

高雄市 115 年度第 45 屆國民中小學科學園遊會 高雄市大寮區忠義國小
The 45th Kaohsiung Primary and Junior High School Science Fair
Zhongyi Elementary School in Daliao District, Kaohsiung

「大」家「港」快來，「橋」見高雄之美！

Hurry up! Let's See the Beauty of Kaohsiung:

Da Vinci's Bridge!



◇ 指導老師：侯雅婷、夏宇彤、黃文玉、黃以周

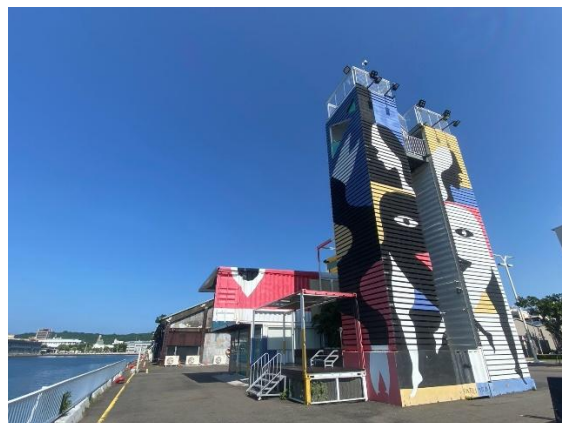
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一、活動主旨 Activity Objectives

本次科學闖關活動設計，靈感來自高雄的著名景點——駁二藝術特區的大港橋。很多學生會向老師或同學分享週末去駁二走走，覺得大港橋很壯觀的感受。另外，在港邊散步時，會看見很多遊艇、輪船、貨櫃等海港特色。

因此，我們將結合學生在自然課堂對「達文西橋」的興趣，並在這次科學闖關的情境中，融入港灣的特色，搭建「達文西橋」，以此喚起大家對高雄的城市記憶、引起孩子的好奇心，讓學生在活動中，一邊欣賞高雄的美，一邊探究達文西橋的結構、承重力、穩固性。



(以上照片皆為實際現場拍攝 All photos were captured on-site during the actual event.)

Inspired by the architectural landmark of the Great Harbor Bridge and the maritime scenery at The Pier-2 Art Center in Kaohsiung, this science challenge integrates local urban context with hands-on inquiry. Building upon students' engagement with Leonardo's arched bridge in science class, the activity utilizes the iconic port elements—such as yachts, vessels, and shipping containers—to contextualize learning. By constructing Da Vinci bridges, students connect with their regional identity while empirically investigating structural mechanics, load-bearing capacity, and stability. Ultimately, this initiative fosters scientific inquiry through the appreciation of local culture and engineering aesthetics.

二、活動流程 Activity Procedure

● 達文西橋：探究達文西橋的結構、承重力、穩固性

Da Vinci's bridge in The Pier-2 Art Center - Build It Without Glue!

1. 準備一些相同的冰棒棍

Prepare some popsicle sticks.

2. 搭建達文西橋

Use the sticks to build a Da Vinci's bridge.

3. 準備一些砝碼、電子秤、小貨櫃、小車子等物品（作為承重測量）

Prepare some counterweight, electronic scale, little containers,

4. 💡 思考：達文西橋可以有哪些變化或結構？

Think About It: Can you build the bridge in different ways?

5. 🔍 探究：達文西橋的不同結構或樣態，會如何影響其承重力？

Explore: Which bridge design can hold the most weight?

6. 改變橋的結構或造型，例如延長橋的長度、加入樂高人物等。

Change the structures of the bridge, such as extending the length of the bridge, adding LEGO figures, etc.

