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教育應用資訊科技發展研究中心
香港大學　教育學院

In-STEAM
以全方位自主學習推展校本STEAM課程計劃

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優質教育基金
Quality Education Fund

Interactive Session: How to facilitate self-directed learning of students through STEAM education? (Secondary school)

Moderators: Eddy LEE, Rachel KO – The University of Hong Kong;

Cheung Chi Pan, Chan Kam Lung
– **Caritas Yuen Long Chan Chun Ha Secondary School;**
Tse Hoi Ming, Hui Yik On, *Chan Sing Hin Eyton*, Wong Cheuk Nam Marcus**
– **St. Margaret's Co-educational English Secondary and Primary School**

Room 104, 2/F, Runme Shaw Building

03 May 2025

Abstract

Two local secondary schools - **Caritas Yuen Long Chan Chun Ha Secondary School; St. Margaret's Co-educational English Secondary and Primary School** - will share their experiences in developing self-directed learning (SDL) for students through STEAM education. They will present their SDL-STEAM curriculum units and discuss with the audience any questions they have regarding the implementation and outcomes of the learning designs.

兩所本地中學，**聖瑪加利男女英文中小學、明愛元朗陳震夏中學** 將分享他們透過 STEAM 教育培養學生自主學習 (SDL) 的經驗。他們將展示他們的 SDL-STEAM 課程單元和學習設，與予會者討論有關學習設計的實施和成果。

@cys

HOW TO

FACILITATE

Self-Directed Learning of Students through STEAM education?

(Secondary school)

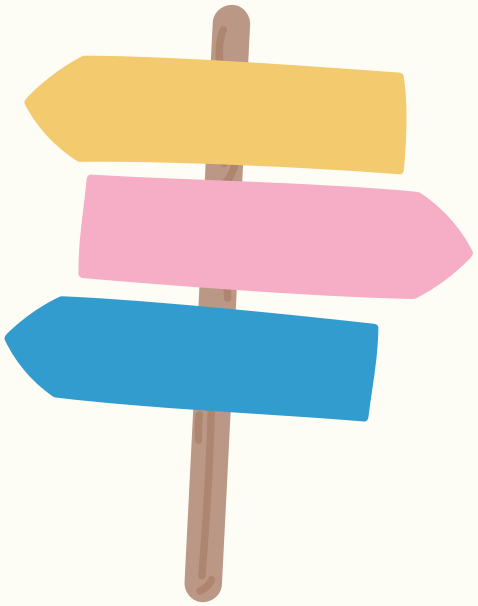
如何透過中學的STEAM教育促進自主學習？

張志斌老師 陳淦龍老師

明愛元朗陳震夏中學
Caritas Yuen Long Chan Chun Ha Secondary School

START PRESENTATION

大綱



- 甚麼是自主學習?
- 甚麼是STEAM教育?
- 學校、教師及學生背景資料
- 教學設計 - 智能家居專題
- 實踐經驗分享與學生成果
- 教師反思
- 總結與問答環節

甚麼是自主學習
Self-directed learning?

逐漸推動

自主學習包括五個學習元素(賽馬會 STEM 自主學習計劃, 2019):

自主學習的元素	描述
設定目標	• 學生辨析個人學習目標及學習活動
自我規劃	• 學生仔細地制訂和計劃與學習相關的決定和安排，例如計劃、製作學習時間表等
自我監控	• 學生管理自己的學習時間 • 學生監管一系列的學習策略 • 學生在學習過程中調整自己的學習路徑
自我評價	• 學生關注評估準則 • 學生能按評估準則小心地評估課業
自我修訂	• 學生根據教師或同儕在不同階段的回饋改進他們的課業 • 學生能反思他們的學習並能應用他們所學的在新的環境

甚麼是STEAM教育?

「香港STEAM教育：中小學教師培訓」政策研究報告:

- “學校要以跨學科方式，把STEM教育的核心元素融入在課堂內外的跨學科「動手」、「動腦」學習活動，讓學生明白理科知識與日常生活息息相關，知識與應用不可割裂，以此培養學生的解難能力、協作能力和創意。“
- 校本課程，模式二「專題為本」實踐
- 加入ART藝術元素，推動學生創意發展

圖片來源：（香港）課程發展議會：《推動STEM教育—發揮創意潛能（概覽）》，2015年11月，頁6。

Interdisciplinary STEM, STEM Integration, Integrated STEM, Integrative STEM 的「跨學科STEM」四個重點:

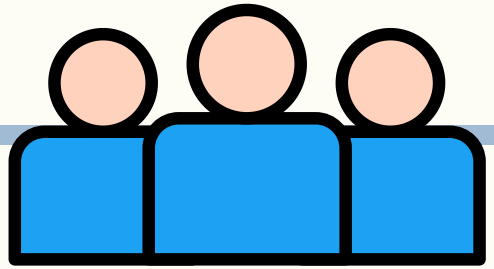
- 解決生活問題，發展學生STEM素養和21世紀技能，引起學生好奇心，培養創意、協作 能力和訓練批判性思考;
- 以主題作連結，運用STEM涉及的四門學科知識;
- 最少綜合兩門學科知識（即跨學科兩門或以上），不屬於STEM範疇的學科也可以;
- 教學法普遍提及主動學習，以學生為中心的教學法，如問題或專題為本的學習法、設計為本的學習法、探究式學習等。

背景資料

學校

- 明愛元朗陳震夏中學
- 獨立成科，創意科技科
- 設有STEAM ROOM
- 設備及工具齊全，例如，多台3D Printer及大型Laser Cutter

教師



- 兩名具資訊科技教育背景的教師
- 一名具設計與科技背景的助教

(工程E、科技T為主)

學生

- 計劃對象為中一級學生
- 3L學生較多(the last, the least, the lost)
- 普遍語文能力較弱
- 抽象/概念化思維較弱
- 動手做的能力及動機較高
- 對於正規學習較為被動

（成績相對較佳的一半同學參與是次計劃）

校本STEAM教育

透過創意科技科的學習達至 STEAM for ALL

創意

解難

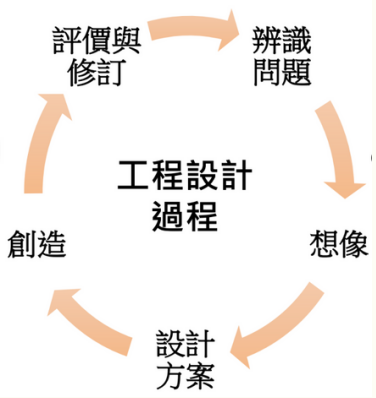
協作

學生經歷

先導

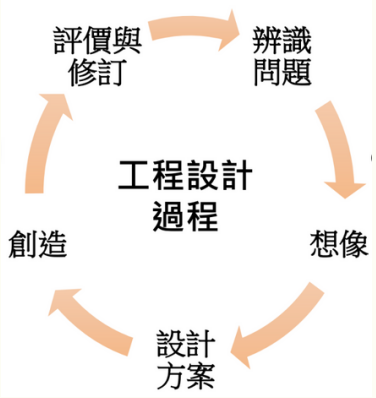
中一級 - 智能家居

(教師提出情景問題)



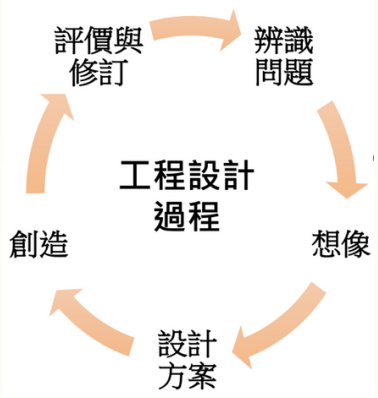
中二級 - 智能農耕/交通

(教師提出情景問題)



中三級 - 智能??

(學生自主提出生活情景問題)



中一級創意科技科

*已有知識(電子、資訊科技及編程)

CH1單元 A Micro:bit 簡介

CH1單元 B Micro:bit 與輸入裝置(內置及外置感應器)

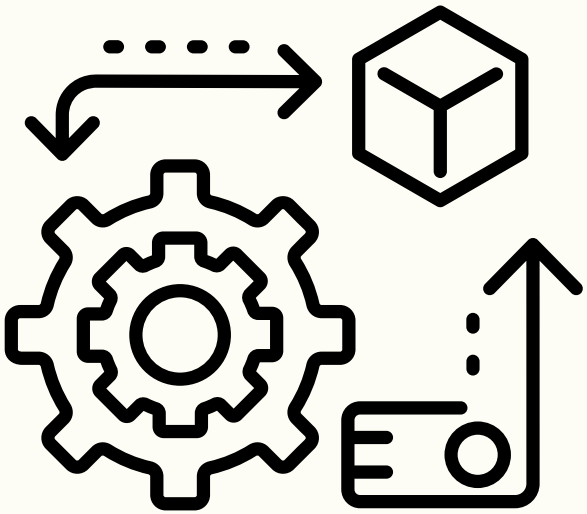
CH1單元C Micro:bit與輸出裝置(揚聲器、馬達及伺服馬達)

CHJ單元D Micro:bit訊號互換溝通

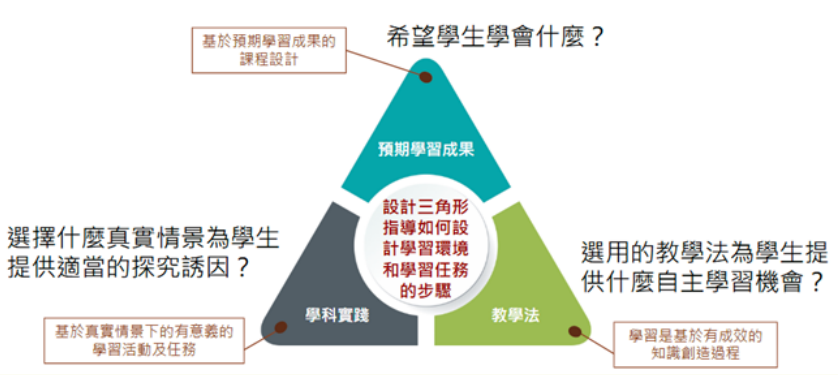
micro:bit	
內置 5 X 5 LED	
內置 麥克風	
內置 蜂鳴器	
內置 溫度感應器	
內置 光感應器	
外接 超聲波感應器	

