



# **Toppers at Sea 2014 Youth Program**

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## Toppers at Sea Youth Program Overview

The Toppers at Sea Youth Program was specifically focused on engaging students in interactive learning through the incorporation of hands-on science lessons, discussions about climate change, and students reflecting on what they have learned through journal writing. Students met for class on days they were at sea and participated in some amazing adventures during the days they were in port.

Using what they learned both in the classroom and through their port experiences, students began working on an interactive presentation they planned to present to the community once we reached Akureyri, Iceland. Students worked hard by researching their topics and learning how to best explain and articulate what they had learned while on this trip. By having the opportunity to engage in these experiences firsthand, our students were very well prepared to speak to the community about climate change, its presence and impact on the world, and opportunities they see for the future.



## TerraMar Organization

The TerraMar Project is a nonprofit organization that educates people on ocean awareness issues and also supports the ocean as well as all of the species that live within it. Students visited the TerraMar website to “Friend a Species” and learn more about specific animals. During the “Friend a Species” assignment students learned about the issues their animals were facing including threats to their animals, the geographical locations where their animals could be found, and conservation efforts that were taking place in order to provide additional protective measures for their animals.



The animals that were adopted by the students on this voyage include the Giant Squid, Bottlenose Dolphin, Tiger Tail Seahorse, and the North Atlantic Right Whale. Students participated in research activities and answered critical thinking questions to show the knowledge they had gained about their animal. Students also completed and signed the “I Love the Ocean” Pledge in which they declared their love for the ocean and its creatures as well as their commitment to share their knowledge of the ocean with others in an effort to spread ocean awareness.

## Science Lessons & Activities

During the days at sea the “Fantastic Four” engaged in multiple hands-on science lessons that incorporated experiments, critical thinking questions, observations, open discussion, and reflections. The lessons presented to the “Fantastic Four” include the following: Ecological Footprint, Sea Level on the Rise, Ocean Acidity and Glacier Changes Over Time, and the “Save the Ocean” Pledge Drive (which will be discussed later). A description of each lesson and the activities students engaged in is presented below.

### Ecological Footprint Lesson

To begin a discussion on climate change students were first asked to think about how much of the Earth’s surface we actually use. Guesses ranged from 15% all the way up to 50%. An apple demonstration was used to show students that we only use less than 2% of the surface of the Earth in order to grow the food we need to survive. Students were surprised to learn that so little of the Earth’s surface was viable for food production, but an interesting conversation was started focusing on how important it is to protect what little resources we have available to us.



Students then completed a calculation worksheet entitled the Ecological Footprint Calculator. The purpose of this activity was for students to answer questions about their daily lives from the activities they engage in to the types of food they eat. All of this information was then calculated to determine their individual ecological footprint. The term ecological footprint refers to how many planet Earths would be needed if everyone on the planet followed the same lifestyle of each individual student. The results ranged from students needing three Earths all the way up to six Earths if everyone on the planet lived their exact same lifestyle. This activity was quite eye opening for the students, and a great discussion followed.

Various additional examples were presented to the students that represented children

from other countries and how many Earths would be required based on the calculations done by those students. A few critical thinking questions were posed including the following: What do you notice about the number of Earths required for each of the students based on where the students live? Does this factor into the types of resources they need in their daily lives? Why do you think students living in the United States would require so many more Earths in regards to resources when compared to students who live somewhere else?