三、發現與探究 Discussion and Conclusion

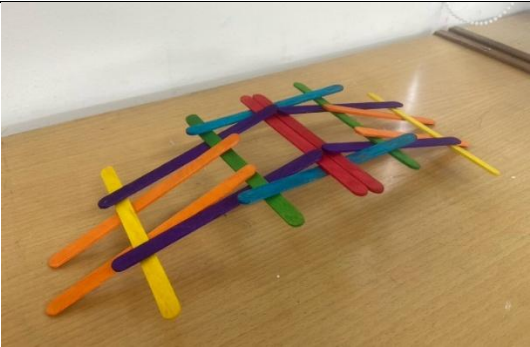
達文西橋是運用冰棒棍之間的摩擦力、重疊方式，來達到支撐和穩固的效果，也不需用膠水等黏著劑來固定連接處，是一種簡便且有趣的搭建橋樑方式。我們實際操作後發現，比想像中還要耐重，可以放非常多的砝碼、小人物、玩具貨櫃、玩具車，甚至是手機、膠帶台等各式各樣的重物，真的好神奇！

為了探究達文西橋的承重，可以嘗試改變結構（例如：改變冰棒棍的寬度、改變冰棒棍的排列密集度或角度、增加冰棒棍的使用根數、冰棒棍改成竹筷等），會發現其穩固性及耐重程度會因而提升或降低。

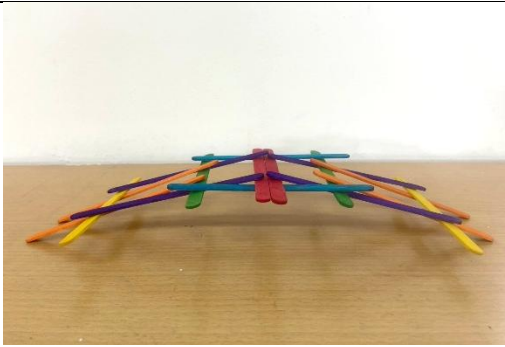
Da Vinci's bridge relies on friction and overlapping patterns among wooden sticks to achieve structural stability without the use of adhesives. Practical testing reveals a surprisingly high load-bearing capacity, capable of supporting various heavy objects such as weights, toy vehicles, and everyday items.

To systematically investigate its load-bearing limit, key structural variables can be manipulated—such as varying stick width, arrangement density, interlocking angles, quantity, or material composition (e.g., substituting with chopsticks). Empirical observations confirm that altering these configuration parameters directly impacts the bridge's overall stability and weight capacity.