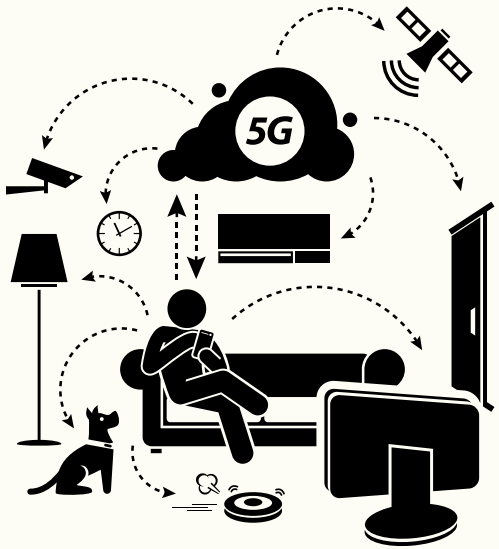
應用於

生活家居解難任務



教學設計三角框架 - 智能家居專題概要





預期學習成果

學生能夠利用課堂所學知識，協助以科技解決生活上不用的困難，從而學習到如何釐清問題，提升解難能力。學生能夠展現以下特質:

- 分析生活情況問題的成因
- 就生活家居的情景問題提出不同可行的解決方法
- 應用科技知識，設計一個智能家居產品原型來解決一個家居問題
  - 設定目標
  - 根據評分準則來不斷修訂自己的原型作品

真實情景

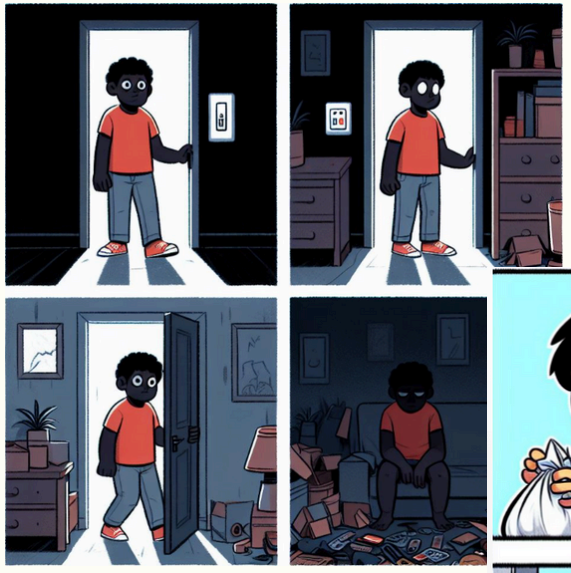
日常生活的家居問題，包括但不限於:
家中太陽西斜導致氣溫上升；難以打開垃圾桶；家中燈光不足導致失足...

教學法

- 小組形式專題研習(自主學習)
- 工程設計循環
- Think-Pair-Share／小組討論
- 動手做

實踐經驗分享 1：
「四格漫畫」切入生活問題　引起學習動機及設定目標

情景A



情景B

情景C

情境 D 你的生活情景 (獎勵分)

教師評分/評語

試從你日常生活當中，找出一個影響你生活素質的家居問題。

文字描述:

實踐經驗分享 1：
「四格漫畫」切入生活問題　引起學習動機及設定目標

第一階段：問題分析

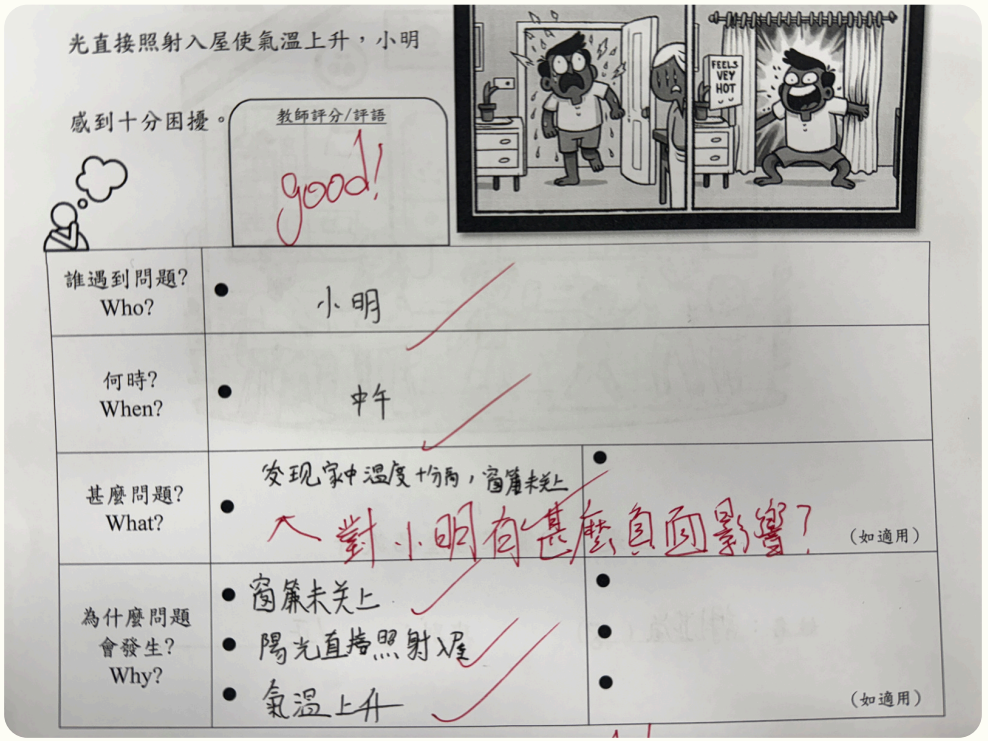
請細閱以下漫畫情境，分析漫畫中角色所遇到的問題。

情境 A

當小明在一烈日當空的中午回到家中，發覺家中溫度也十分高，細察之下才發現窗簾未有關上，以致陽光直接照射入屋使氣溫上升，小明感到十分困擾。

教師評分/評語

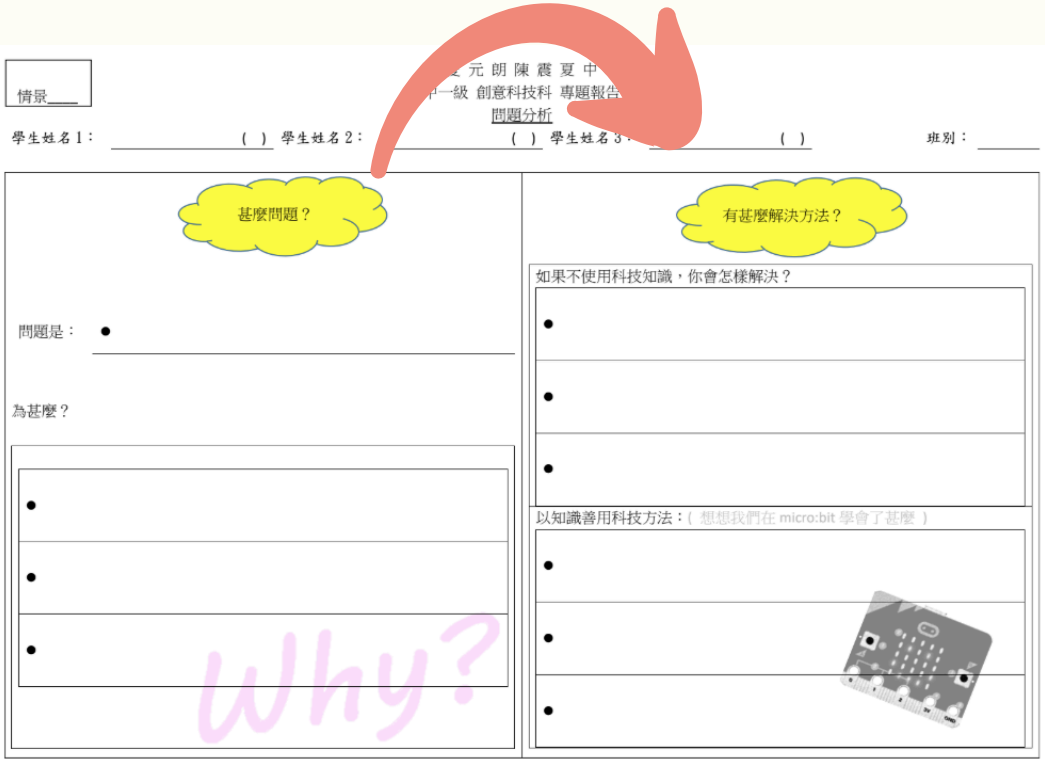
誰遇到問題? Who?	•	
何時? When?	•	
甚麼問題? What?	•	• （如適用）
為什麼問題會發生? Why?	• • •	• • • （如適用）



技巧：利用wh問題，讓同學自行預習及初步了解及分析各個情景的問題

實踐經驗分享 2：
利用Padlet 腦力激盪　紀錄解難過程及強化朋輩學習

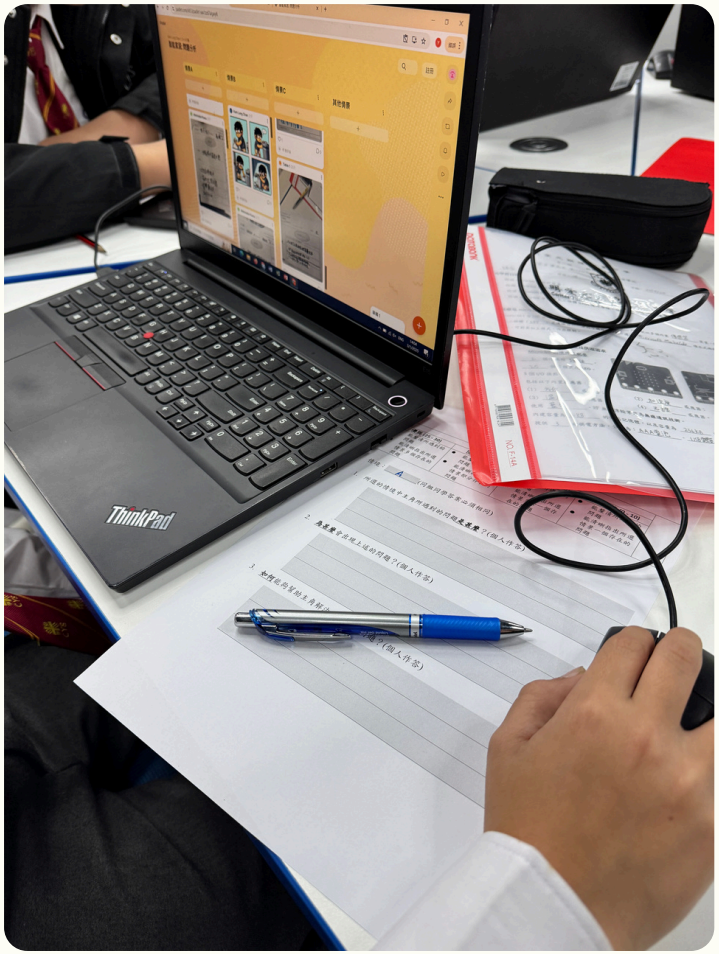
分組討論，並集合各人的思考成果



A 3 小組討論工作紙 (問題 → 解決方法)

