

## 【附件2】：111年度海洋教育「永續海洋」教案設計格式

### （一）基本資料

參加組別	<input type="checkbox"/> 高中組 <input checked="" type="checkbox"/> 國中組 <input type="checkbox"/> 國小組	編號	(由本中心需填寫)
參加子題	<input type="checkbox"/> 海中的教室 <input checked="" type="checkbox"/> 教室中的海	設計者 姓名 (至多3名)	陳俐安
教案名稱	How does global warming influence the ocean?		
教學領域 (或科目)	英語科		
教學理念	Climate change is affecting our world now, but we have the responsibility to build a sustainable and feasible world for the next generation. Invite students to brainstorm how to protect the coral reefs around Taiwan and guide students to modify some life styles to the ocean.		
符合聯合國 永續發展目標	SDGs 11.5 By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situation. SDGs 13.3 Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning. SDGs 14.1 By 2025, prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution.		

### （二）教案概述

教案名稱	How does global warming influence the ocean?		
實施年級	七年級	節數	共 <u>2</u> 節， <u>90</u> 分鐘。(請以1至4節課設計)
課程類型 <sup>i</sup>	<input checked="" type="checkbox"/> 議題融入式課程 <input type="checkbox"/> 議題主題式課程 <input type="checkbox"/> 議題特色課程	課程實施時間	<input checked="" type="checkbox"/> 領域/科目：英語科 <input checked="" type="checkbox"/> 校訂必修/選修 <input type="checkbox"/> 彈性學習課程/時間 <input type="checkbox"/> 其它：
學習目標	探究海洋科學與永續海洋資源的知海素養，三個面向思考提升學生海洋教育素養之目標。		
總綱核心素養 <sup>ii</sup>	A2 系統思考與解決問題 A3 規劃執行與創新應變		
與課程綱要對應之各領域學習重點 <sup>ii</sup>			
核心素養	英-J-A2 具備系統性理解與推演的能力，能釐清文本訊息間的關係進行推論，並能經由訊息的比較，對國內外文化的異同有初步的了解。 英-J-B2 具備運用各類資訊檢索工具蒐集、整理英語文資料的能力，以擴展學習素材與範疇、提升學習效果，同時養成資訊倫理素養。		
學習內容	D-IV-1 依綜合資訊作合理猜測。 *C-V-4 國際議題(如全球暖化、人工智慧、氣候變遷等)。		