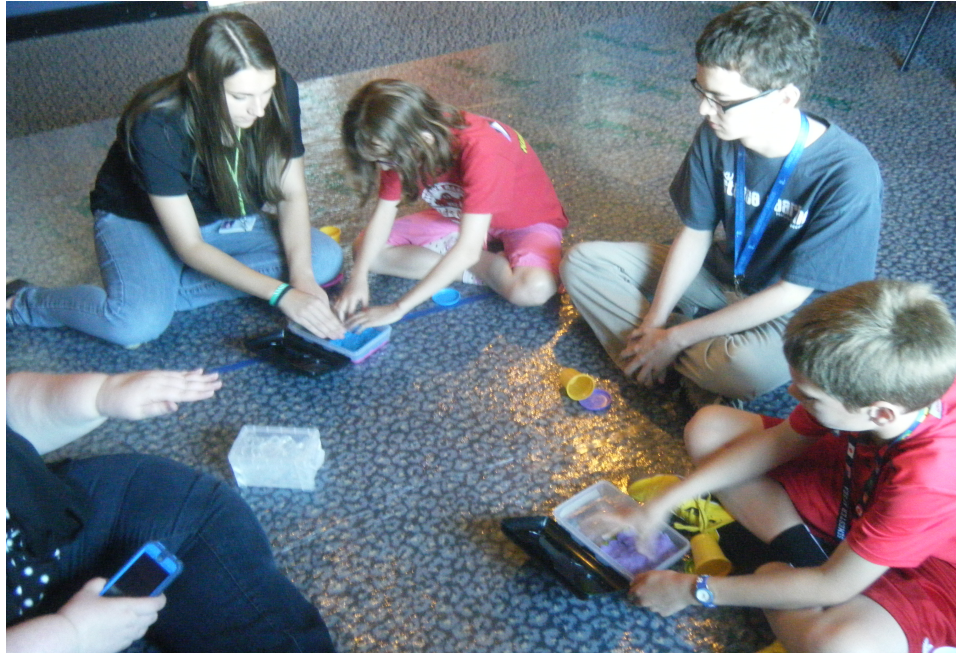


Students then signed an Ecological Footprint Commitment where they determined at least three ways they could change their lifestyle in order to reduce their overall ecological footprint. The students had a lot of great ideas that ranged from turning off the water while brushing their teeth to carpooling with their friends or riding their bikes to school. It was interesting to see the students realize how much they alone could impact the environment and the resources the Earth is able to provide.



### Sea Level on the Rise Lesson

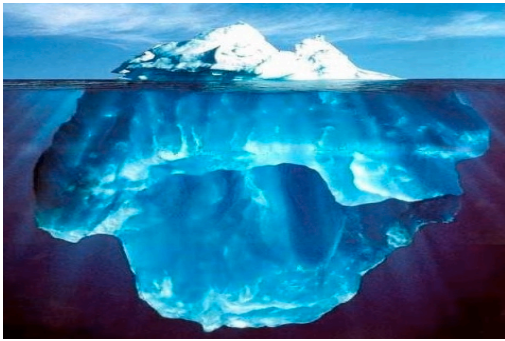
Due to climate change the current glaciers and other ice masses on the Earth are melting at an alarming rate. All that ice will turn to water, which has to go somewhere, but where? In this lesson students formulated a hypothesis stating whether they thought the sea level would rise more from the melting of free floating ice in the oceans, such as icebergs, or solid ice masses located on land, such as glaciers. Students supported their decisions with various reasoning, and all of the students felt that the free floating ice in the oceans would cause the sea level to rise more than ice on land. To test their hypotheses, students simulated both icebergs and glaciers with the help of some pencil boxes, water, ice cubes, rulers, and some modeling clay.



The ice floating in the water inside one of the pencil boxes represented icebergs, which are also free floating in the ocean. The ice sitting on top of the modeling clay in the other pencil box represented ice on land in the form of glaciers. Students then poured the same amount of water into each pencil box so that the “sea level” in each box started out in the same place. Every 15 minutes students used a ruler to measure the difference in sea level rise that had occurred in each pencil box and recorded their data on a graph. At the end of an hour the students could clearly see that the water in the pencil box that had the ice cubes sitting on top of the modeling clay had risen much higher than the water where the ice cubes started out floating in the water.



The theory of water displacement was then discussed where students learned that free floating icebergs take up a large amount of space in the ocean. When they melt, the water that was in frozen form then takes up that space causing the sea level to rise very little. However, frozen ice on land does not currently take up any space in the ocean. When that ice melts, the liquid water will then flow into the ocean and add volume, therefore causing the sea level to rise at a much higher rate.



### Ocean Acidity and Glacier Changes Over Time Lesson

The purpose of this lesson was for students to understand how CO<sub>2</sub> and other components are changing the acidity of our ocean water. Students were asked to put drops of vinegar onto eggshells, which represented calcium carbonate. Eggshells were used to represent the shells of certain sea animals as well as coral reefs. Students observed a reaction on the eggshells when they came into contact with the vinegar and noticed that the eggshells began to bubble. This reaction was explained to the students as the eggshells beginning to dissolve after coming into contact with the acid component of the vinegar.