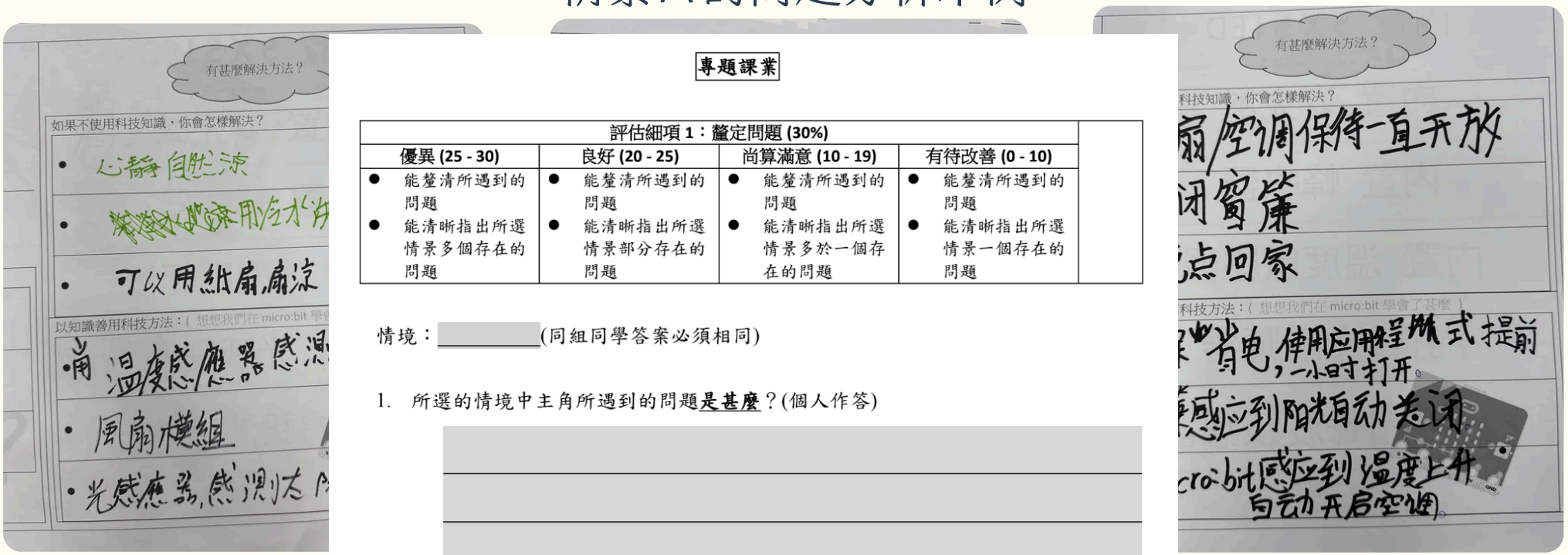
完成討論後，每組同學的思考過程均紀錄於padlet，
並由老師邀請一些同學作分享

實踐經驗分享 2：
利用Padlet 腦力激盪　紀錄解難過程及強化朋輩學習



實踐經驗分享 2：
利用Padlet 腦力激盪　紀錄解難過程及強化朋輩學習

情景 A 的問題分析示例



專題課業

評估細項 1：釐定問題 (30%)				
優異 (25 - 30)	良好 (20 - 25)	尚算滿意 (10 - 19)	有待改善 (0 - 10)	
● 能釐清所遇到的問題 ● 能清晰指出所選情景多個存在的問題	● 能釐清所遇到的問題 ● 能清晰指出所選情景部分存在的問題	● 能釐清所遇到的問題 ● 能清晰指出所選情景多於一個存在的問題	● 能釐清所遇到的問題 ● 能清晰指出所選情景一個存在的問題	

情境：_____(同組同學答案必須相同)

1. 所選的情境中主角所遇到的問題**是甚麼**？(個人作答)

同學可以就不同情景，比較不同解決方法的優劣。然後, 選擇一個情景，並設計一個合適、可行的智能家居產品。

實踐經驗分享 3：
活用Google Classrom 促進自我評價及修訂

技巧：提供充分的自學資源/鷹架

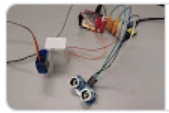
(專題匯報遞交) - CH1 單元E 智能家居

每組需要指派一名組員在此遞交以下項目，以便教師評分：

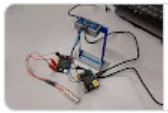
- (1) 一段約1分鐘的匯報影片(詳細指引及要求可閱讀附件);
- (2) 「輸入裝置microbit A」的程式 及 「輸出裝置microbit B」的程式;
- (3 - 額外加分項目) 拍照紀錄一份完整的專題報告。

智能家居匯報指引.pdf
PDF

2425_CT_中一專題匯報講稿...
PDF



智能垃圾桶作品示範影片.mp4
影片



智能燈光作品示範影片.mp4
影片

智能窗簾作品示範影片.mp4
影片

各情景參考編程

各組別可根據所選擇的情況開啓附件中的筆記作為參考。

2324-S1CT- 學生筆記-智能家...
PDF

2324-S1CT- 學生筆記-智能家...
PDF

中一級 創意科技科

專題任務 - 智能家居的最終匯報指引

一、匯報要求

1. 影片長度：約 1 分鐘
2. 匯報內容：設計意念及作品操作展示
3. 小組成員需共同參與

二、匯報影片準備步驟

1. 撰寫匯報腳本

可參考提供的「中一專題匯報講稿」的模板，包含：

實踐經驗分享 3：
活用Google Classrom 促進自我評價及修訂

問題分析
及想像

評估細項 1：釐定問題 (20%)				
優異 (15 - 20)	**良好 (10 - 14)**	**尚算滿意 (5 - 9)**	**有待改善 (0 - 4)**	
● 能釐清所遇到的問題 ● 能清晰指出所選情景多個存在的問題	● 能釐清所遇到的問題 ● 能清晰指出所選情景部分存在的問題	● 能釐清所遇到的問題 ● 能清晰指出所選情景多於一個存在的問題	● 能釐清所遇到的問題 ● 能指出所選情景一個存在的問題	
●				
● 評估細項 2：探究解決方法 (10%)				●
優異 (15 - 20)	**良好 (10 - 14)**	**尚算滿意 (5 - 9)**	**有待改善 (0 - 4)**	
● 能針對所遇到的問題提供解決方法 ● 所提供的解決方法能完全解決所遇到的問題	● 能針對所遇到的問題提供解決方法 ● 所提供的解決方法能解決大部份所遇到的問題	● 能針對所遇到的問題提供解決方法 ● 所提供的解決方法能解決部份所遇到的問題	● 能針對所遇到的問題提供解決方法 ● 所提供的解決方法只能解決小部份或未能所遇到的問題	

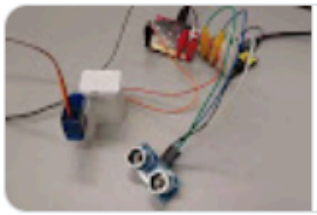
評設方案及
創造階段

I. 產品製作與專題匯報 (80%)				
評估細項 1：產品外殼的設計與組裝 (30%)				
優異 (25 - 30)	**良好 (20 - 25)**	**尚算滿意 (10 - 19)**	**有待改善 (0 - 10)**	
● 能提交設計圖 ● 能按照設計圖，完成組裝電子模組至外殼，並裝飾產品外殼，從而優化使用者體驗	● 能提交設計圖 ● 能按照設計圖，完成組裝電子模組至外殼，並有裝飾產品外殼	● 能提交設計圖 ● 能大致按照設計圖，完成組裝電子模組至外殼，並略為裝飾產品外殼	● 未能提交設計圖 ● 未有／未能按設計圖組裝電子模組至外殼，而且沒有裝飾產品外殼	
評估細項 2：產品程式設計 (30%) 1. 能夠正確應用至少一個感測器用作啟動產品 2. 合理地設有「關閉」產品的指令 3. 能夠正確應用至少兩個感測器用作優化產品的功能 4. 能夠正確應用一些輸出裝置來提示產品的使用方法或狀態				
優異 (25 - 30)	**良好 (20 - 25)**	**尚算滿意 (10 - 19)**	**有待改善 (0 - 10)**	
● 能完成編寫程式，展現所有於上述提及的程式設計描述	● 能完成編寫程式，展現最少三項上述提及的程式設計描述	● 能完成編寫程式，展現最少兩項於上述提及的程式設計描述	● 未呈交任何程式／未能於所編寫程式展現最少兩項於上述提及的程式設計描述	
評估細項 3：課堂/影片匯報 – 設計理念與程序解釋 (20%)				
優異 (15 - 20)	**良好 (10 - 14)**	**尚算滿意 (5 - 9)**	**有待改善 (0 - 4)**	
● 成功展示產品的功能 ● 簡明扼要地闡釋產品的使用	● 成功展示產品的功能 ● 詳細地闡釋產品的使用方	● 成功展示產品的功能 ● 未有清楚地闡釋產品用方	● 未能展示產品的功能 ● 未有闡釋產品用方法	