學習表現	7-IV-1 能使用英文字典，配合上下文找出適當的字義。 2-IV-6 能依人、事、時、地、物作簡易的描述或回答。
與課程綱要對應之海洋教育議題 <sup>1</sup>	
核心素養	海 A2 能思考與分析海洋的特性與影響，並採取行動有效合宜處理海洋生態與環境之問題。 海 B2 能善用資訊、科技等各類媒體，進行海洋與地球資訊探索，進行分析、思辨與批判海洋議題。
學習主題	海洋科學與技術、海洋資源與永續。
實質內涵	海 J9 了解我國與其他國家海洋文化的異同。 海 J12 探討臺灣海岸地形與近海的特色、成因與災害。
教學資源	<p>一、參考書籍：南一英語第一冊</p> <p>二、學習單</p> <p>三、網站資源：</p> <ol style="list-style-type: none"> <li>1. <i>What causes Sea Level Rise?</i> <a href="https://www.youtube.com/watch?v=QH-KYmRAzOA">https://www.youtube.com/watch?v=QH-KYmRAzOA</a></li> <li>2. <i>A Guide to Climate Change for Kids</i> <a href="file:///C:/Users/User/Downloads/kids-guide-to-climate-change.pdf">file:///C:/Users/User/Downloads/kids-guide-to-climate-change.pdf</a></li> <li>3. <i>Climate Change</i> <a href="http://Climate%20change%20(nationalgeographic.com)">Climate change (nationalgeographic.com)</a></li> <li>4. <i>Rising Ocean Temperatures are "Cooking" Coral Reefs   National Geographic.</i> <a href="https://www.youtube.com/watch?v=mQ10xBI8XMQ">https://www.youtube.com/watch?v=mQ10xBI8XMQ</a></li> <li>5. <i>What is coral bleaching?</i> <a href="https://oceanservice.noaa.gov/facts/coral_bleach.html">https://oceanservice.noaa.gov/facts/coral_bleach.html</a></li> <li>6. <i>Coral bleaching</i> <a href="https://climatekids.nasa.gov/coral-bleaching/">https://climatekids.nasa.gov/coral-bleaching/</a></li> <li>7. 珊瑚是植物還是動物？珊瑚白化的原因、影響及解決辦法是？ <a href="https://www.greenpeace.org/taiwan/update/20550/%E7%8F%8A%E7%91%9A%E6%98%AF%E6%A4%8D%E7%89%A9%E9%82%84%E6%98%AF%E5%8B%95%E7%89%A9%E7%BC%9F%E7%8F%8A%E7%91%9A%E7%99%BD%E5%8C%96%E7%9A%84%E5%8E%9F%E5%9B%A0%E3%80%81%E5%BD%B1%E9%9F%BF/">https://www.greenpeace.org/taiwan/update/20550/%E7%8F%8A%E7%91%9A%E6%98%AF%E6%A4%8D%E7%89%A9%E9%82%84%E6%98%AF%E5%8B%95%E7%89%A9%E7%BC%9F%E7%8F%8A%E7%91%9A%E7%99%BD%E5%8C%96%E7%9A%84%E5%8E%9F%E5%9B%A0%E3%80%81%E5%BD%B1%E9%9F%BF/</a></li> </ol>
教學架構	<p style="text-align: center;">How does global warming influence the ocean?</p> <p>Lesson 1: Find what causes sea level rise.</p> <p>I. Warm up: Read the passage and brainstorm the reason.</p> <p>II. Activity: Watch the video and organize the reason of climate change.</p> <p>III. Homework: Read the reason and the impact of climate change.</p> <p>Lesson 2: Find the impact of coral bleaching.</p> <p>I. Warm up: Discuss how climate change influences us.</p> <p>II. Activity: Watch the video about coral bleaching and organize the impact of coral bleaching.</p> <p>III. Homework: Think up solutions for coral bleaching.</p>

<sup>1</sup>可參閱國家教育研究院發展之「十二年國民基本教育課程綱要國民中小學暨普通型高級中等學校議題融入說明手冊」(12-13頁；294頁；52-57頁)。

(1)議題融入式課程：此類課程是在既有課程內容中將議題的概念或主軸融入。融入的議題可僅就某一議題，或多項相關議題。此類課程因建立於原有課程架構與內容，以現有課程內容為主體，就其教學的領域/科目內容與議題，適時進行

教學的連結或延伸，設計與實施相對容易。

- (2) 議題主題式課程：此類課程是擷取某單一議題之其中一項學習主題，發展為議題主題式課程。其與第一類課程的不同，在於此類課程的主軸是議題的學習主題，而非原領域/科目課程內容，故需另行設計與自編教材。它可運用於國中小的彈性學習課程、高級中等學校的彈性學習時間，以數週的微課程方式進行，或於涉及之領域教學時間中實施。
- (3) 議題特色課程：此類課程是以議題為學校特色課程，其對議題採跨領域方式設計，形成獨立完整的單元課程。它可於校訂課程中實施，例如國中小的彈性學習課程、高級中等學校的彈性學習時間，或規劃成為校訂必修或選修科目。此類課程不論是單議題或多議題整合進行，通常需要跨領域課程教師的團隊合作，以協力發展跨領域的議題教育教材。雖有其難度且費時，但因是更有系統的課程設計，並輔以較長的教學時間，故極有助於學生對議題的完整與深入了解，可進行價值建立與實踐行動的高層次學習；同時，亦可形成學校的辦學特色。

