

自然領域教學單元案例

領域	自然科學領域		設計者	林雨慶、林怡伶、陳美卿
實施年級	六年級		總節數	4 節
單元名稱	第一單元活動 1 大氣中的水		教材來源	南一版
教學內容				
第一節	介紹雲和霧的成因，知道他們都是水蒸氣遇冷變成液態的水，但形成高度、位置不一樣。			
第二節 第三節	藉由實驗模擬雨、露、霜、雪的成因，知道他們都是水蒸氣遇冷而變成的，並發現露和霜的行程溫度不同。			
第四節	介紹大自然中水的循環過程。			
設計依據				
學習重點 Learning focus	學習內容 Learning content	INd-III-11 海水的流動會影響天氣與氣候的變化。氣溫下降時水氣凝結為雲和霧或昇華為霜、雪。 INd-III-12 自然界的水循環主要由海洋或湖泊表面水的蒸發，經凝結降水，再透過地表水與地下水等傳送回海洋或湖泊。	核心素養 Essential literacy	自-E-A1 能運用五官，敏銳的觀察周遭環境，保持好奇心、想像持續探索自然。 自-E-A2 能運用好奇心及想像能力，從觀察、閱讀、思考所得的資訊或數據中，提出適合科學探究的問題或解釋資料，並能依據已知的科學知識、科學概念及探索科學的方法去想像可能發生的事情，以及理解科學事實會有不同的論點、證據或解釋方式。
	學習表現 Learning behavior	tr-III-1 能將自己及他人所觀察、記錄的自然現象與習得的知識互相連結，察覺彼此間的關係，並提出自己的想法及知道與他人的差異。		
跨域連結		英文領域		
學習目標 Learning objectives	<p>By the end of the course, students will be able to</p> <p>1-1能說出雲和霧的成因和不同之處。 Identify the causes and differences between cloud and fog.</p> <p>1-2 能解釋雨、露、霜、雪的成因。 Explain the causes of rain, dew, frost and snow. 能時做露和霜的實驗，並發現露和霜的形成溫度不同。 Operate the experiment of dew and frost, discovering the difference of the temperature when dew and frost are formng. 由實作說明水凝固成冰的過程 Explain the process of water condensation by experiment</p> <p>1-3 介紹大自然中的水循環</p>			

	Introduce the water cycle
教學設備 / 資源 Teaching aids/ sources	Videos [The water cycle] (0:00-2:15') https://www.youtube.com/watch?v=ncORPosDrjI
語言學習目標	Language <i>of</i> learning
	雲(cloud)、霧(fog)、雨(rain)、露(dew)、霜(frost)、雪(snow)、水蒸氣(vapour)、溫度(temperature)、型態(form) 蒸發(evaporate)、凝結(condensate)、凝固(precipitate)、融化(melt)、降水(precipitation)、匯集(collection)

教學活動設計 Teaching activities design			
教學目標 Teaching objectives	主要問題與引導 Main questions and guides	時間 time	評量重點 Evaluation points
能說出大氣的水如何受溫度影響而改變型態 (explain how the temperature affect the water in atmosphere to change the forms) 能理解並說出雲、霧等與水的不同 (explain the difference between water, cloud and	<p style="text-align: center;">First class</p> <p>1-1 雲和霧 Cloud and Fog</p> <p style="text-align: center;">【Engage 參與】</p> <p>一、問題一：在自然界中哪裡可以看到水？ Where can you see water in nature?</p> <p>二、問題二：當溫度不同時，水的型態有什麼變化？ When the temperature is different, how does the type of water change? What changes of the water in atmosphere will happen when the temperature is changing?</p> <p>結論：大氣中的水會有水、雲、霧、露、霜、雪等各種不同的形態在大氣中變化 The water in atmosphere has a variety of different forms like water, cloud, fog, dew, snow, etc., which will change in atmosphere</p> <p style="text-align: center;">【Explore 探索】</p> <p>一、雲和霧的模擬實驗 (一) 將熱水倒入 100 毫升的量筒中，並用冰袋蓋住量筒，再插入點燃的線香使他產生煙粒。 Put hot water into a 100 ml graduated, cover the graduated with an ice pack, and insert the ignited</p>		Students can identify the definition of water, cloud, fog, dew, snow, etc.

fog)	<p>incense stick to make smoke particles. (二) 將冰袋完全蓋住量筒上方。 Cover the top of the measuring cylinder completely with the ice pack. (三) 移去冰袋後觀察人造雲霧。 Observe the artificial cloud after removing the ice pack.</p> <p style="text-align: center;">【Explain 解釋】</p> <p>一、根據實驗結果，雲和霧是如何形成的？ According to the experimental results, how do clouds and fog form?</p> <p>◇ 雲 cloud 高空中的水蒸氣附著在凝結核(灰塵、鹽粒、煙粒等微小顆粒)上，凝結成小水滴飄浮在空中，這些看的見的小水滴或冰晶就是「雲」 At high altitude(高海拔), vapour adheres on condensation nucleus and becomes small water drops floating in the air. These visible small water drops or ice crystals are called “cloud”</p> <p>二、量筒內為什麼要加熱水？ Why is there hot water in the measuring cylinder?</p> <p>三、冰塊的目的為何？ What is the purpose of the ice?</p> <p>四、實驗中的線香煙粒有什麼作用？ What is the role of the mitochondria in the experiment?</p> <p>◇ 凝結核 condensation nucleus 水蒸氣冷卻凝結為小水滴時，空氣中的微小顆粒供水蒸氣附著 When vapour cool down and condense to small water drops, the tiny granule will let vapour to adhere</p> <p style="text-align: center;">【Evaluate 評量】</p> <p>一、請完成習作第三頁。 Please finish the third page of the workbook.</p>		
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Second class & Third class

1-2 雨、露、霜、雪 Rain, frost, dew and snow

【Engage 參與】

一、問題一：查一查，雨、露、霜、雪的形成原因為何？
What are the causes of rain, dew, frost, and snow?