Students discussed how this type of reaction could impact the animals in the ocean that have calcium carbonate as part of their shells as well as coral reefs, which are composed primarily of calcium carbonate. Students concluded that the increased acidification of the ocean would be detrimental to these creatures as well as coral reefs. Animals that make coral reefs their homes would also be negatively affected by the increased acidity of ocean water.

To further examine the environmental affects of climate change, students engaged in a discussion relating to the changes of glaciers over extended periods of time. To complete this activity students were given multiple pictures of various glaciers around the world. Students had to work together to determine which pictures were of the same glacier and then discuss the observable changes they could see to the glacier and the surrounding landscape. Students were

both amazed and alarmed at the rate of change the glaciers exhibited over such short periods of time.



The conclusion of this lesson focused on a student led discussion about what changes could be made in order to slow the melting of the glaciers. Students also reflected on what they learned regarding ocean acidity and what will happen to ocean animals and habitats if the acidity continues to increase.

## “Save the Ocean” Pledge Drive

To support the TerraMar organization students engaged in their own “Save the Ocean” pledge drive. Students made signs and set up a table outside one of the dining rooms on the ship for a period of two hours. Ship passengers stopped by, and students explained the purpose of the TerraMar organization, its mission, and the pledge.





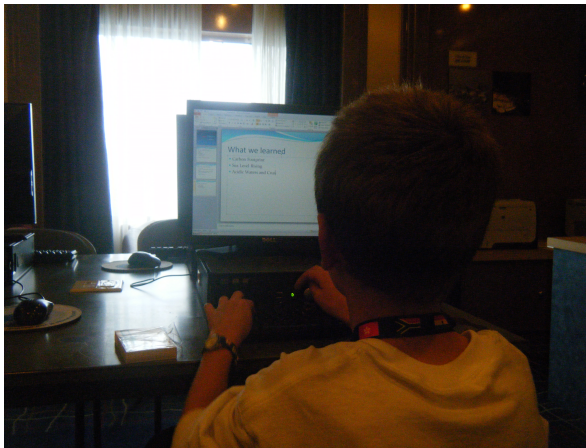
The students talked to the ship passengers about their individual ocean animals and how they were being affected by climate change. They also explained the components of the “I Love the Ocean” pledge, which include the following:

- I love the ocean.
- I will share my love for the ocean with family and friends.
- I support the need for the ocean to be managed sustainably for generations to come.

At the end of the pledge drive the students had gathered a very impressive 338 signatures in support of the ocean!

## Group Presentation at Akureyri

As part of their class on climate change, the “Fantastic Four” worked very hard to compile what they learned into a presentation so they could present their knowledge to the community in Akureyri. The student presentation was divided into four sections with each of the students being responsible for the research and information in their assigned section.



Koji Barnaby began the presentation by explaining the TerraMar Project to the Akureyri community members. He explained the purpose of TerraMar as well as its overall mission in helping protect the ocean as well as its creatures. He discussed the involvement the “Fantastic Four” had with TerraMar and explained the process each of the students went through when they completed the “Friend a Species” assignment. Koji further discussed the goal of TerraMar, which is to bring ocean awareness to the public to assist in the success of future conservation efforts.

Joanna Carey then spoke more in-depth about the “Save the Ocean” pledge drive that the students held on the ship. She explained the process they went through of making signs for their table and talking to the shipboard community about the importance of the ocean and why they should support the conservation efforts by the TerraMar organization. She also spoke about the overall success of the pledge drive and shared some pictures of the pledge drive event with the community members in Akureyri. Joanna explained all of the hard work that the students put into the pledge drive and shared that through their efforts they were able to get 338 members of the shipboard community to pledge their support for the ocean, the TerraMar organization, and its ocean conservation efforts.

Lawson Strenecky then went into detail about the science the students had been learning in their class while onboard the ship. He did an excellent job explaining the various lessons the students had and detailed the content knowledge students had gained from each of the lessons. For his part of the presentation Lawson also made quite a visual impact by going through the apple demonstration students experienced in their first class on the ship where they learned how much of the Earth's surface was actually usable by humans for their necessary resources. The pictures that Lawson included in his section of the presentation allowed the community members to see the activities students engaged in while also seeing what they learned as a result of those activities. This part of the presentation really helped the community members see the importance of presenting the topic of climate change to students at a young age.