<sup>ii</sup> 可參閱教育部發布之「十二年國民基本教育課程綱要」總綱及各領域綱要。

### (三) 教學活動設計

學習活動	時間	備註 (請說明評量方式)						
<p>The first class</p> <p>The aim of the class: Find what causes sea level rise.</p> <p>I. Warm up:</p> <p>1. Ask students to look at the pictures on page 107 and 108. Guide the students to guess what the reading is going to talk about.</p> <p>II. Activity:</p> <p>1. Show the video <i>What Causes Sea Level rise?</i>  <a href="https://www.youtube.com/watch?v=QH-KYmRAzOA">https://www.youtube.com/watch?v=QH-KYmRAzOA</a>            Explain key words in the video, such as average height, local sea level, global sea level, and glacier melting. Use a K-W-L chart to make students know more about the sea level rising.</p> <table border="1"> <thead> <tr> <th>What do I know before the video?</th> <th>What do I want to know?</th> <th>What do I learn from the reading?</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table> <p>2. Invite students to share their K-W-L charts.</p> <p>3. Conclude what is climate change and what climate change may impact the Earth.</p> <p>III. Homework</p> <p>1. Give students <i>A Guide to Climate Change for Kids</i> from NASA.  <a href="file:///C:/Users/User/Downloads/kids-guide-to-climate-change.pdf">file:///C:/Users/User/Downloads/kids-guide-to-climate-change.pdf</a></p> <p>2. Ask students to read the introduction of climate change, and ask students to find out how climate change influences our ocean. Encourage students to look up new words in the dictionary to understand the guide.</p> <p>3. If needed, give students more information about climate change on the website.  <a href="https://kids.nationalgeographic.com/science/article/climate-change">https://kids.nationalgeographic.com/science/article/climate-change</a></p>	What do I know before the video?	What do I want to know?	What do I learn from the reading?				<p>10 mins</p> <p>25 mins</p> <p>10 mins</p>	<p>K-W-L chart</p>
What do I know before the video?	What do I want to know?	What do I learn from the reading?						
<p>The second class</p> <p>The aim of the class: Find the impact of coral bleaching.</p> <p>I. Warm up:</p> <p>1. Review what we learned last time and invite students to share what they read from <i>A Guide to Climate Change for Kids</i>.</p> <p>2. In addition to the sea level rising, lead students to think how climate change may influence our ocean.</p> <p>II. Activity:</p> <p>1. Focus on coral bleaching. Show the video <i>Rising Ocean Temperatures are "Cooking" Coral Reefs   National Geographic</i>.  <a href="https://www.youtube.com/watch?v=mQ10xB18XMQ">https://www.youtube.com/watch?v=mQ10xB18XMQ</a></p> <p>2. After the video, give the students the worksheet about coral bleaching. Let students discuss the reason, the impact of coral bleaching. Brainstorm how to stop coral bleaching.</p> <p>3. Show the picture about coral bleaching.</p>	<p>10 mins</p> <p>25 mins</p>	<p>The worksheet about coral bleaching</p>						

