



保良局王賜豪(田心谷)小學

PLK Dr. Jimmy Wong Chi-Ho (Tin Sum Valley) Primary School

使用圖像化程式語言工具
(Scratch, App Inventor)
發展學生計算思維和編程
技巧的教學知識

周曉瞳老師





1. 計算思維教育的目標
2. 計算思維概念
3. Scratch 教學分享
4. App Inventor教學分享

學校發展編程教育的方向



保良局王賜豪(田心谷)小學
PLK Dr. Jimmy Wong Chi-Ho (Tin Sum Valley) Primary School

- 賽馬會運算思維教育計劃資源學校
- 全校STEM普及教育，4-6年級所有同學均有機會參與學習

{oo/Think @ JC >
賽馬會運算思維教育
Inspiring digital creativity 啟發數碼創意

為甚麼要發展編程教育？



在高小年級推行計算思維和編程教育，目的並非訓練及培養電腦程序編寫員，而是讓學生得到實作經驗及建立解難的信心，持續透過協作及重覆的測試來解決問題。

計算思維-編程教育，小學課程補充文件，教育局課程發展議會，2017年11月

為甚麼要發展編程教育？



保良局王賜豪(田心谷)小學
PLK Dr. Jimmy Wong Chi-Ho (Tin Sum Valley) Primary School



希望學生能**運用計算思維**，解決更多**生活難題**。





甚麼年級發展編程教育最適合？

| 年級 | 電子教育工具 |
|-----|--------------|
| 三年級 | Scratch |
| 四年級 | Scratch |
| 五年級 | App Inventor |
| 六年級 | |

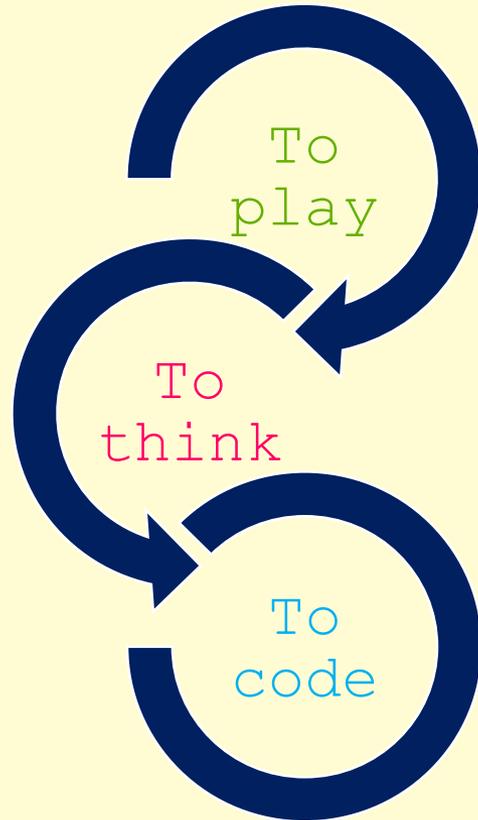


十歲的學生有能力編寫程式嗎？

學習編程技巧的根本與基礎概念

- < 序列 / > : 識別任務從一步到另一步的一連串的次序
- < 事件 / > : 一件事情導致另一件事情的發生
- < 重複 / > : 反複多次執行相同序列的事件
- < 條件 / > : 基於各種不同狀況來作出決定
- < 同步發生 / > : 讓多於一事件同時發生
- < 命名 / > : 將變數和函數命名供存取及改變數據的數值
- < 運算子 / > : 支援數學及邏輯表達式的運算符號
- < 數據操作及結構 / > : 數據儲存的格式 及 數據儲存、取回及更新

課堂3部曲



程式體驗

明白程式



實際編程

Scratch



Scratch web editor interface showing the 'Motion' category on the left. The main workspace displays a Scratch cat sprite on a grid. The bottom right panel shows the sprite's properties: Sprite1, x: 0, y: 0, Size: 100, and Direction: 90. The Windows taskbar at the bottom shows the time as 10:22 on 10/10/2019.



To Play: 配合身體動作, 更具體易明

The illustration shows a teacher and two children dancing on a beach. The teacher is in the center, wearing a black top and pink skirt. To her left is a girl in a white dress, and to her right is a boy in a white shirt and red shorts. A red boombox with musical notes is on the left. The background features palm trees, a sun, and a blue sky. A coding block is overlaid on the right side of the scene.

