自然科學部分雙語課程設計

單元名稱	第二單元－空氣占有空間，沒有固定形狀		
領域類別	自然科學	教案設計	郭婉容
教學對象	三年級	教學節次	2 節/每節 40 分鐘
教學目標	1.透過實驗證明空氣占有空間。 2.知道空氣和其他物質一樣占有空間、具有重量。 3. 觀察物品充氣前後的變化，了解空氣的形狀會隨著容器改變。		
學習內容	INa-Ⅱ-2 在地球上，物質具有重量，占有體積。		
學習表現	pe-II-2 能正確安全操作適合學習階段的物品、器材儀器、科技設備及資源，並能觀察和記錄。 pa-II-2 能從得到的資訊或數據，形成解釋、得到解答、解決問題。並能將自己的探究結果和他人的結果（例如：來自老師）相比較，檢查是否相近。		
核心素養	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。		
議題融入	科技教育 E2 了解動手實作的重要性。		
學科英語	空氣 air、佔有空間 takes up space		

教學活動	教學資源	評量方式
第一節開始 引起動機:（5’） 複習物質的定義。 T: Last time we talked about matters. What’s matter? Ss: 占有空間，具有質量。 T: Matter has mass and takes up space. We use balance to prove that air has mass. Today we are going to figure out whether air takes up space. 教師拿出海綿及塑膠袋，詢問學生這兩項物品是否含有空氣? T: Is there air inside the bag? Ss: Yes,…. /No,….. / I don’t know. T: Is there air inside the sponge? Ss: Yes,…. /No,….. / I don’t know. T: How do you know? Ss: Free response. T: Air is everywhere. 發展活動:（30’） 1.請問紙團塞入杯中，垂直放入水缸中，再垂直拿出，紙團會濕嗎?。 T: Make a guess- Put a paper ball in the bottom of the	海綿 塑膠袋 塑膠杯 紙團 水缸	口頭評量 實作評量

cup. Place the cup upside down, then put it into water straightly, and then take it out straightly. Will the paper ball get wet? Ss: Yes, because you put it into water. /No, because there's air in the cup. / Free response. T: Let's find out. (Teacher demonstrates.) Does paper ball get wet? Ss: No! Why? T: Let's find out the answer by yourself. Group leader, please come out to get cups. (Step 1) Please take a piece of paper and make it into a paper ball. (Step 2) Put the paper ball at the bottom of the cup. (Step 3) Place the cup upside down, make sure your paper ball won't fall. (Step 4) Put it into water straightly, and then take it out straightly. T: Does your paper ball get wet? Ss: No./ Yes. /本來沒濕，但我放斜的之後就濕了/ Free response. T: Please do it again. This time take a closer look at your cup. T: Why did or didn't your paper ball get wet? Ss: There's air. /Water goes in. /Free response. T: This time I want you leaning your cup into water. What happened? Ss: Paper ball gets wet. /Water goes in. / 有泡泡 T: Good observations. When you put the cup into water, what do you feel? / What do you see? Ss: 需要用力才能壓下去 /冒泡泡 /Free response. T: Great! Your paper ball didn't get wet because there's air inside. Air takes up space, so water can't get in. If you didn't do it straightly down and up, then air come out as bubbles, then water can get in.	水	
2.為什麼用打氣筒打氣，氣球會越來越大? T: Use a balloon pump to pump up a balloon. Why does balloon get bigger? Ss: 因為你打更多氣進去/ 因為空氣變多了/ Free response. T: Balloon gets bigger because air takes up space. If you pump more air in, the size will become bigger.	氣球 打氣筒	實作評量

綜合活動:(5’) 1.日常生活中還有哪些空氣占有空間的例子? T: Can you give me some examples that air takes up space in our daily life? For example, down jacket takes up space, we can squeeze out the air to make it smaller and easier to store. Ss: 睡袋/ 羽絨被/ 造型氣球/ 游泳圈/ Free response. 2. 結論－空氣占有空間，且具有質量，空氣也是物質。 T: We have done the experiment to prove that air has mass last time. Today we did the experiment to prove that air takes up space. Is air matter? Ss: Yes, air has mass and takes up space. T: All matters take up space and have mass. 第一節結束 - 第二節開始 引起動機:(5’) 老師手拿造型氣球，問學生為什麼可以用氣球做出各種不同造型? T: Look at this balloon dog. Why can I change the shape of a balloon? Ss:氣球可以折/ 裡面有空氣/ Free response.	羽絨外套 造型氣球	口頭評量 口頭評量
發展活動:(34’) 1.觀察不同物品，發現空氣沒有固定形狀。 T: Can you change the shape of air? Ss: Yes, …. / No, …. / Free response. T: Check these items. You could look, press, punch, or feel whether there’s air inside or not. T: Is there air inside? Ss: Yes. There’s air inside. T: So, can you change the shape of air? Ss: Yes! 空氣沒有固定形狀，會隨著容器而改變形狀。 T: That’s right. Air does not have a solid shape. It will change the shape with containers.	寶特瓶 沙灘球 球	口頭評量
2.將不同形狀的氣球打氣，利用長形氣球做造型氣球。 T: Group leader, please come out to get balloons and balloon pumps. Use balloon pump to pump up the round	氣球 打氣筒 PPT	實作評量

balloon first. T: Please squeeze the balloon. Can you change the shape of it? Ss: Yes. T: Why you can change the shape? Ss: 空氣沒有固定形狀，會隨著容器而改變形狀。 T: That’s right. Air does not have a solid shape. It will change the shape with containers. T: Let’s make a balloon sword together. (Step 1) Pump the balloon and tie it off, leaving a 2 cm uninflated tip at the end. (Step 2) Make a basic twist about 10 cm from the balloon’s knotted end. After twisting it, you will need to keep hold of it so it does not untwist. (Step 3) Bend the second segment of the balloon at about the 6 cm mark to make a fold twist. After folding the balloon 6 cm from the first twist, twist the folded segment with the first twist. (Step 4) You have just twisted one-half of the handguard for the sword. You should have a short section of the handle, one-half of the handguard, and the long shaft. (Step 5) Fold the balloon again 6 cm from the first fold. Twist a second fold twist the same size as the first one to create the second part of the handguard. 綜合活動:(1’) 結論－空氣沒有固定形狀，會隨著容器而改變形狀。 T: What do you learn for this period? Ss: 空氣沒有固定形狀，會隨著容器而改變形狀 T: Great! Air does not have a solid shape. It will change the shape with containers. 第二節結束	（參考資料 造型氣球教學）	口頭評量