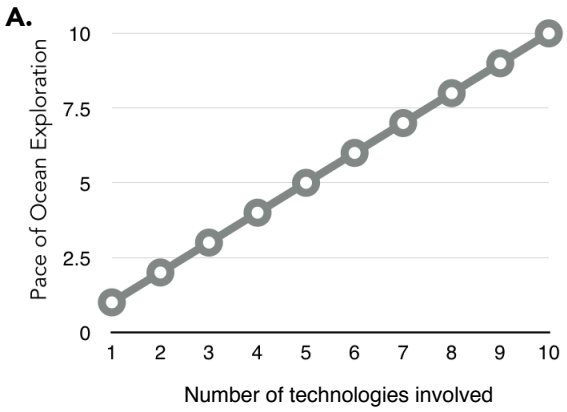

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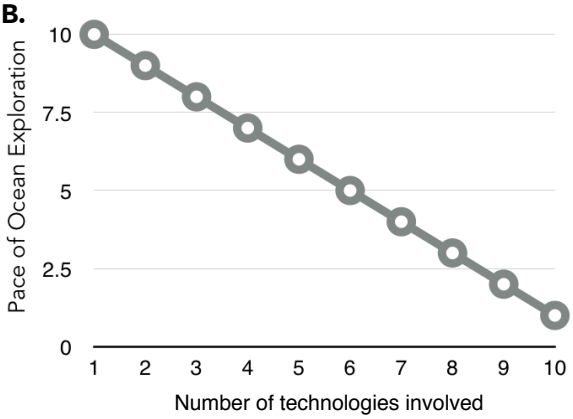

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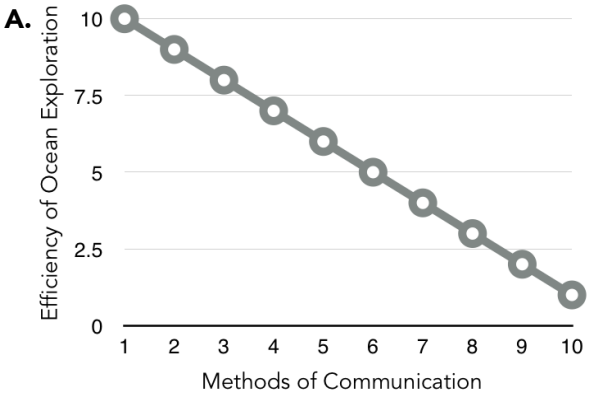

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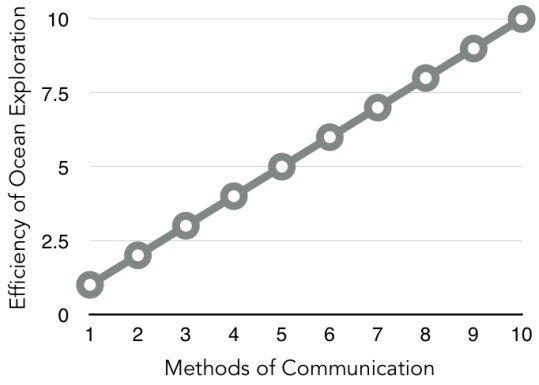

Worksheet Four: Writing Assignment

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

OBJECTIVE	CRITERIA			
	4 Exemplary	3 Commended	2 Emerging	1 Developing
Content and Vocabulary |	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.	Explanation uses appropriate vocabulary. Student is able to provide some examples of the content or justify their response and is able to discuss application of the content. Response may contain minor errors that do not detract from overall understanding of the topic.	Student attempts to use appropriate vocabulary. Student attempts to provide some examples of the content or justify their response. Application of the content may be weak. Response may contain some errors.	Use of appropriate vocabulary is weak. Student does not attempt to provide examples of the content or justify their response. Application of the content is weak or nonexistent.
Language and Conventions |	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.	Student produces writing in which the development, organization and style are appropriate to task, purpose and audience. Demonstrates a command of standard English conventions; errors do not interfere with understanding.	Student produces writing in which some development, organization and style are appropriate to task, purpose and audience. Demonstrates a limited and/or inconsistent command of standard English conventions; errors may interfere with understanding.	Student produces writing in which there is limited development, organization and style appropriate to task, purpose and audience. Demonstrates a weak and/or inconsistent command of standard English conventions; errors interfere with understanding.
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: **My Community (City, State):**

Email Address:

School's Name:

Instruction date: **Grade level instructed:**

Subject area:

My education space is a...

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

Who did you engage in your teaching?

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!