邊學跳舞
邊學Coding

```
when key pressed  
  move 8 steps  
  hide  
  play sound
```

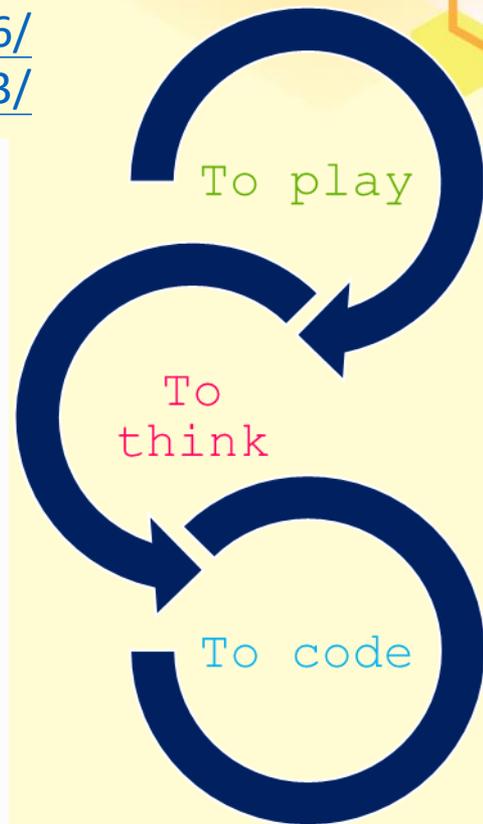
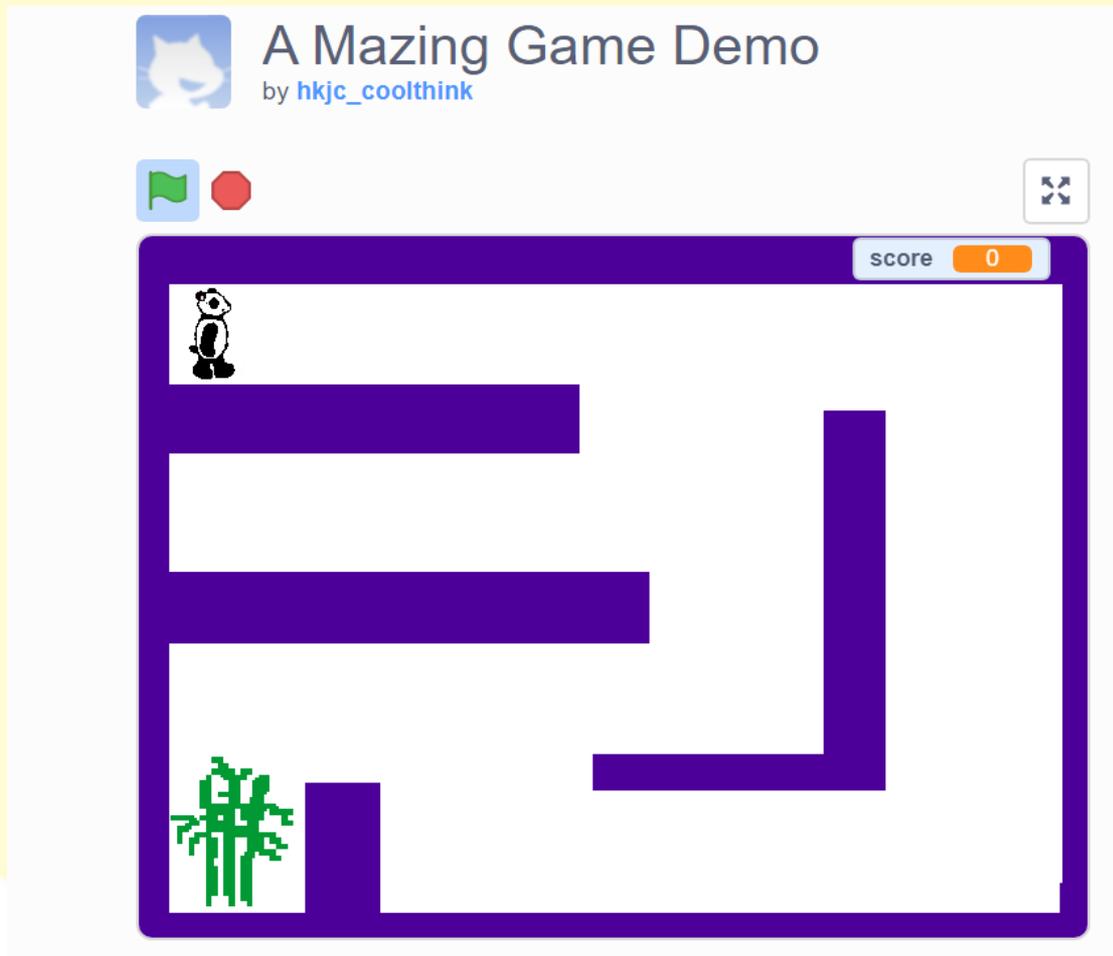
Eoo/Think@JC >
賽馬會運算思維教育