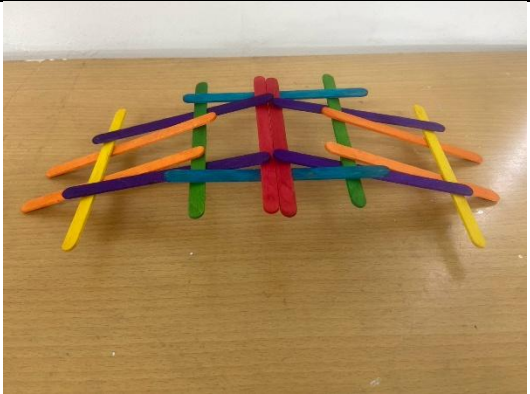
四、作品集 Masterpiece



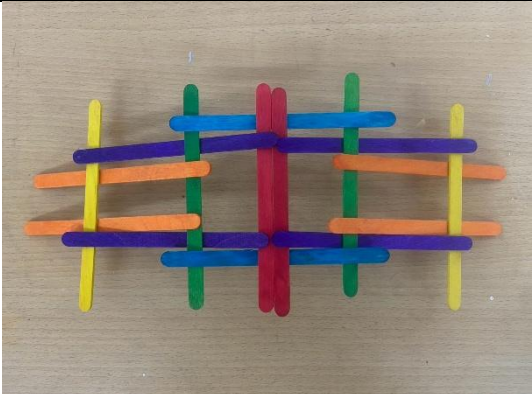
達文西橋：側面圖
Da Vinci Bridge: Side View



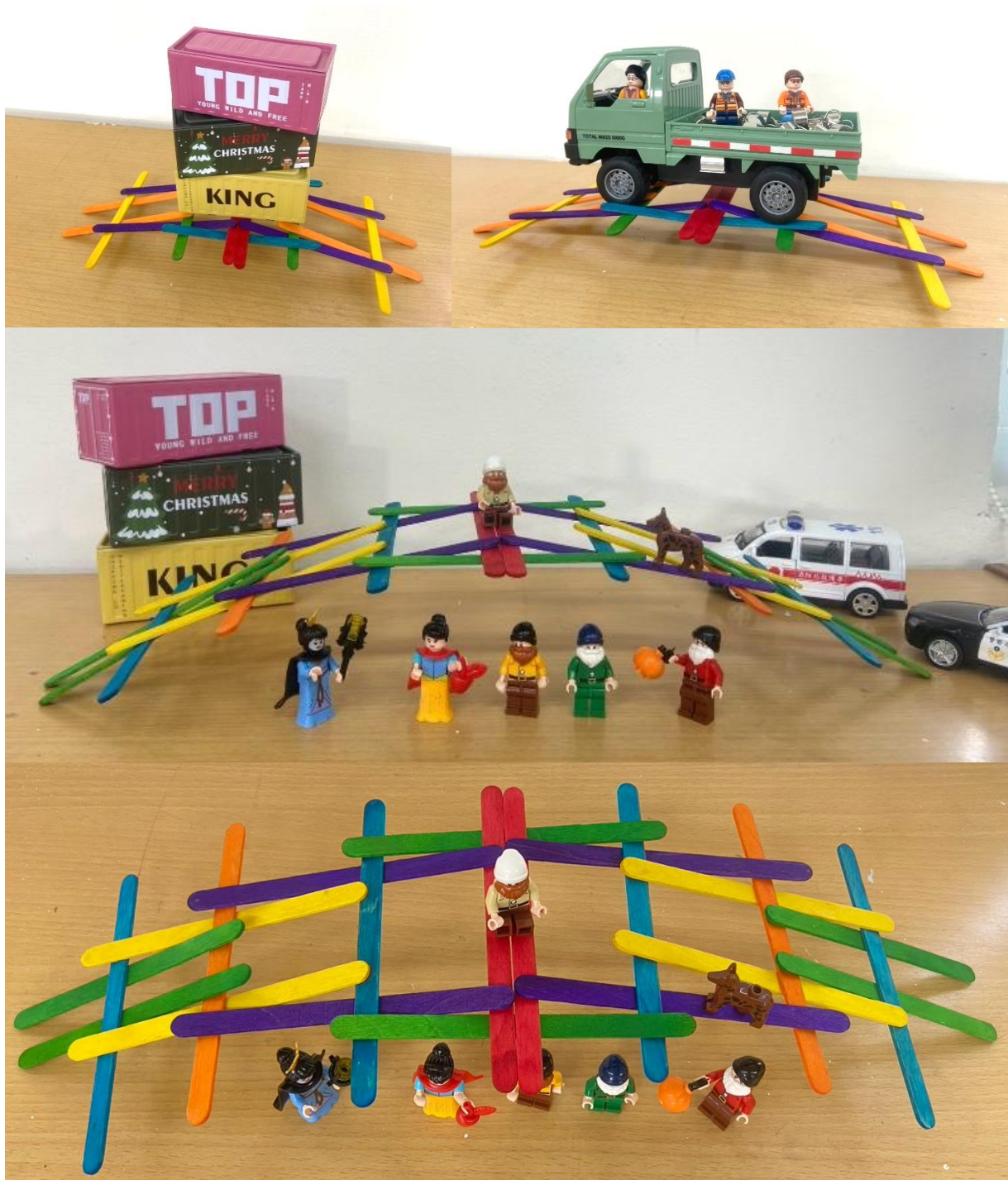
達文西橋：側面圖
Da Vinci Bridge: Side View



達文西橋：正面圖
Da Vinci Bridge: Front View



達文西橋：俯視圖
Da Vinci Bridge: Top View



五、參考資料 References

李劭洋、林弘軒（2019）。達文西橋〔未出版之中小學科學展覽會作品說明書〕。中華民國第 59 屆中小學科學展覽會（國小組 生活與應用科學（二）科），國立臺灣科學教育館。

邱璿綾、林汶靜（2023）。「橋」見摩擦力—探討達文西橋不同結構之形抗結果〔未出版之中小學科學展覽會作品說明書〕。中華民國第 63 屆中小學科學展覽會（國中組／高中組），國立臺灣科學教育館。