<p><b>CORAL BLEACHING</b> Have you ever wondered how a coral becomes bleached?</p> <p><b>HEALTHY CORAL</b> 1 Coral and algae depend on each other to survive.</p> <p><b>STRESSED CORAL</b> 2 If stressed, algae leaves the coral.</p> <p><b>BLEACHED CORAL</b> 3 Coral is left bleached and vulnerable.</p> <p>Corals have a symbiotic relationship with microscopic algae called zooxanthellae that live in their tissues. These algae are the coral's primary food source and give them their color.</p> <p>When the symbiotic relationship becomes stressed due to increased ocean temperature or pollution, the algae leave the coral's tissue.</p> <p>Without the algae, the coral loses its major source of food, turns white or very pale, and is more susceptible to disease.</p>	<p><b>WHAT CAUSES CORAL BLEACHING?</b></p> <p><b>Change in ocean temperature</b> Increased ocean temperature caused by climate change is the leading cause of coral bleaching.</p> <p><b>Runoff and pollution</b> Storm generated precipitation can readily dilute ocean water and runoff can carry pollutants — these can bleach near-shore corals.</p> <p><b>Overexposure to sunlight</b> When temperatures are high, high solar irradiance contributes to bleaching in shallow water corals.</p> <p><b>Extreme low tides</b> Exposure to the air during extreme low tides can cause bleaching in shallow corals.</p> <p>NOAA's Coral Reef Conservation Program <a href="http://coral-reef.noaa.gov/">http://coral-reef.noaa.gov/</a></p>		
<p><a href="https://oceanservice.noaa.gov/facts/coral_bleach.htm">https://oceanservice.noaa.gov/facts/coral_bleach.htm</a></p> <p>After reading the picture, students should complete the worksheet about coral bleaching.</p> <p>4. Invite students to play the coral bleaching game on the website. <a href="https://climatekids.nasa.gov/coral-bleaching/">https://climatekids.nasa.gov/coral-bleaching/</a></p> <p>Let students experience how coral bleaching happens.</p> <p>III. Homework</p> <p>1. Give students Greenpeace website. Ask students to read the website and get ready to discuss coral bleaching in Taiwan and what we can do to help the ocean around Taiwan.</p> <p><a href="https://www.greenpeace.org/taiwan/update/20550/%E7%8F%8A%E7%91%9A%E6%98%AF%E6%A4%8D%E7%89%A9%E9%82%84%E6%98%AF%E5%8B%95%E7%89%A9%E7%BC%9F%E7%8F%8A%E7%91%9A%E7%99%BD%E5%8C%96%E7%9A%84%E5%8E%9F%E5%9B%A0%E3%80%81%E5%BD%B1%E9%9F%BF/">https://www.greenpeace.org/taiwan/update/20550/%E7%8F%8A%E7%91%9A%E6%98%AF%E6%A4%8D%E7%89%A9%E9%82%84%E6%98%AF%E5%8B%95%E7%89%A9%E7%BC%9F%E7%8F%8A%E7%91%9A%E7%99%BD%E5%8C%96%E7%9A%84%E5%8E%9F%E5%9B%A0%E3%80%81%E5%BD%B1%E9%9F%BF/</a></p>	<p>10 mins</p>		

#### (四) 教學實踐、教學省思、成長與建議

##### 教學實踐情形與成果

##### I. During the class

1. There is some new vocabulary for students. That may reduce students' willing to learn. It would be better if some picture cards were made before. With enough words, students will be able to catch the whole picture.
2. Although there are subtitles in the video, some students are reluctant to watch the video. If possible, find a video with both Chinese and English. For the 7<sup>th</sup> graders, the lesson is a little hard.
3. 7<sup>th</sup> graders have few words, but they can use their body languages to express their thinking and opinions. The sentences are not complete, but it doesn't mean they are not good at English. The best thing is that they are willing to try to speak out their opinions in English.
4. Students like to discuss the video with the class, and brainstorm the solution with the class.

##### II. After the class

1. Students get the point that climate change impacts our ocean a lot, and start to change their customs in the daily life. For example, they take their own bottles to school, or use less plastic. For some, they even donate second hand clothes to those who are in need. They know there is only one Earth, and all of us have

the duty to protect it.

2. Some students think the K-W-L chart is a good resource to help learn something new in every field. For example, before they study history, they write down what they learned and guess what they are going to learn. It is a reasonable way to organize information and train the way of thinking logically.

#### 教學省思、成長與建議

Although Taiwan is surrounded by the ocean, most students know little about the marine. The word “ocean” only means beaches and vacation for them. However, at school, teachers have the responsibility to have students understand the ocean and solve the problems the oceans face.

During the class, when we talked about coral bleaching, it may not be their first time to hear the word, but they know nothing about the reason. It seems a distant question for them. After knowing how climate change destroys the ocean life, students understand the serious problem of coral bleaching.

In the future, schools and teachers can merge some ocean topics into the lesson, and let students know some basic concepts of the marine. It can also interest students about the marine.

### (五) 附錄

#### 附錄資料

一、附錄清單說明：

(一)學習單：一份

(二)評量工具：一份

二、附錄內容：

(一)學習單

What is coral bleaching?↵	What can cause a coral reef to bleach?↵	Where can we find coral bleaching?↵
Please draw the healthy coral reef in the video.↵	<b>Exploring Coral Reefs</b> ↵	Please draw the coral bleaching in the video.↵

**Brainstorm**↵

Is there anything we can do to stop coral bleaching? Can coral reefs get healthy again?↵  
Why are coral reefs important to the Earth?↵

↵  
↵  
↵  
↵  
↵

(二)評量工具：一份

What do I know before the video?	What do I want to know?	What do I learn from the reading?