Maze Game

教師示範: <https://scratch.mit.edu/projects/320995996/>

學生檔案: <https://scratch.mit.edu/projects/222153103/>





Maze Game

Sample 1 :

<https://scratch.mit.edu/projects/251690624/>

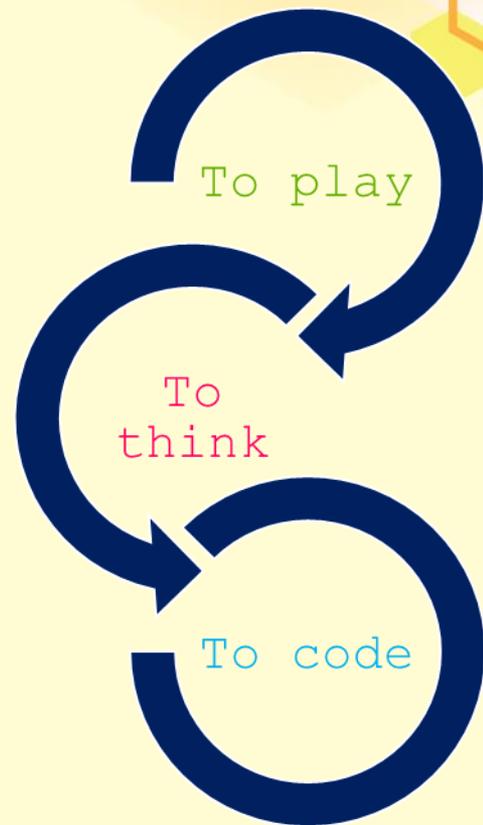
Sample 2 :

<https://scratch.mit.edu/projects/256088841/>

Sample 3:

<https://scratch.mit.edu/studios/5588873/>

<https://scratch.mit.edu/projects/256088852/>





Scratch

注意事項:

1. 學生帳戶
2. 收集功課

自擬教材方法:

1. 運用Tutorials

<http://appinventor.mit.edu/exploration/ai2/tutorials>

2. 準備教師版+學生版



App Inventor

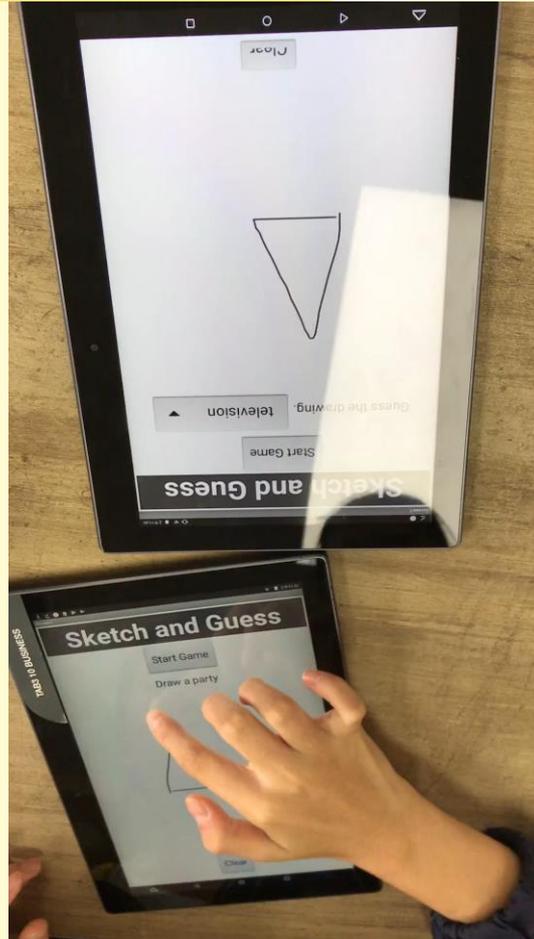
教學前準備:

硬件→電腦、平板電腦(Android,
下載MIT AI companion)

知識→Level2、3 (進階能力)