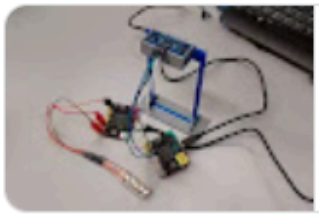
實踐經驗分享 4：
客製化教學套件　配合自主學習需求

時間充裕及學生動手能力強 → 環保材料（紙皮）＋套件

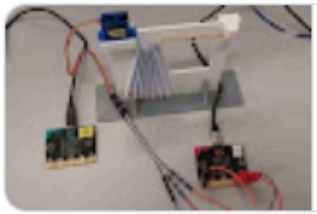
時間不足,能力較弱 → 教師提供所需材料



智能垃圾桶作品示範影片....
影片

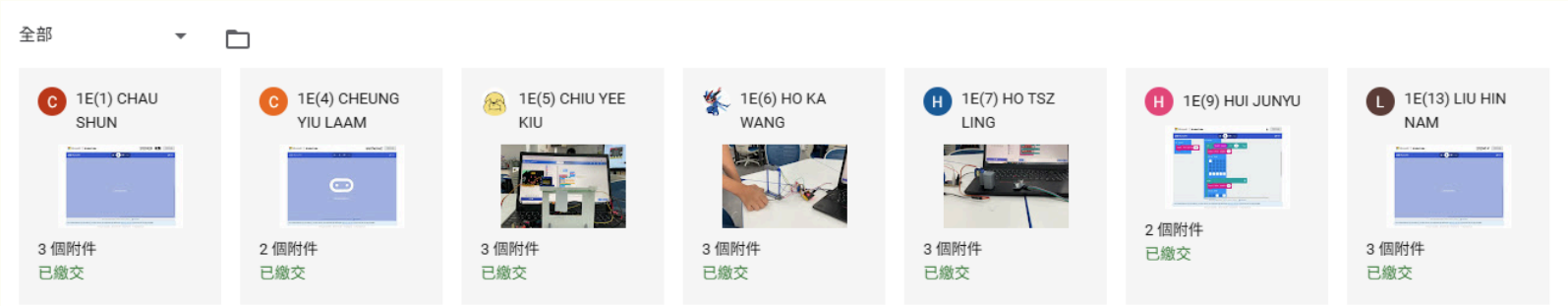


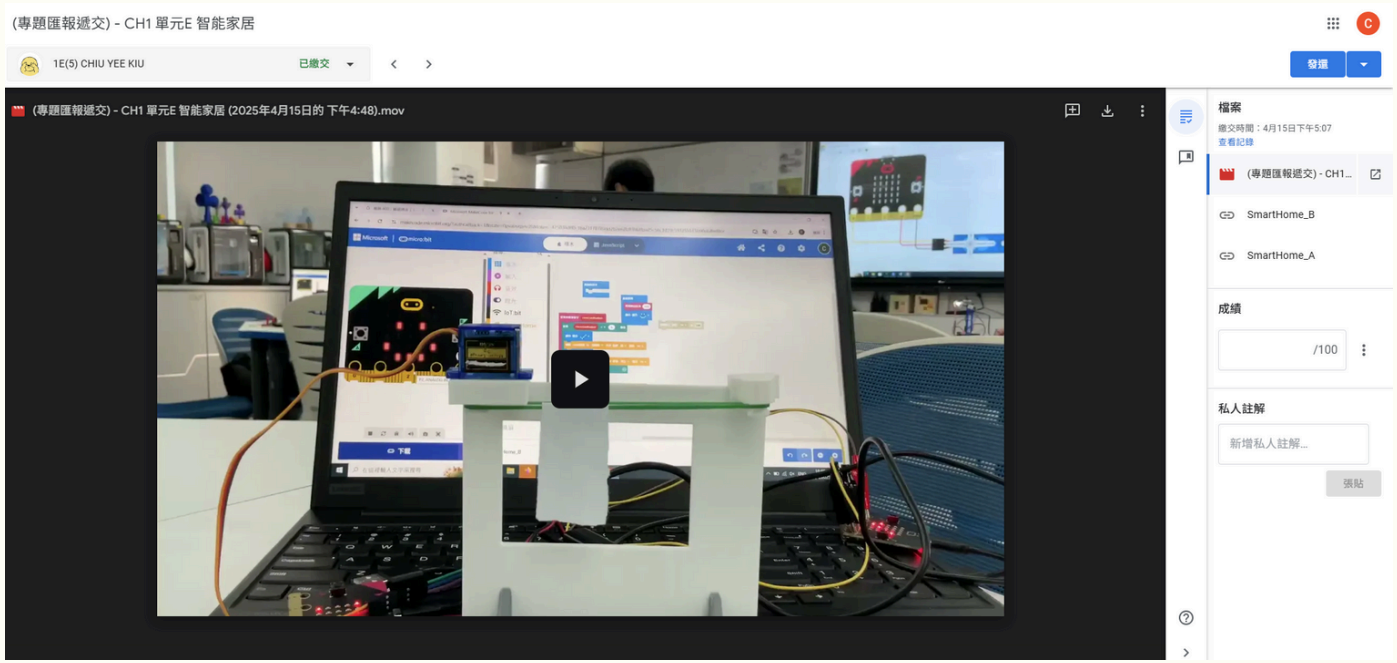
智能燈光作品示範影片.m...
影片



智能窗簾作品示範影片.m...
影片

學生成果(1)





中一級智能家居專題匯報講稿框架

大家好！我們是_____班的_____和_____，

我們的專題作品是_____。

這是用作解決情景____主角的問題，他因為_____，而感到_____，希望我們的作品能為他解決這問題。這件成品是由兩個 micro:bit 組成，並包含一些其他外置硬件，例如:

超音波感應器 / 直流馬達 / 伺服馬達 / LED燈帶/_____

中一級智能家居專題匯報講稿框架

它的運作原理 (處理過程)是_____

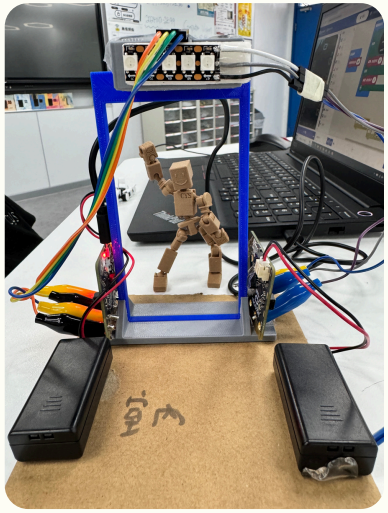
_____

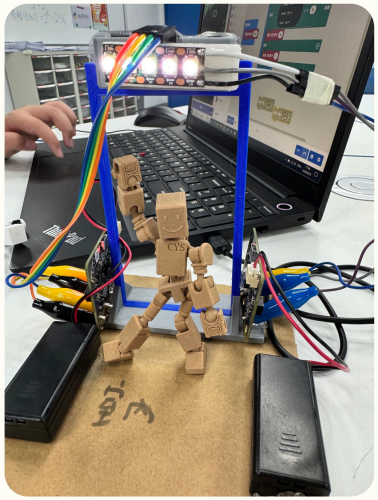
_____

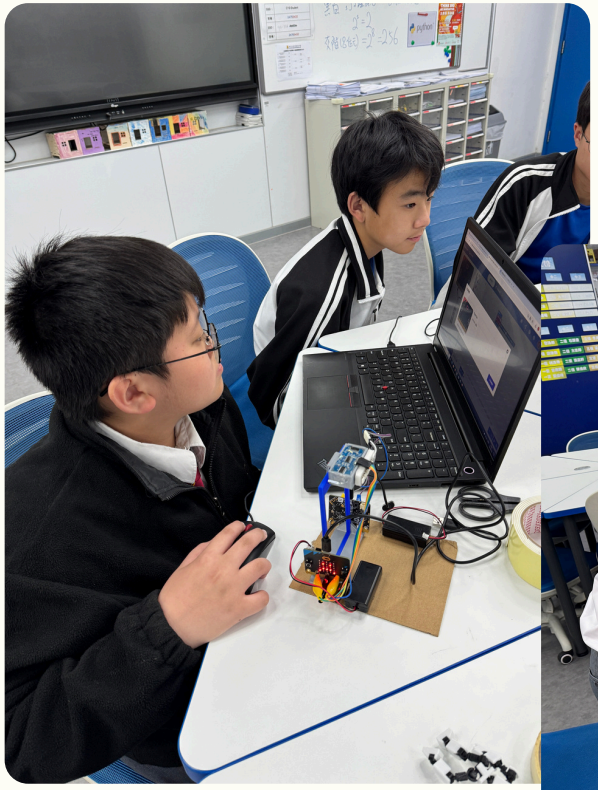
_____。

現在就讓我為大家示範一下我的作品。

學生成果(2)







學生自行與教師及助教預約時間，
在課後時間來STEAM ROOM
繼續完成專題

教師反思(1)

有甚麼成功經驗/要點值得推廣?

- 活用生成式ＡＩ來設計圖像化及生活化的教材，以及評分準則
  - 「漫畫分析」有利於吸引文字閱讀能力較弱的學生進行問題分析
- 採用大量引導性問題來推動學生思考
  - 分析解決問題
    - Ｗｈａｔ—ＷＨＹ—ＨＯＷ
  - 自主學習
    - 為甚麼選擇這個情景？
    - 為甚麼選擇這個解決方案？
    - 可行嗎？時間上足夠嗎？硬件足夠嗎？

- 提供清晰及明確的評分準則
- 利用合適的電子習平台來紀錄及分享學生的專題期間的學習進程
- 信念：「後進生也能逐步發展解難及自主學習的能力」

教師反思(2)

在下一次執行時，有甚麼地方需要改善或留意?

- 人力資源：專題研習會耗用大量課堂及備課時間，並需要有一定人力資源，並必須預習資源支援學習在課外完成專題任務
- Ｐｌａｎ　Ｂ：對於弱生而言，由「０到１」是十分困難，教師隨時要提供一個「逃生門」，即是每個任務都有一個半成品讓部分同學可以動力繼續完成
- 完成時間：盡量需要在一個學期內完成整個專題任務
- 教學套件：充足的專題套件需要在專題開始前準備好，如果能夠讓學生借用回家效果更好。
- 自主學習習資源：在前置的科技知識（micro:bit)課堂可以將部分專題會用到的硬件程式，提前教授，並製作一些學習資源(影片/程式/圖像)讓學生進行專題期間可以複習。

@cys

THANK YOU!

Self-directed learning in STEAM learning design.

St. Margaret's Co-educational English Secondary and Primary School

Mr. Hui Yik On, STEAM Coordinator

Chan Sing Hin, Student Representative

Wong Cheuk Nam Marcus, Student Representative

學校簡介

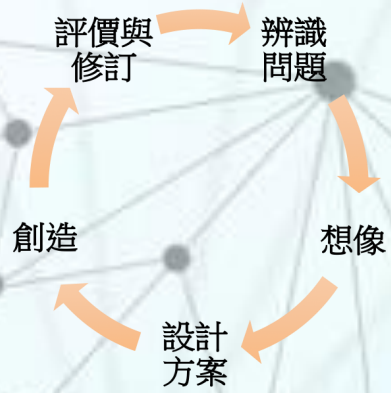
- 直資一條龍英文中、小學
- 設有校本小一至中三STEAM常規課堂
- 重點關注事項(2023 - 2028)
  - Nurturing Active Learners: Prioritizing Ownership, Reflection, and Adaptability in Education
  - Strengthening Positive Education

計劃背景

- 由優質教育基金資助，
- 並由香港大學教育學院教育應用資訊科技發展研究中心(CITE)主辦。

- 建立聯校網絡，以促進可持續、可擴展的教學及評估創新。

- 重點概念/技能：
- 自主學習(Self-directed learning)
- 工程設計過程(Engineering design process)
- 數碼素養(Digital Literacy)