- ◇ 雨 rain
當空中的小水滴聚集變大而變重後，便會掉落到地面，形成雨
When the small water drops in the air gather together and become big and heavy, they will fall down on the ground as rain
 - ◇ 雪 snow
雲中的冰晶在掉落地面過程中，如果沒有融化，直接落到地面，就是下雪
In the process of ice crystal in the clouds falls to the ground, if it doesn't melt and fall to the ground directly, it is called snow
 - ◇ 露 dew
夜晚時，空氣接觸到溫度較低的物體或葉子，這時空氣中的水蒸氣會在物體或葉子上凝結成小水滴，形成露
When the air touches the objects which is lower temperature or leaves at night, the vapour in the air will condense to dew on these objects or leaves
 - ◇ 霜 frost
空氣中的水蒸氣遇到非常冷的地面物(低於 0°C)，就會形成碎冰狀的結晶，就是霜
The vapour will becomes fragmental crystals when it touches the objects on the ground which are very cold (below 0 degree Celsius)
- 二、問題二： 什麼原因會造成水有那麼多變化？
What causes so many changes in water?
形成時的溫度和位置
The temperature and location when it is forming

Students can understand the reason of lowering the temperature with salt

Students could explain the differences between different forms of water

Students can conduct the experiment correctly

Students can tell the differences between liquid and solid water

<p>Students understand the process of water cycle and know how it works</p>	<p>◇ 露和霜都是水蒸氣變成的，但是形成時的溫度不同，型態也不同。 Both dew and frost are made by vapor, However the temperature of forming and the forms are different</p> <p>◇ 水有各種不同的形態 固態：霜、雪 液態：雨、露 water has different forms -solid state: frost and snow -liquid state: rain and dew</p> <p style="text-align: center;">【Explore 探索】</p> <p>一、露和霜的製作 Making of dew and frost (一) 在鋼杯中倒入 150 公克的冰和些少許水。 Put 150 grams of ice and some water in a steel cup. (二) 加入 50 公克的鹽巴。 Add 50 grams of salt. (三) 觀察杯子的外壁。 Observe the outer wall of the cup.</p> <p style="text-align: center;">【Explain 解釋】</p> <p>一、問題一：什麼在杯子內加鹽可以降溫？ 因為鹽溶解時會吸熱，可以讓杯子內的水溫下降，使空氣中的水蒸氣在杯壁上凝固成類似霜的東西 Why adding salt in the cup can lower the temperature? Because the salt can absorb the heat when it is melting, which can decline the temperature in the cup. And it can make the vapor in the air to condensate as something like frost on inside of the cup.</p> <p>二、從實驗中你可以發現水有什麼型態變化？ What kind of changes can you find from the experiment? 水的溫度 the temperature of water 當水的溫度在 0°C 到 100°C 之間就是液態的水 當水的溫度降到低於 0°C 就會形成固態的水 When the water's temperature is between 0°C to 100°C, it is liquid water</p>	<p>Students can explain the water cycle by themselves or with the picture</p>
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When the water's temperature is lower than 0°C, it is solid water

【Evaluate 評量】

一、請完成習作第四頁。

Please finish the fourth page of the workbook.

Fourth class

1-3 水的循環 water cycle

【Engage 參與】

請仔細觀看影片，並在影片後回答老師問題

Please watch the video carefully and answer the teacher's questions after the video



[The water cycle] (0:00-2:15')

<https://www.youtube.com/watch?v=ncORPosDrjI>



【Explore 探索】

一、問題一：從影片中，我們可以知道水有不同的形態改變，請問這些變化是如何產生的？

From the film, we can know that water has different forms of changes. How do these changes occur?

【Explain 解釋】

二、問題二：請用簡單的句子描述出水在自然界中的循環？

Please describe the circulation of water in nature in simple sentences?

1. 蒸發 Evaporation

海面和河面上的水蒸發成水蒸氣

Water in ocean and river evaporate into vapour

2. 凝結 Condensation

水蒸氣遇冷變成小水滴或冰晶

Vapour condense into small water drops or ice crystals when it becomes cold

3. 降水 Precipitation

小水滴或冰晶合併變重，落下形成雨或雪

small water drops and ice crystals combine together and become heavy, falling down and becoming rain or snow

雨：雨水匯集成河流

雪：雪融化匯集成河流

Rain: the rain **collects** and becomes river

Snow: the snow will **melt** and collect to become river

4. 匯集 Collection

在地表的水會形成河水或冰，或滲入地下，重新流入大海中

The water on the ground will become river, ice or seep into the underground and flow into ocean again

◇ 溫度的變化使水不斷重複蒸發、凝結、凝固和融化，這個過程就是水循環

The changes of temperature make water evaporate, condensate, precipitate and melt again and again, and this process is water cycle

【Evaluate 評量】

一、請完成習作第一單元。

Please finish the Unit one of the workbook.