

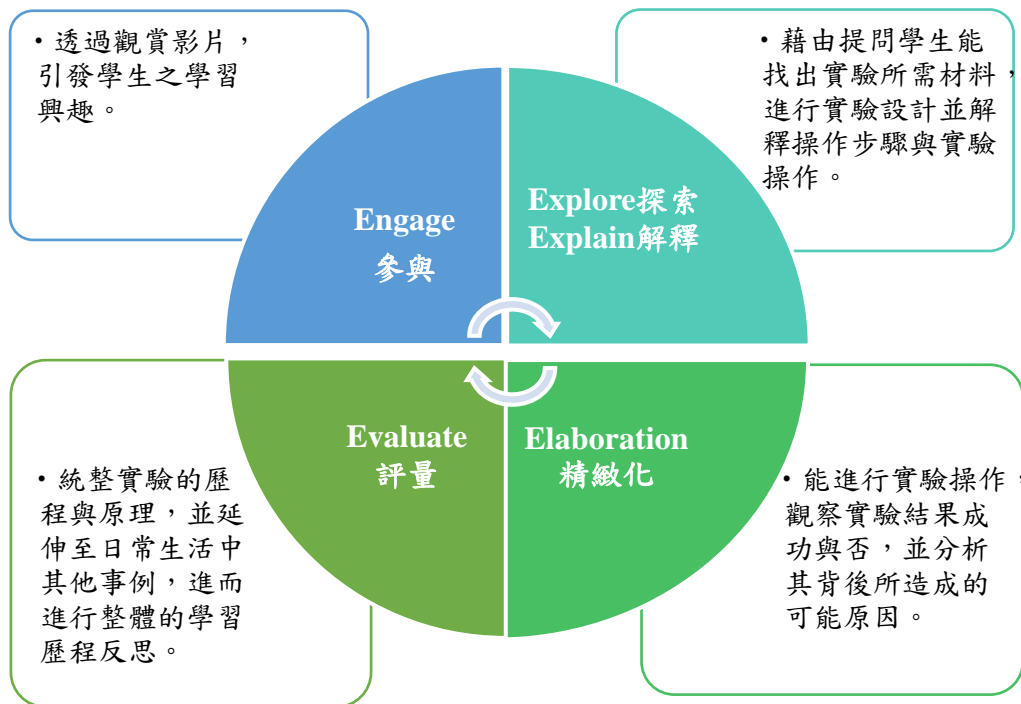
活動名稱：《觀測太陽》

一、教學設計理念說明：

本活動主旨在培養學生具有觀測太陽位置的能力，引導學生可具體指出時間、太陽高度角與影子變化的關聯性。由喚醒學生日常生活中觀察太陽與影子的經驗，帶領學生探究各種透過影子間接測量太陽方位與高度角的方法。本節主要探討概念如下：

1. 一天之中，太陽在天空中方位的變化是由東向西移動，正午在正南方。
2. 一天之中，影子的長度由長變短，再由短變長；太陽的位置與影子的位置相反。
3. 一天之中，太陽在天空中高度角的變化是呈現由小到大，再由大到小的變化。