- https://instem.cite.hku.hk/stem-education/

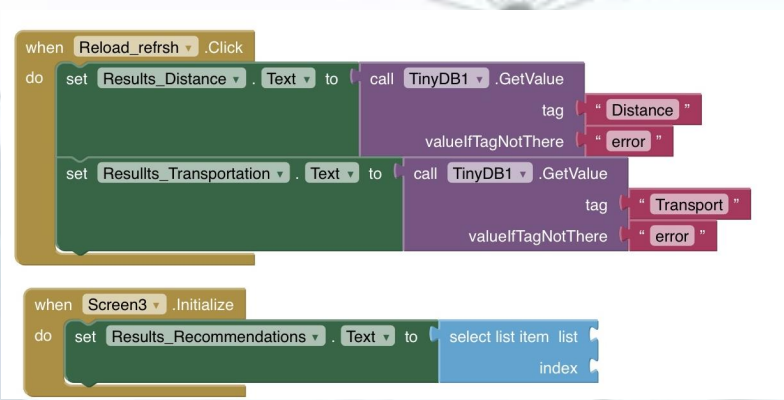
教學團隊

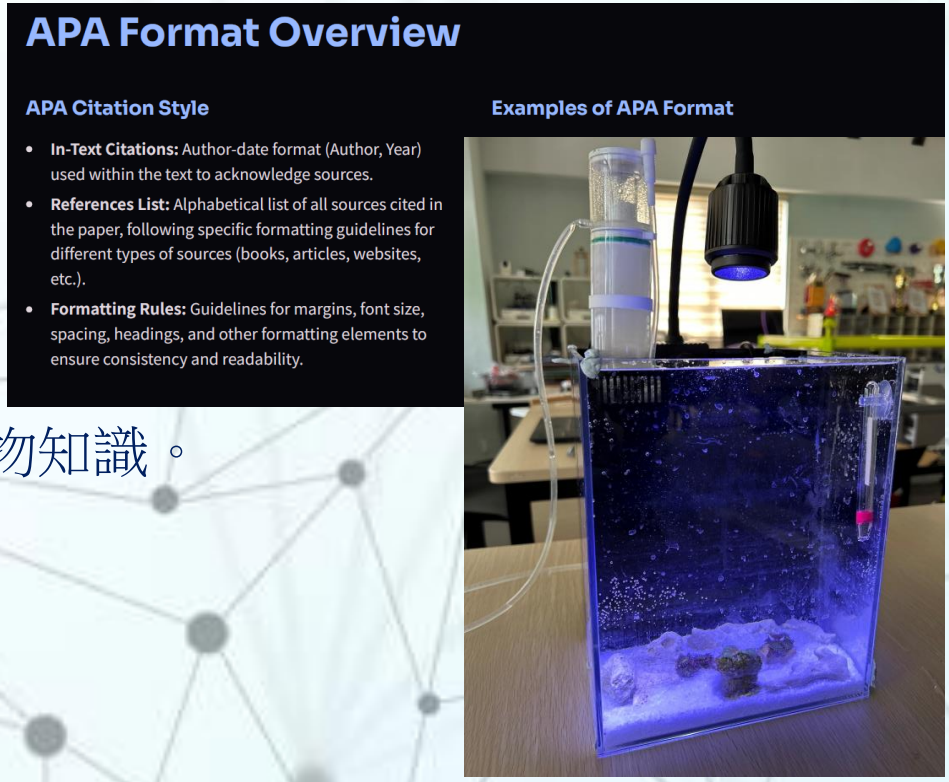
2023 – 2024	2024 - 2025
校長	校長
副校長(學術)	副校長(學術)
助理副校長(科學科主任及STEAM統籌人員)	助理副校長(科學科主任)
資訊科技主任	資訊科技主任
STEAM助理統籌人員	STEAM統籌人員
兩名STEAM老師	三名STEAM老師
STEAM教學助理	STEAM教學助理

額外人手

需要時，其他科目的老師也為學生提供適切的指導:

- 電腦科老師：提供有關Programming的專業指導及數碼素養的教學





- 生物科老師：提供與Corals相關的生物知識。

課堂簡介

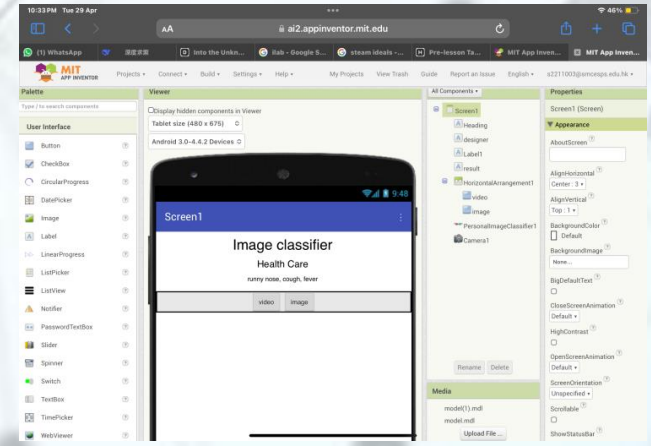
STEAM Maker:
常規課堂、一星期一堂、全年共二十八堂。

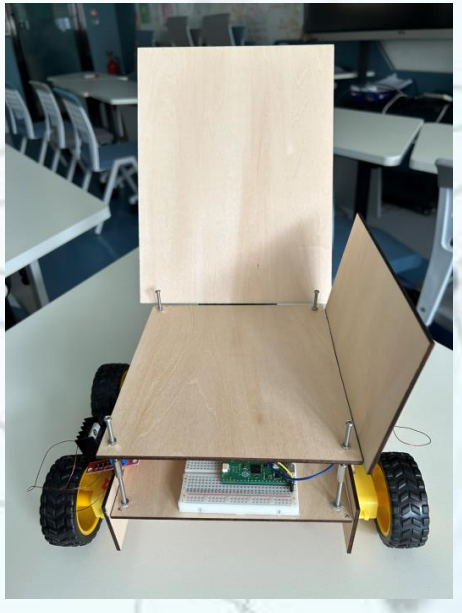
透過利用STEAM技能及知識，設計一件解決日常生活困難的產品：
1. Improving human life and enhancing quality of life
2. Enhancing human well-being and happiness
3. Fulfilling at least 1 Sustainable Development Goals (SDGs)

預期學習成果

學科知識

3D繪圖及打印 (3D Drawing and Printing)
鐳射雕刻及切割 (Laser Engraving and Cutting)
手機應用程式設計 (App Design)
機械人技術 (Robotic)
虛擬場境設計 (VR Scene Design)
智能種植 (Smart Planting)
AI應用 (Application of AI)
自選項目 (Self-proposed Project)





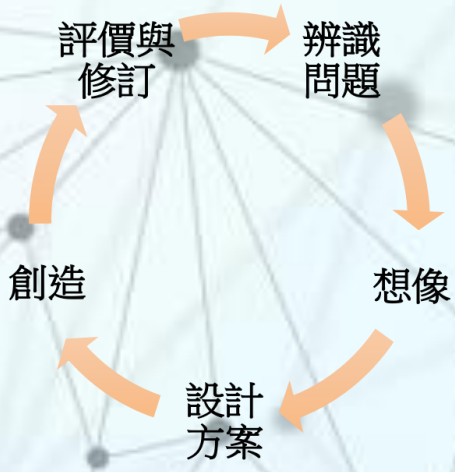
預期學習成果(2)

非學科類學習成果

自主學習(**Self-directed learning**)
數碼素養(**Digital Literacy**)

學科技能

工程設計過程(**Engineering design process**)



主要評估

Item	Percentage
Proposal (including research review)	20%
Criteria for Success	20%
Project Logbook (including final product)	25%
Final Presentation	20%
Class Participation	10%
Peer Evaluation	5%

課堂內容

Lesson	Content
Lesson 1	[Mass Lecture]: Introduction of STEAM lesson & Key Elements
Lesson 2	[Mass Lecture]: Introduction of different 8 topics
Lesson 3	[Group Tutorial]: Introduction to iLap and Sustainable Development Goals (SDGs)
Lesson 4	[Group Tutorial]: Knowing more about SDGs by a matching game
Lesson 5	[Group Tutorial]: Presentation on selected SDGs with existing projects
Lesson 6	[Group Tutorial]: Deciding the topic and introducing how to prepare a proposal
Lesson 7 – 8	[Group Tutorial]: Preparation of proposal with support and guidance
Lesson 9	[Group Tutorial]: Presentation on proposals
Lesson 10	[Mass Lecture]: How to prepare a project logbook
Lesson 11 – 16	[Group Tutorial]: Self-learning & marking prototype

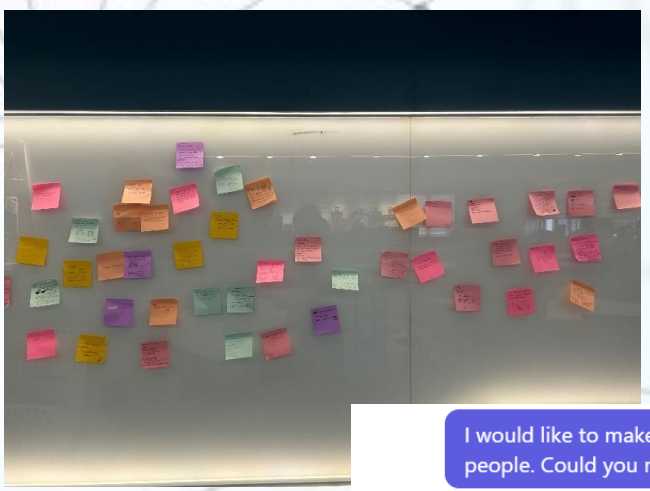
課堂內容

Lesson	Content
Lesson 17	[Mass Lecture]: What is Criteria for Success?
Lesson 18	[Group Tutorial]: Drafting their own Criteria for Success
Lesson 19 – 22	[Group Tutorial]: Revising the design based on the feedback collected from users
Lesson 23 – 24	[Group Tutorial]: Finalizing the design and project logbook
Lesson 25	[Group Tutorial]: Preparation of final presentation
Lesson 26 – 27	[Group Tutorial]: Final presentation
Lesson 28	[Group Tutorial]: Peer evaluation
Post-exam period	Science Fair for all S.2 students
Student Award Scheme	Nomination of potential groups

學生在學習過程中的角色

- 設計師 Designer
- 程式設計員 Programmer
- 測試人員 Tester
- **實踐工程設計過程**

Goal Setting



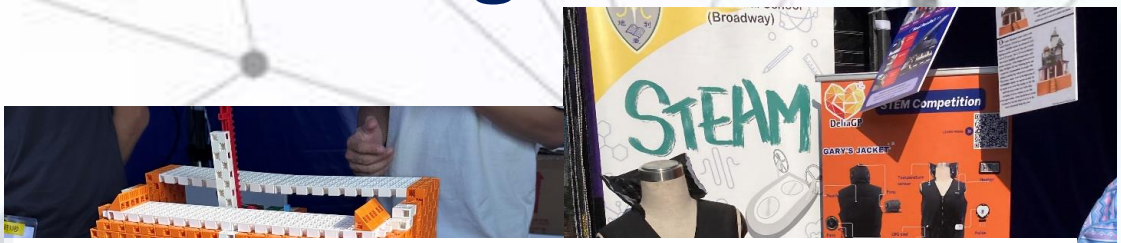
I would like to make a product to address a problem faced by a certain group of people. Could you name three common problems nowadays?

