

Designing a Bridge 設計橋樑

Purpose of Designing a Bridge

We explored how to design and build a bridge that is strong and innovative. The students started this project with two inquiries - "Build a Straw Bridge", and "Bridge Footing Design." Both inquiries lead to discussions on shapes, materials, length, thickness, and constraints that real life projects face. They also learned about what a force is and how tension (pulling) and compression (squeezing) work in the different types of bridges such as truss, arch, and suspension.

Task

Through our discussions and inquiries the students were given the task to design, create, and test the strongest bridge given limited resources. The design aspect of their bridges was done through multiple steps consisting of pros & cons, individual design and group collaboration. In the creation stage, students were given a set amount of materials, knowing that any mistakes would require them to re-evaluate their direction. Testing was the final and most exciting step for the students. We did the testing by hanging weight from the bridge until it snapped and collapsed. They made estimations beforehand and then compared those to the actual results.

Conclusion

The students had an enjoyable time with their firsthand experience creating and testing different ideas. They also learned how to work together as a team to accomplish the task set forth. This included splitting up responsibilities and making sure everyone in the team was doing their job to the best of their ability.

橋樑設計目的

我們探討如何設計及建造一座堅固又創新的橋。學生們透過兩個問題開始研究這個專題——「搭建稻草橋」和「橋樑基礎設計」。這兩個問題引導學生討論實際生活上遇到的形狀、材料、長度、厚度以及限制問題。他們學習力以及張力（拉力）和壓力（擠壓）如何在不同類型的橋樑中發揮作用，像是桁架、拱橋及吊橋。

任務

透過討論後，學生利用有限的資源開始設計、建造並測試最堅固的橋樑。橋樑的設計是通過許多步驟完成的，包括利弊、個人設計以及小組合作。在建造的階段，學生利用一些材料製作，並清楚知道任何一個錯誤都會需要重新評估建造的方向。測試階段是最後也是最刺激的一步，學生將一些重量放到橋上，直到橋斷裂坍塌。他們事先估計重量，再與實際結果進行比較。

結論

學生親身經歷創造以及測試不同的想法來造橋，並度過愉快的時光。他們學會如何透過團隊合作來完成被指派的任務，包括分工負責，確保團隊中的每個人盡其所能地完成自己的工作。

1 ASK + IMAGINE 提問 + 創思



Students discussed design elements, shapes, and styles of various bridges. 學生討論設計元素、形狀以及各式橋樑的樣式。

4 CREATE 創造



Construction of the bridges with the materials was time consuming and required patience. 造橋耗費時間且要有耐心。

6 PRESENT 展現

Students analyzed on their outcomes and shared their results. They also reflected on improvements to make a stronger bridge. 學生分析並分享結果，更思考如何改進以搭建一座更堅固的橋樑。

3 PLAN 計畫



A cohesive group effort was required for students to maximize their design within the constraints given. 學生需要努力及凝聚力，讓他們在限制下設計出橋樑。

5 IMPROVE 改進



Bridges were adapted and enhanced to provide the best possible results. 將橋樑進行調整和增加強度，以獲得最好的結果。