二、教學概要：

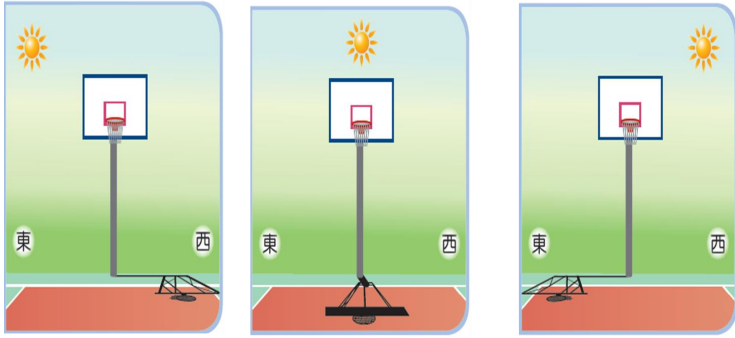


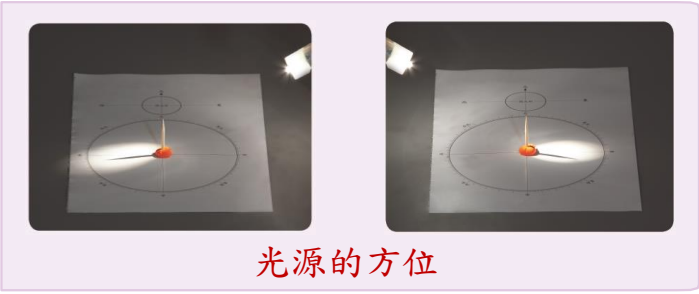
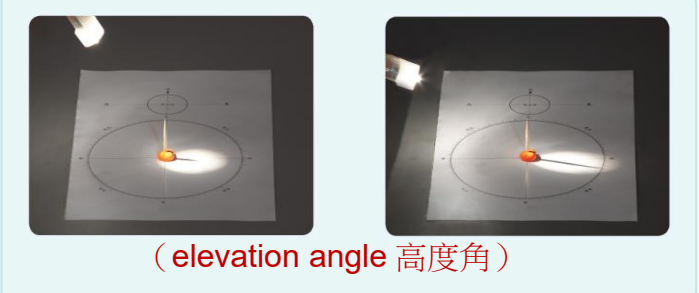
三、活動設計

領域	自然科學領域		設計者	陳宜君、陳美卿
實施年級	五年級		總節數	共 2 節
活動名稱	觀測太陽 Let's observe the sun!		教材來源	南一版
教學內容				
本節	<ol style="list-style-type: none"> 1. 引導學生觀察白天竿影的變化，推論太陽在空中有方位和高度角的位置變化。 2. 引導學生探究各種利用影子觀測太陽的方位和高度角的方法。 			
設計依據				
學習重點	學習內容	INC-III-13 日出日落時間與位置，在不同季節會不同。	核心素養	自-E-A3 具備透過實地操作探究活動探索科學問題的能力，並能初步根據問題特性、資源的有無等因素，規劃簡單步驟，操作適合學習階段的器材儀器、科技設備及資源，進行自然科學實驗。
	學習表現	tm-III-1 能經由提問、觀察及實驗等歷程，探索自然界現象之間的關係，建立簡單的概念模型，並理解到有不同模型的存在。		
跨域連結	英文領域			
學習目標	<ol style="list-style-type: none"> 1. 學生能透過觀察白天竿影的變化，推論太陽位置與影子的關係。 2. 利用知道方位和高度角，來描述太陽在天空中的位置。 			
教學設備／資源	Videos, PPT, direction sheet(方位板), Straw holder (底座), compass(指北針), ruler(尺), set square(三角板), flashlight (手電筒)			
語言學習目標	Language <i>of</i> learning			
	<p>E-1 vocabulary: observation 觀察、shadow 影子、elevation angle 高度角、east 東、west 西、south 南、north 北。</p> <p>E-2 The shadow moves from <u>west</u> to <u>east</u> throughout the day. 一天中影子的位置由西往東移動。</p> <p>E-3 The shadow goes from <u>long</u> to <u>short</u> and back to long throughout the day. 一天中影子的長度由長變短，再由短變長。</p> <p>E-4 The sun and shadow are in <u>opposite</u> positions. 太陽的位置與影子的位置相反。</p>			

Language <i>for</i> learning	
教師用語 For teachers	學生用語 For students
I. <u>Academic English:</u> ● How does the shadow change from the morning to the afternoon? II. <u>Classroom English</u> ● What did you learn? ● What happened? ● What did you observe?	1. The shadow moves from _____ to _____. 2. The shadow changes from _____ to _____. 3. In the morning/At noon/In the afternoon, the shadow is longer/shorter and points west/north/east. 4. It's because _____. 5. I think _____ because _____. 6. I observed _____.

教學活動設計

教學目標	主要問題與引導	時間	評量重點
學生能透過觀察白天竿影的變化，推論太陽位置與影子的關係。	1st Course 【Engage 參與】 Warm Up : Teacher asks questions. 1. Why can't we observe the sun directly? 2. How can we observe the sun? https://www.youtube.com/watch?v=fy7eoMef3e8	5'	Students can share their ideas.
	【Explore 探索】【Explain 解釋】 Development Activity 1: 1. What do you observe? 	10'	Students can observe and share their ideas.
	➤ Does the sun always in the same position(位置) during		