Assistant Poe

Here are three common problems faced by various groups of people today:

1. **Mental Health Issues**: Many individuals experience stress, anxiety, and depression, often exacerbated by social media, work pressures, and global events.
2. **Access to Quality Education**: Educational disparities exist, with many students lacking access to resources, technology, and support, particularly in underserved communities.
3. **Sustainability and Environmental Concerns**: People are increasingly concerned about climate change, pollution, and the depletion of natural resources, leading to a demand for eco-friendly products and practices.

Goal Setting



Please share what you have gained in the area of STEAM with at least 50 words.

搜尋討論區 | 新增一個討論主題 | 訂閱本討論區

議題	開始於	回應
Innogala		0
Innogala 2024		0
An interesting visit		0

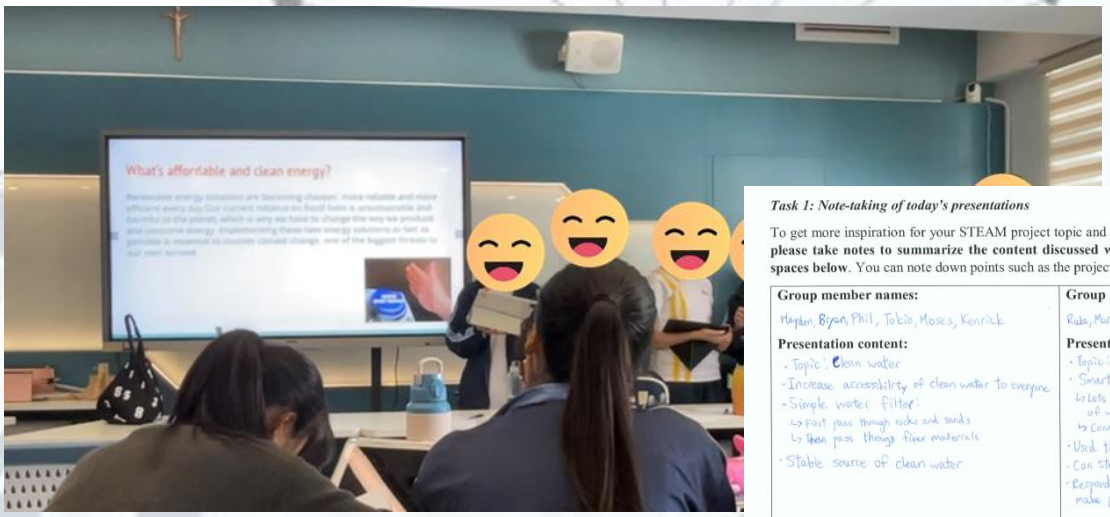
I think the Innogala was very useful because I could learn about STEAM from every booth there was. My favourite product I sav
the Innogala is the claw machine made by Winstars. The reason why it is my favorite product is because it is one of my childho
toys, reminding me of my childhood. I hope I can go to the Innogala again someday.

Task 1: Familiarizing yourself with the UN's 17 SDGs

Listed below are examples of projects related to the 17 SDGs. Please **match them to one corresponding SDG** based on the names of the projects and their descriptions.

Project	Corresponding SDG
Mental Health Awareness: Campaigns to promote mental health resources and reduce stigma.	Good Health and Well-being
Rainwater Harvesting Systems: Designing systems to collect rainwater for school gardens.	Clean Water and Sanitation
Solar Panel Projects: Installing solar panels to power parts of the school.	Affordable and Clean Energy
Community Resource Mapping: Create a detailed map of local resources available for low-income families, including food banks, shelters, and job training programs. Students can conduct interviews and surveys to gather information.	No Poverty
Sustainable Product Design: Students can design a prototype for a sustainable product, such as eco-friendly packaging or a reusable item. This project combines engineering principles with environmental science and artistic design.	Responsible Consumption and Production
Hydroponic System Design: Students can design and build a small hydroponic system to grow vegetables indoors, so that everyone is able to plant their own vegetables.	Zero Hunger

Goal Setting



Task 1: Note-taking of today's presentations

To get more inspiration for your STEAM project topic and for the succeeding task in this worksheet, **please take notes to summarize the content discussed within each group's presentation in the spaces below**. You can note down points such as the project's goals, implementation, impact, etc.

Group member names: Hayden, Bryan, Phil, Tobio, Moses, Kenrick **Presentation content:** - Topic: Clean water - Increase accessibility of clean water to everyone - Simple water filter: ↳ First pass through rocks and sands ↳ Then pass through fiber materials - Stable source of clean water	**Group member names:** Rida, Marcus, Jay, Ryton, Mayes, Candice (+Karen) **Presentation content:** - Topic: Life below water - Smart Buoys (Passive Acoustic Monitoring Buoy) ↳ Lots of sensors to transmit data to know condition of water ↳ Connected to Internet - Used to track animals like whales and dolphins - Can study animals without disturbing them - Respond quicker/do further analysis/use data to make products
Group member names: Gloria, Hannah, JC, Jasmine Wong, Isabelle, Tiffany **Presentation content:** - Topic: Reduced inequalities - Modern Wheelchair - Help disabled ppl → let them have the ability to go out by themselves - Functions: ↳ Base → Google Maps as system to search routes ↳ Ozobot to help detect situations on roads ↳ Self-driven (AI voice & voice recognition) - Problems: ↳ Lines required for Ozobot ↳ Expensive ↳ How to stop at obstacles/traffic lights?	**Group member names:** **Presentation content:**

isk 2: Presentation Reflection

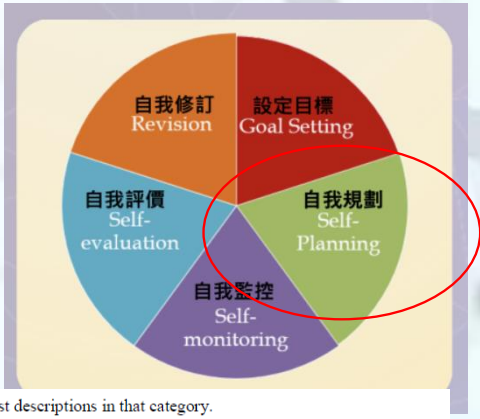
fter listening to the presentations and summarizing them in Task 1, **please choose your favorite roject that was presented by one of the groups and introduce it below in around 100 to 200 ords**. You may discuss the following points:

- Why this project is your favorite (e.g. it relates to a topic you are interested in, it inspires you, etc.)
- Project Overview (e.g. goals, target audience, etc.)
- Implementation (e.g. technology and methods used, key organizations/individuals, etc.)
- Impact and Results (e.g. outcomes, successes, challenges, etc.)

ly favorite project was the smart buoy. The smart buoy, also known as the Passive coustic Monitoring Buoys and addresses the Sustainable Development Goal "Life Below Water." sensing water environments of animals and sending data to research centres. It uses lots of fferent types of sensors to track different information of habitats of sea animals like dolphins d whales and to instantly transmit it back to research stations via the Internet. It is volutionary as it can get large amounts of data without disturbing the wildlife, and it can nd data much quicker than waiting for a researcher to travel back to stations which can low researchers to respond to any possible crises or to do further analysis quicker.

Self-planning

- 撰寫**計劃書**
- 提供定期回饋，
  如已批改的計劃書
  (附有評分準則)



Students should be given the mark range in 'high', 'average', 'low' or 'NA' if their performance meet the most descriptions in that category.

Assessment Item	Full Mark	High	Average	Low	NA
Goal Setting	**10**	**10 / 9 / 8** Able to choose 1-3 SDG(s), STEAM topic, identity the problem **clearly**, explain how does it relate to our daily life in detail and set an **accurate goal**.	**7 / 6 / 5 / 4** Able to choose 1-3 SDG(s), STEAM topic, identity the problem and goal. However, **do not** have a comprehensive understanding of them.	**3 / 2 / 1** **Not able to** point out the problem they want to address and set a suitable goal.	**0** Not attempted / No focus.
Self-planning	**10**	**10 / 9 / 8** Able to provide a **detailed planning**, including the following items: 1. adequate resources 2. skills and knowledge needed by self-studied 3. Suitable target users 4. Material list. 5. Timeline	**7 / 6 / 5 / 4** Able to provide a **simple planning**, including the following items, but the **description** of each of the items are **not enough**: 1. adequate resources 2. skills and knowledge needed by self-studied 3. Suitable target users 4. Material list. 5. Timeline	**3 / 2 / 1** **Only** able to provide a **rough planning**, including **some** of the following items: 1. adequate resources 2. skills and knowledge needed by self-studied 3. Suitable target users 4. Material list. 5. Timeline	**0** Not able to provide any planning.

Self-planning

Presentation	**10**	**10 / 9 / 8** Have a **well-organized** structure, including title, name of team members, sections, subsections etc, **clearly** explain the significance of this project, provide argumentation for its significance with solid and reliable evidence.	**7 / 6 / 5 / 4** Have a **simple** structure, **simply** explain the significance of this project and provide **related information** as evidence.	**3 / 2 / 1** Have an **incomplete** structure, **hard for readers to understand and follow**.	**0** Not understandable.
Subject Knowledge	**10**	**10 / 9 / 8** Able to highlight explicitly what they learnt in Mathematics, Science, Computer Literacy or other subjects in this project **at a large extent**.	**7 / 6 / 5 / 4** Able to apply what they learnt in Mathematics, Science, Computer Literacy or other subjects in this project **at a satisfactory extent**.	**3 / 2 / 1** Able to apply what they learnt in Mathematics, Science, Computer Literacy or other subjects in this project **slightly**.	**0** **Not able to** show what subject knowledge they apply in this project.
Reference	**10**	**10 / 9 / 8** Read and reference **a lot of reliable and relevant resources**, including e-resources, books, dissertations etc. Have a **well-organized** reference list **with APA format**.	**7 / 6 / 5 / 4** Read and reference **some reliable and relevant resources**, including e-resources, books, dissertations etc. Have a **simple** reference list.	**3 / 2 / 1** Read and reference **very few reliable and relevant resources**. **Do not** have reference list.	**0** Not attempted

Self-planning

STEAM Proposal - Self proposed project

Electromagnetic Generating Floor Tiles

1. Introduction
- a. Introduction
- b. Which SDGs are we focusing on
- c. Which topic we chose

2. Required Knowledge Basic Principle
- a. Electromagnetism

3. Significance of the Project

4. Skills/Knowledge Needed

5. Target User

6. Timeline & Work Distribution

7. Material List

8. Research Review

9. Reference (APA Format)

1) Introduction

a) Introduction

Electricity is critical and increasingly demanded nowadays. Energy crisis has also emerged as one of the biggest global challenges, as non renewable energy like fossil fuels and nuclear energy will run out eventually. Finding a replacement by using alternative sources of energy will be crucial for human long term development.