Sketch and Guess



透過試玩程式，發現編程漏洞。



To Think

事件的順序

- 與你的伙伴一起檢視下表。看看你們是否明白「你猜我畫」程式的步驟序列。在空格內填上 A 或 B。

A. 清除熒幕上所畫的圖案

B. 在使用者拖動的地方
畫上一條線

使用者把手指放在
熒幕上拖動



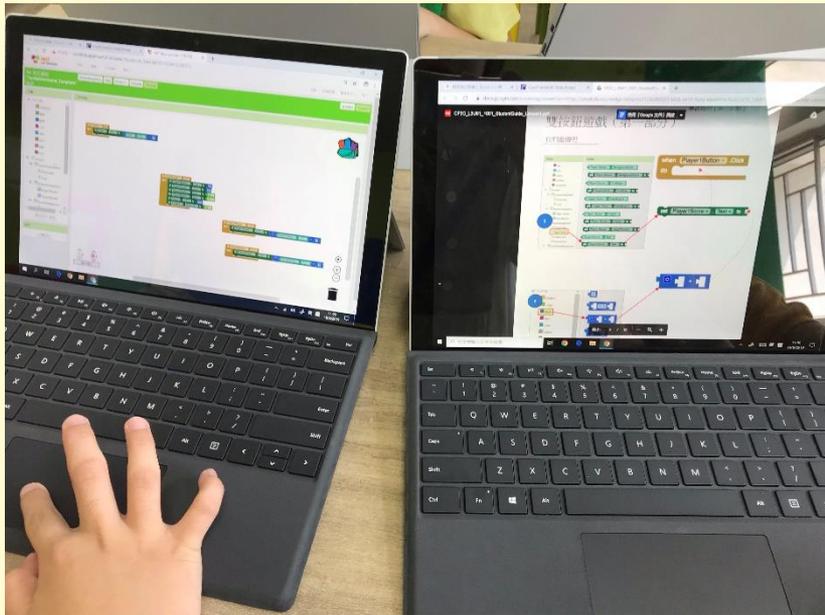
使用者按動 Clear
按鈕



To Code



*雙人連結對編程模式



To Code



SketchAndGuess_completed Screen1 Add Screen ... Remove Screen

Blocks

- Built-in
 - Control
 - Logic
 - Math
 - Text
 - Lists
 - Colors
 - Variables
 - Procedures
- Screen1
 - TitleLabel
 - StartButton
 - GuessArrangement
 - DrawingLabel
 - AnswerSpinner
 - Canvas1
 - ClearButton

Viewer

```
initialize global (drawingOptions) to [ make a list [ cat dog sun moon pany monster video game home school ballerina television horse ] ]

when ClearButton Click
do
  if get global isDrawer
  then
    call Canvas1 Clear
    call CloudDB1 StoreValue
      tag DrawingData
      valueToStore create empty list

initialize global userID to random integer from 0 to 99999

initialize global isDrawer to false

initialize global currentDrawing to [ ]

when Canvas1 Dragged
startX startY prevX prevY currentX currentY draggedAnySprite
do
  if get global isDrawer
  then
    call Canvas1 DrawLine
      x1 get prevX
      y1 get prevY
      x2 get currentX
      y2 get currentY
    call CloudDB1 StoreValue
      tag DrawingData
      valueToStore make a list [ get prevX get prevY get currentX get currentY ]

when CloudDB1 DataChanged
tag value
do
  if get tag == CurrentDrawing
  then
    set global currentDrawing to get value
  if get tag == DrawingData and not get global isDrawer
  then
    if is list empty? list get value
    then
      call Canvas1 Clear
    else
      call Canvas1 DrawLine
        x1 select list item list get value index 0
        y1 select list item list get value index 1
        x2 select list item list get value index 2
        y2 select list item list get value index 3

    if get tag == CurrentDrawer
    then
      if get value == get global userID
      then
        set global isDrawer to false
        set AnswerSpinner Visible to true
        set DrawingLabel Text to Guess the drawing

when StartButton Click
do
  set global currentDrawing to pick a random item list get global drawingOptions
  set global isDrawer to true
  set DrawingLabel Text to join Draw a
  get global currentDrawing
  call CloudDB1 StoreValue
    tag CurrentDrawing
    valueToStore get global userID
  call CloudDB1 StoreValue
    tag CurrentDrawing
    valueToStore get global currentDrawing

when Screen1 Initialize
do
  set AnswerSpinner Elements to get global drawingOptions
```