<p>學生能透過操作，了解太陽位置與影子的關係。</p> <p>知道利用方位和高度角，來描述太陽在天空中的位置。</p>	<p>the day?</p> <ul style="list-style-type: none"> ➤ Does shadow always point the same direction(方向) ? ➤ Does shadow has the same length(長度) under the sun? <p>Development Activity 2:</p> <ol style="list-style-type: none"> 1. Teacher’s demonstration: Use straw hlder, flashlight to demonstrate the relation between shadown and light. <div style="text-align: center;">  <p>光源的方位</p>  <p>(elevation angle 高度角)</p> </div> <ol style="list-style-type: none"> 2. Have students share their ideas: <ul style="list-style-type: none"> ➤ When the light comes from east, the shadow points west. ➤ When the light comes from west, the shadow points east. <p>Conclusion: The light and shadow are in oppisite positions.</p> <ul style="list-style-type: none"> ➤ The shadow goes from <u>long</u> to <u>short</u> and back to long throughout the day. <p>Development Activity 3:</p> <ol style="list-style-type: none"> 1. Play the video: Sun's shadow time lapse https://www.youtube.com/watch?v=3B7KLstUZbl 	<p>12’</p> <p>7’</p>	<p>Students can explore the activity.</p> <p>Students can observe the process.</p>
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	<p>➤ What happened?</p> <p>a) In the morning, the shadow is longer and points west.</p> <p>b) At noon, the shadow is shorter and points north.</p> <p>c) In the afternoon, the shadow is longer and points east.</p> <p>➤ The length of shadow changes with the elevation angle:</p> <p>a) When the light (sun) comes from higher elevation angle, the shadow is shorter.</p> <p>b) When the light (sun) comes from lower elevation angle, the shadow is longer.</p> <p style="text-align: center;">【Evaluate 評量】</p> <p>Summary Activity:</p> <ol style="list-style-type: none"> 1. Have students share their findings for today's class. 2. Finish workbook page 3. <p>2nd Course</p> <p style="text-align: center;">【Engage 參與】</p> <p>Warm Up : Teacher ask questions for a quick review.</p> <ol style="list-style-type: none"> 1. What did we learn last time? 2. What can we do to observe the sun? 3. Can we tell the position of the sun by observing the shadow? Why? <p style="text-align: center;">【Explore 探索】 【Explain 解釋】</p> <p>Development Activity: Let's observe the sun.</p> <ol style="list-style-type: none"> 1. Teacher leads the students to make sun observers: <ol style="list-style-type: none"> a) Place the direction sheet on the table. b) Align the directions in the sheet with those the compass. c) Tape the compass onto the sheet. d) Have the stick firmly fixed in the middle by using 	<p>6'</p> <p>15'</p> <p>10'</p>	<p>Students can make conclusions for today's class and finish the worksheet.</p> <p>Students can recall what they have learned.</p> <p>Students can follow teacher's guide to make sun observers.</p>
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	<p>the clay.</p> <p>e) Use a set square to make sure the stick is vertical to the direction sheet.</p> <p>f) Record the endpoint of shadows and times at different times of the day.</p> <p>g) Draw lines from the central point to the endpoints of the shadow at different times.</p> <p>2. Have students discuss and share their observation:</p> <p>a) What have you found?</p> <p>b) T: Does the length of the shadow changes from the morning to the afternoon? S: The shadow changes from <u>_long_ to _short_</u>, and back to <u>_long_</u> in the afternoon.</p> <p>c) T: In what direction does the the shadow move? S:The shadow moves from _____ to _____.</p> <p>d) What’s the relation between the length of the shadow and the elevation angle of the sun? (The shorter the shadow is, the greater the elevation angle is.)</p> <p style="text-align: center;">【Evaluate 評量】</p> <p>Summary Activity:</p> <ol style="list-style-type: none"> 1. Have students share their findings for today’s class. 2. Finish activitybook page 4. <p style="text-align: center;">~The End ~</p>	<p>8’</p> <p>7’</p>	<p>Students can share their findings.</p> <p>Students can make conclusions for today’s class and finish the worksheet.</p>
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參考資料

- **Sun's shadow time lapse**
<https://www.youtube.com/watch?v=3B7KLstUZbl>
- Sidewalk Shadows(有字幕)
https://www.youtube.com/watch?v=YvnQFGP_k4E
- <https://www.generationgenius.com/>
<https://www.tigttagworld.com/clil>

Sun and shadow

Name: _____

◆ What do you observe?



Questions	Answer
➤ Does the sun always in the same position(位置) during the day?	<input type="checkbox"/> YES <input type="checkbox"/> NO
I observed the sun moves from _____ to _____ throughout the day. (east,west)	
➤ Does shadow always point the same direction(方向) ?	<input type="checkbox"/> YES <input type="checkbox"/> NO
I observed the shadow moves from _____ to _____ throughout the day. (east,west)	
➤ Does shadow has the same length(長度) under the sun?	<input type="checkbox"/> YES <input type="checkbox"/> NO
I observe the shadow goes from _____ to _____ and back to <u>long</u> throughout the day. (long,short)	