Sachi Barnaby concluded the presentation by summarizing what the students had learned about climate change so far during their experience onboard the ship and through interactions with the shipboard community and other experts they had the opportunity to meet while in port. She also discussed the impact that climate change is currently having on our environment and our world focusing on the immediate impact felt by the ocean and the animals and habitats within it. Sachi concluded her part of the presentation by giving examples of preventative measures the students had discussed regarding climate change while in class and by also providing examples of opportunities the students felt would benefit educational methods relating to climate change. Overall, the "Fantastic Four" did an amazing job of sharing their knowledge and experiences with the community members in Akureyri!



## \$100 Solution Service Project

The "Fantastic Four" decided that they wanted to pay a guide while in Isafjordur to tell

them the history about the town as well as Iceland while taking a hike through the breathtaking scenery. The guide we had was amazing and was able to tell the students a lot about the fishing history of the town. She also took us on a hike up one of the large hills close to the town so we could overlook the entire town. We were in Isafjordur on a holiday, so many of the shops were closed, but students were able to learn about the culture and history of many of the buildings while on our hike. At the conclusion of our hike the students presented our guide with a red towel so that she could become a part of the WKU Hilltopper family!



For the second part of the service project the students wanted to purchase an Icelandic food product and put the rest of their money back into the community. They decided to buy “Skyr” at a local store, which is a type of thick yogurt. There were different fruit flavors, and all of the students seemed to be happy with their purchases!





## Program Evaluation

The Toppers at Sea 2014 Youth Program was very successful in both teaching the students who participated about climate change while also preparing them to become global citizens. I feel that the interactive approach this program had was extremely beneficial for the students, especially with them being given the opportunity to travel and experience what other countries are doing to respond to climate change. The students were able to participate in multiple hands-on and academically engaging experiments and activities related to climate change while in their classes onboard the ship.

These lessons and activities led to a lot of great discussion topics that required students to think critically. Students had the opportunity to articulate their ideas and problem solving skills while also having the chance to learn from their fellow classmates. Students were able to see how climate change has multiple impacts on the environment, especially the ocean and its inhabitants. The guest speakers who took time out of their busy schedules to come talk to the students about various areas of climate change were extremely valuable in regards to encouraging students to view the bigger picture related to this issue.

The students put a lot of work into their “Save the Ocean” pledge drive and were able to speak articulately about climate change, its impact, and the importance of protecting the ocean and the animals and habitats within it. Students were also able to provide the shipboard passengers with the knowledge and information they had learned about climate change in an effort to encourage them to support the conservation efforts of the TerraMar organization. The students also discussed with the passengers how they became involved with the TerraMar organization, and they explained their “Friend a Species” assignment. By having 338 people pledge their love for the ocean and their support of the TerraMar organization it is clear that the “Fantastic Four” exceeded all expectations!

The journey the four students in the youth program took while on this voyage was all about the learning. During the course of the voyage it was clear that the students were truly internalizing the information presented to them, and they were able to converse with others about

the topic of climate change and the impact it is having on our environment. I was very impressed during the pledge drive when I saw all of the students talking with others about the TerraMar organization and feeling comfortable doing so. These students are excellent advocates for the TerraMar organization and for this important topic of climate change. They can explain the affects of climate change and refer back to the activities they participated in to draw from their knowledge base information to further detail what will happen in the future if this problem issue goes unanswered.

As a teacher I was extremely proud to see what the students learned about climate change over the course of the voyage. It was also thoroughly enjoyable for me to have the opportunity to interact with such amazing students on this voyage! All of the students were eager to learn and were excited to see what activities they would be participating in during our class. There were multiple occasions when the students actually brought some of the friends they had made on the ship to class with them. This was so great to see because it showed that they truly enjoyed being in class and that they wanted to share that enjoyment with their new friends. Based on the hard work the students put into their presentation at Akureyri and the wonderful positive feedback I received from multiple people, both from the community members in Akureyri and from members of our group, I feel confident that all of the students from the “Fantastic Four” will make positive contributions and help lead the way in making decisions for the betterment of our global society!