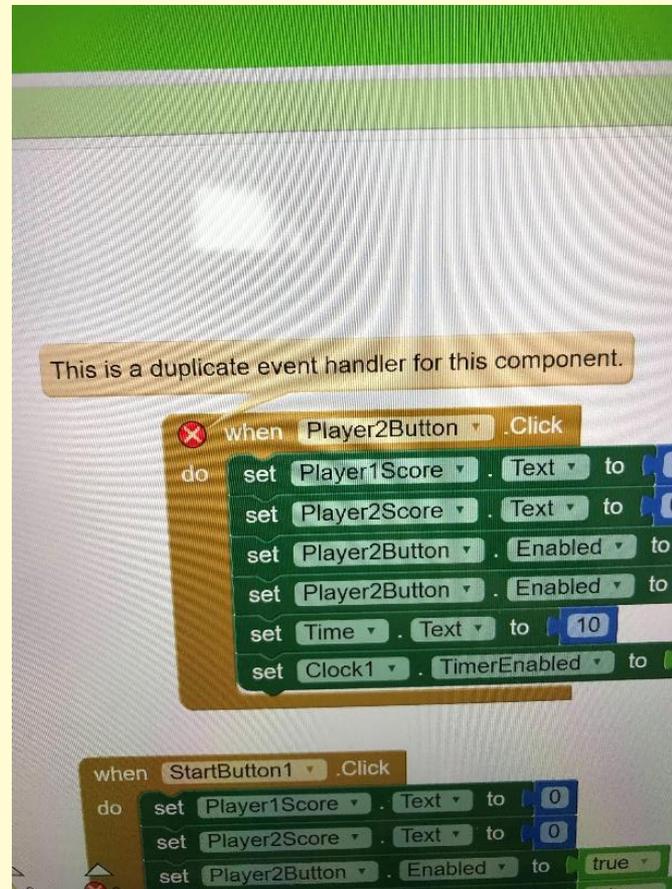
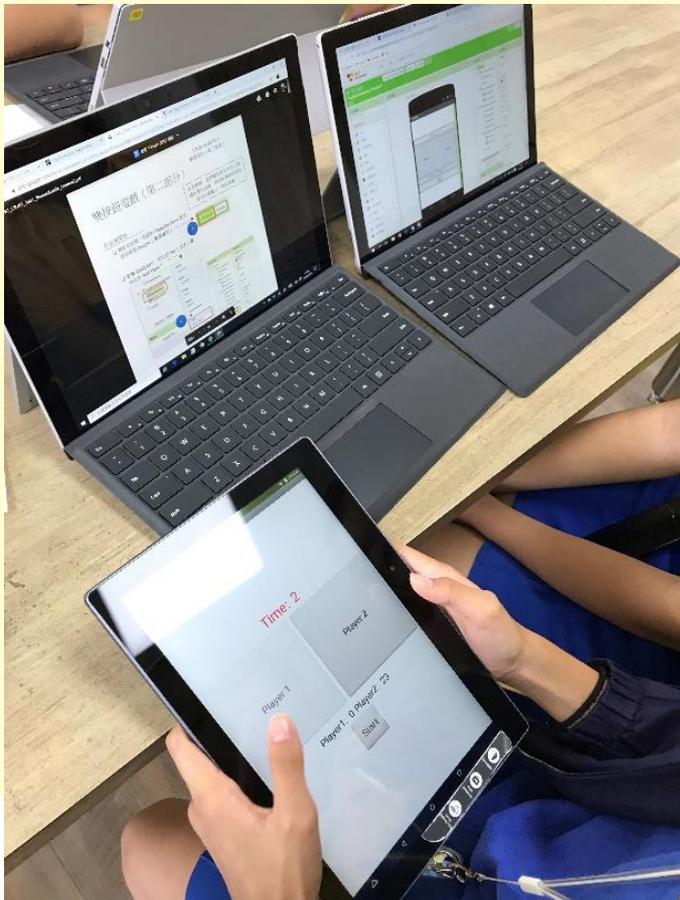
Show Warnings

To Code



*編程及**除錯**

*引導學生找出錯誤，越早除錯越容易





常見問題

- 開啟學生帳戶
- 收集功課
- 教材問題(Scratch運用Tutorials)
- 語言問題

更簡易入門軟件

Scratch Jr. Code.org



學生只需拖拉拼圖便能令程式順利運作，
從中訓練學生程式計算的邏輯，掌握基本的編寫程式概念。



- Q & A
- 問卷