Electromagnetic floor tiles generate energy depending on walking of humans.

b) Which SDGs are we focusing on

We are focusing on the SDG 7- Affordable and Clean Energy
SDG 11- Sustainable Cities and Communities

Ensuring access to affordable, reliable, modern and sustainable energy is a long term goal. Electromagnetic generating floor tiles contribute to the provision of clean energy by harnessing renewable sources which reduce the dependence on fossil fuels.

In addition, this innovative design enhances the energy efficiency of urban infrastructure. For example, the energy generated could be used to power lighting in the cities

c) Topic we chose

Self proposed topic and laser cutting for wood

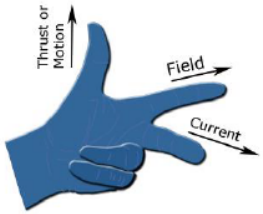
Self-planning

2. Required knowledge and basic principles

What is electromagnetism?

In physics, electromagnetism is a type of interaction between particles
by an electromagnetic field. An electromagnetic force is one of the fo
(Electromagnetism, the strong nuclear force, weak nuclear force, and g

The electromagnetic force is a combination of electrostatics and mag
particles with opposite charges to attract each other and repulse thos
charge. We can define these two forces in terms of the electromagnetic



6)Timeline & Work Distribution

September - November
- Proposal making

December - January
- Presentation

January - February
- Buy all materials needed
- Confirm our project with

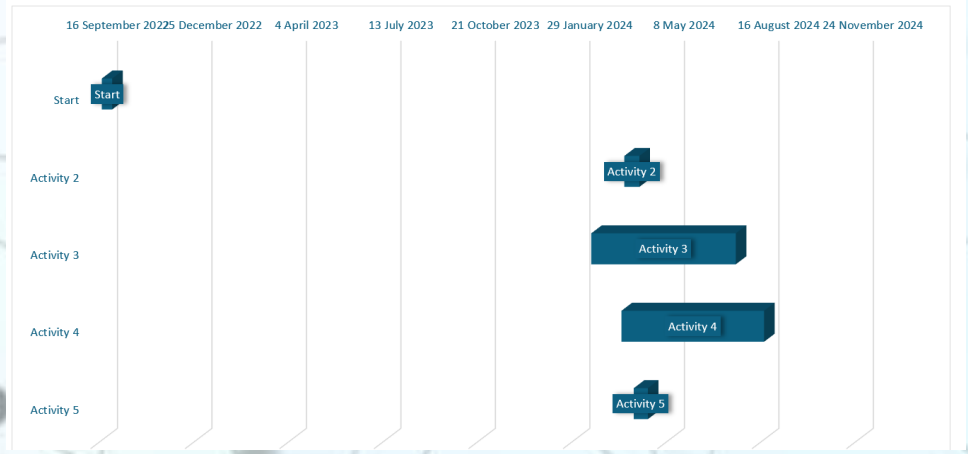
March - April
- Work on the product
- Make amendments

May
- Presentation of our product

Work Distribution
- Megrez: Proposal making (Research, Analysis), designing
- Eyton: Proposal making (Introduction), product creation
- Ruka: Proposal making (Target users), product creation
- Marcus: Proposal making
- Jay: skills required
- Candice: drafting our design

Self-monitoring

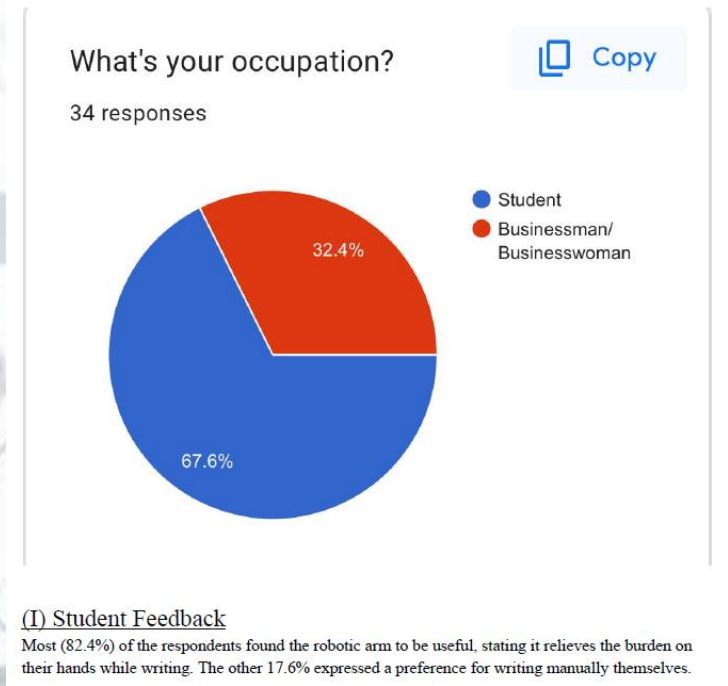
- 撰寫項目日誌(附有指導性問題)
  - Table of Content
  - Research Review
  - Significance of the Project
  - Target Users
  - **Planned Timeline, Task Completion Checklist and Schedule (Gantt Chart)**
  - Material List
  - Task Division and Coordination
  - **Prototype(s)**
  - **Self-Evaluation**
  - Reference
  - Acknowledgement



Self-monitoring

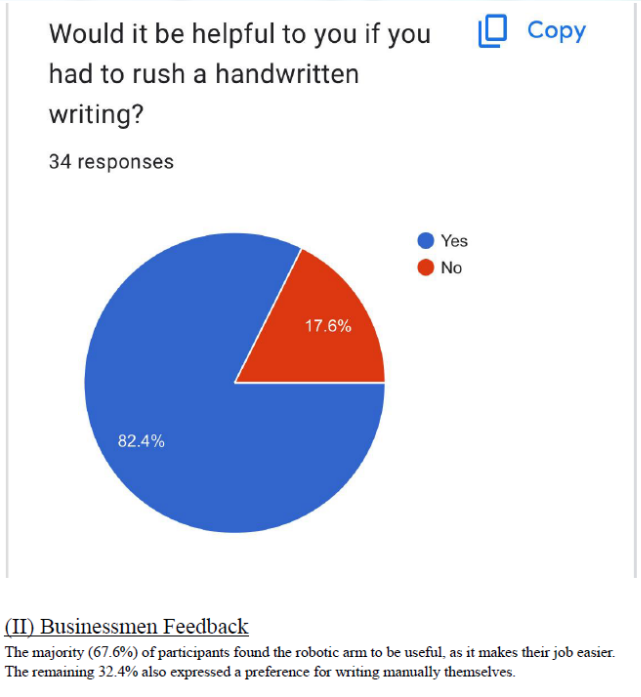
- 撰寫項目日誌傑出示例：

  Questionnaire and feedback



(I) Student Feedback

Most (82.4%) of the respondents found the robotic arm to be useful, stating it relieves the burden on their hands while writing. The other 17.6% expressed a preference for writing manually themselves.



(II) Businessmen Feedback

The majority (67.6%) of participants found the robotic arm to be useful, as it makes their job easier. The remaining 32.4% also expressed a preference for writing manually themselves.

Self-monitoring,

- 撰寫項目日誌傑出示例：

Schedule

Process Timeline

September

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4 Discuss with teammates what project is to be done	5	6	7	8	9
		Research the technical aspects of the project, how difficult the process is				
10	11 Discuss what was gathered, if we are still up to the project	12	13	14	15	16
		Research in detail what prospects are needed				
17	18	19	20	21	22	23
		Research why it's useful in daily life with reference and facts				
24 Gather on a doc	25 Ask for opinion and advice	26	27	28	29	30
		Fix and change the doc				

Process Timeline

October

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
	Re-evaluating our target audience		Researching how our project will benefit our new target audience, alongside the disadvantages of using it			
8	9	10	11	12	13	14
		Drafting our initial design (to be adjusted in further months)				
15	16	17	18	19	20	21
		Further research on each and every material (e.g it's				
22	23	24	25	26	27	28
		purpose, how to use it) to complete the project				
29	30	31				

Self-evaluation

- 教導學生利用AI生成工具撰寫**成功指引**

Watch the following video and answer these 2 MCQs.

What is Prompt Engineering primarily concerned with?

- a. Creating visual designs for websites
- b. Writing clear questions to help AI give useful and relevant answers
- c. Programming computer algorithms for data analysis
- d. Developing hardware solutions for robotics

Which of the following is an example of a good prompt for generating success criteria?

- a. What do you think about my project?
- b. What are three measurable outcomes to determine the success of my solar-powered model car?
- c. List some things that might matter for success.
- d. Provide some ideas about being successful.

Self-evaluation

- 教導學生利用AI生成工具撰寫成功指引

steam Roblox poverty game project
由S3B 12 FONG CHUN YAT發表於2025年 04月 29日(週二) 16:00

By poe:

1. Educational Outcomes

- **Knowledge Assessment**: Pre- and post-game quizzes to measure changes in understanding of poverty-related concepts (e.g., statistics, causes, and effects).
- **Skill Development**: Ability to identify and articulate solutions to poverty-related challenges (measured through in-game tasks).

2. Engagement Metrics

- **Playtime**: Average duration of gameplay per session.
- **User Retention**: Percentage of players returning to the game after the first session (tracked over a week/month).
- **Level Completion Rates**: Percentage of players who complete each level or task in the game.

3. User Feedback

- **Surveys**: Collect player feedback on enjoyment, learning experience, and perceived relevance of the game.
- **Rating System**: Implement a star rating system that allows players to rate their experience.

4. Community Interaction

- **Forum Participation**: Number of players engaging in discussions about the game's themes in forums or social media.
- **Collaborative Projects**: Count of in-game collaborations or projects initiated by players.

5. Behavioral Changes

- **Actionable Insights**: Survey players on their real-world behaviors and attitudes toward poverty before and after gameplay (e.g., increased awareness or willingness to engage in community service).

6. Accessibility Metrics

- **Diversity of Players**: Percentage of players from different backgrounds and demographics.
- **Technical Accessibility**: Number of players able to access and play the game without technical issues.

Self-evaluation

- 教導學生利用AI生成工具撰寫**成功指引**

Self-evaluation

- 教導學生利用AI生成工具撰寫成功指引

Criteria for success

Example:

Criteria	Excellent	Good	Fair	Not Applicable
1. Energy Saving				
Deducing energy consumption	Saving 20% or more	Saving 10 – 19%	Saving 1 – 9%	Saving 0% or even consuming more than that of the original product
2. Cost Saving				
Reducing cost	Reducing 25% or more	Reducing 15 – 24%%	Reducing 5 – 14%	Reducing 0% or even more expansive that that of the original product
3. Environmental-friendly				
Reducing carbon emission	Reducing 50% or more	Reducing 24 – 49% or more	Reducing 10 – 24% or more	Reducing 0% or even producing more than that of the original product
Using recycled materials	Using 100% recycled materials	Using 75% – 99% recycled materials	Using 50% – 75% recycled materials	Not using recycled materials
4. User-friendly (from questionnaire)				
Usability test score	Average score is greater than 9 marks	Average score is greater than 7 – 8 marks	Average score is greater than 5 – 6 marks	Average score is lower than 5 marks
5. Automation				
Degree of automation	Performing tasks automatically without human intervention	Requiring minimal users input to perform certain tasks, but still relying on some manual operations	Having limited automation capabilities and heavily replying on manual operation	No automation, replying on manual operation completely

Self-evaluation

- 撰寫項目日誌傑出示例：

  Self-evaluation &

  Peer evaluation

9.1. Reflection

Nowadays, urban residents prefer to reduce space as plenty of furniture or tools will be crammed in such a small area. It is, with no doubt, very troublesome that when things cluster together, a messy environment will be formed and the user might feel frustrated for not finding the required tool. Being cognizant of this ongoing circumstance, our objective of this project is to save space in the kitchen in order to make it cleaner, and to improve our personal hygiene. In this 15 cm model, several functions such as storing utensils and sanitising can be carried in an organised way. Overall, our project did manage to save space, making the environment more hygienic.

While modelling the whale on SketchUp, our skills of 3D modelling have greatly improved. From designing and creating shapes, or how to mirror and flip objects. Instead of blindly following instructions, this is a creative and original product.

In our opinion, the most important thing we have learnt in this project is perseverance, which is one of the core values promoted by school.

At the beginning of the project, we barely had any clue of what functions the whale could uire as its size is relatively small. But since we persisted in thinking of relevant tools that hens commonly have, we came up with an idea of a multi-functional whale.

Perseverance demonstrated the most during the process of modelling. Modelling the whale is highly demanding because we want to restore the characteristics of the whale's curved body as much as possible. Although we could not model a curved surface due to 3D modelling limitations, we still put in a lot of effort and time to make the whale's body as round as possible.

The second core value we demonstrated is self-management. We need to complete assignments given daily and do revisions for upcoming quizzes or tests. As a result, we need to manage and distribute time accordingly, some for homework, some for tests, and some for this project.

Self-evaluation

- Student Award Scheme:
- Self-Evaluation

香港大學教育應用資訊科技發[illegible]
HKU CITE 學生獎勵計劃 2023-2024 -
STEAM 自主學習之星 反[illegible]

A1:

After witnessing many bridges collapsing due to resonance, ev
bridge, it was observed that the problem of resonance is still ver
which inspired me to try and replicate a bridge undergoing
simulating the situation, along with building miniature dampers
problem of bridges collapsing because of bridge resonance. By
the problem of bridge resonance can be brought to light and pr
solutions to get rid of this problem in bridge design.

A2:

Many different aspects of building were implemented into the pr

- Background research, where I found different historic
resonance
- Collection of information relating to the use of different
alternate prevention measures like fluid and frictional d
due to design of bridges
- Basic design of said bridge, researching how resonance
and how to adapt dampers as a simplification
- Construction of bridge model by using different techni
obstacles, such as research towards how different materi
- Improvement of model design by replacing certain parts
bridge from failing
- Undergoing experiments to see how different dampers
what type of prevention measure works the best

A3:

Apart from learning various aspects of STEAM knowledge and how to apply them, various types of core values had also been demonstrated in the construction of the bridge, including:

- Commitment, where leisure time was invested into data research and compilation, along with construction of said bridge in order to continuously improve in design and construction. I learned that in order to achieve a project like this, tremendous time and effort must be put in.
- Leadership, where fellow peers were instrumental in their completion of said project. I learned to lead a group and instruct them in various different aspects of the project, so that clashes do not occur.
- Optimism, where I learned to stay positive even when encountering certain limitations and problems. Even when the design of the material did not match how nails were to be installed, I stayed optimistic and searched for alternative building options that fit the workings of the bridge. Eventually, the bridge was completed.
- Perseverance, where I learned to continuously work on the project and to not give up, even when facing obstacles, as there will always be and aspect to be improved on.

In terms of physics and mathematics, I came into contact with upper-secondary knowledge, learning how to simulate similar situations in the future.

I also learned digital literacy, as reports of the calibre of university were required. I learned to use different websites like google scholar to find references and citations, and to quote citations i used in reports.

Revision

- 撰寫項目日誌傑出示例：

  Prototype

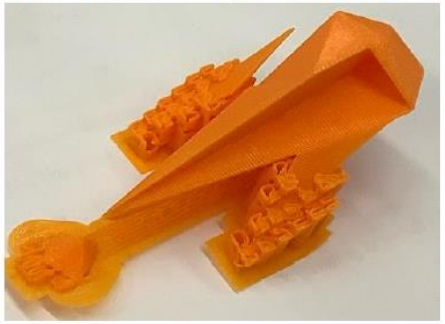
7.1. First Prototype

Our first prototype was just a mini model, just used to check whether the overall design is acceptable.

As shown from the diagram, the appearance of the whale can roughly be seen. Even with supporters, the tail and fins broke during the printing progress as it was too thin, consequently being fragile.

The base for the whale was also unable to be printed out as errors occurred prior printing. We can conclude that the first prototype was a bit disappointing.

In order to improve, we will need to thicken the tail so it will not fall off from the whale and a sensor can be installed into it; and to reconstruct the base so it can be printed out.



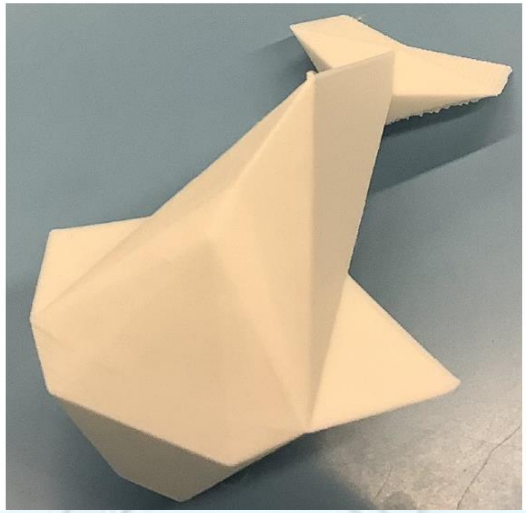
1st prototype (mini model)

7.2. Second Prototype

After some modifications, the result is better.

From the diagram, we can see that the shape of the whale is more evident — the head, fins and tail displayed obviousness. Also, since the tail of the whale has thickened, it did not break during the printing process.

The base to support the whale can also be printed out after reconstruction. The next thing to do is to construct hollow parts in the whale, as shown in design diagrams, to put UV light, hand sanitizer tube and hand sanitizer gel into the whale.



Revision

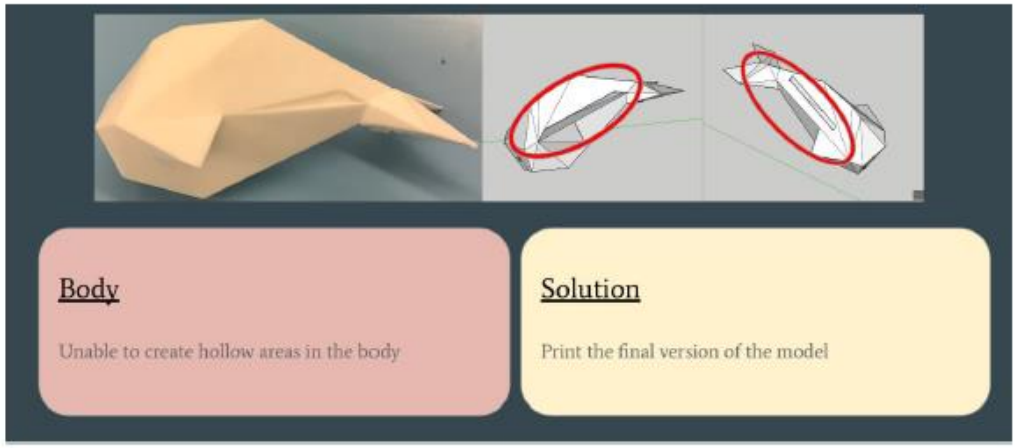
- 撰寫項目日誌傑出示例：

  Prototype

7.3. Finalised Product

This is our finalised product, showing similarity to the second prototype.

We acknowledged the fact that installing supporters inside a body is a difficult task, thus printing models with hollows is very strenuous from teachers and "SketchUp", due to the reality that 3D platforms frequently remind us that they are unable to print models that are not in solid state. Eventually, we could only ignore that error and still print the product out.



There is only a small gap, so the components cannot be installed.

總結及心得分享

- 善用科技支援：BYOD、Google Classroom、iLap及LDS。
- 提供各項評估的樣本示例及評分指引。例如計劃書、成功準則等。
- 需要足夠的人力資源、軟件及硬件。
- 邀請不同科目的老師提供技術上支援。
- Feedback & Feed-forward: 定期向管理層匯報，讓管理層知道前線老師的需要，並將良好設計推展到其他科目及級別。
- 尋求不同持份者支持，如校方及家長。
- 鼓勵科任老師及學生成為不同類型分享會的講者。

以全方位自主學習推展校本STEAM課程計劃(In-STEAM)網站

Q&A

Thank You !

回應

總結

學科及非學科?
知識、技能、態度、價值?
高階思維?

學習設計開始 (Learning Design Triangle)

自主學習?

真實情景下的探究解難
工程設計過程?
探究過程?

總結

設計教學的點子
(**Design patterns** in LDS)

有關設計學習時的教學問題...
(**Pedagogical questions**)

總結

設計教學的點子
(**Design patterns** in LDS)

- 匯報並獲取回饋 (附評估表)
- 體驗活動
- 訪談找出對象需要
- 資料搜尋
- 腦力震盪 (6W)

有關設計學習時的教學問題...
(**Pedagogical questions**)

如何促進學生設計實驗的能力以達成自我規劃？

如何協助學生辨識問題以促進他們設定目標？

如何促進學生找尋解難的方向以輔助他們自我規劃？

如何評估？

教育應用資訊科技發展研究中心
香港大學　教育學院

「提升課程領導・推動課程倡議」
教育局 校本支援服務（2025/26）
「優質教育基金主題網絡計劃—指定主題」

IN-SMART

Innovation Network for STEAM Mature, AI Ready Talents

培育STEAM及人工智能人才的創新網絡計劃

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支援服務！

期望你與我們分享你對本
分享會的意見！