



**Advanced Course (D): Practical Cases  
Analysis: Three-tier Implementation Model  
of Gifted Education - Level 2 Pull-out  
Programme (Secondary) (Re-run)**

Sin Ka Ho

# Background

- Established in 1978
- EMI school
- School based subjects:  
Service learning, value education



# Prologue

Lots of learning opportunities outside (competition, HKAGE, etc.)

However, students may have difficulties if they join the competition/HKAGE directly.

An initial idea for creating a bridge between Tier 1 and Tier 3.

# Some rationale behind



**To create a space for potential students to further explore their talent**

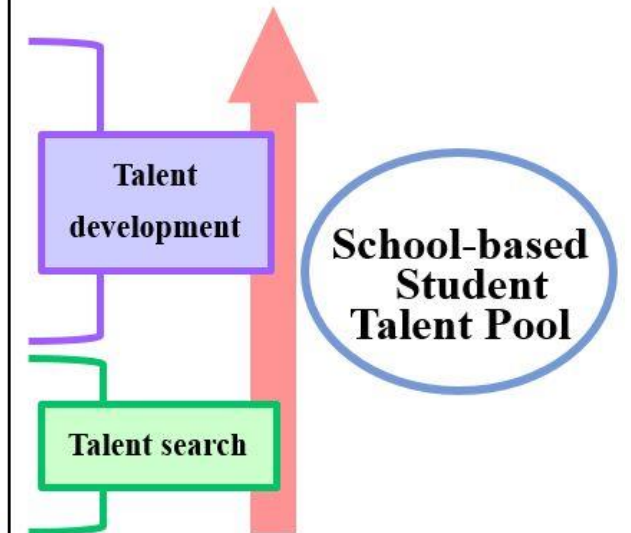
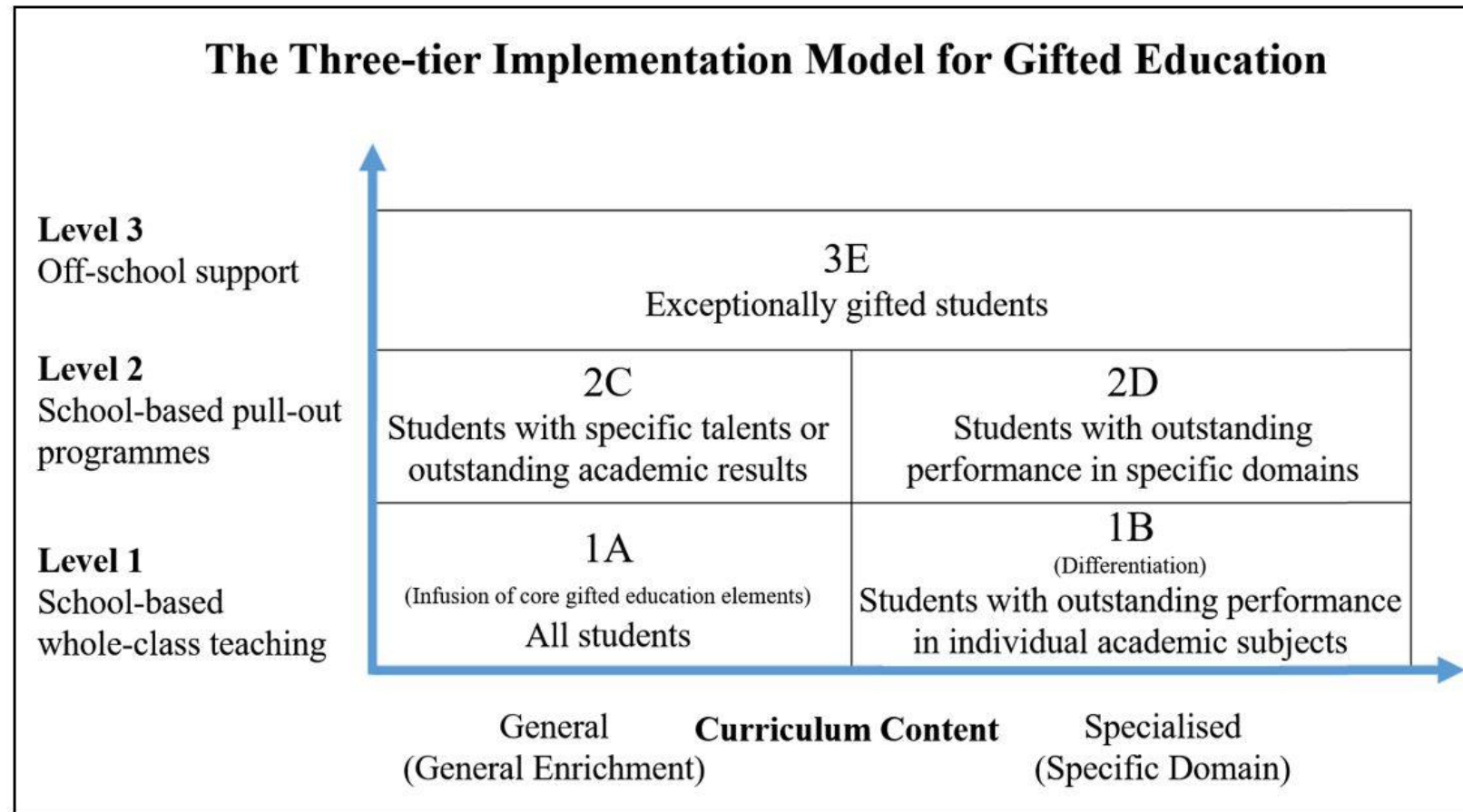


**To create a school-based talent pool**



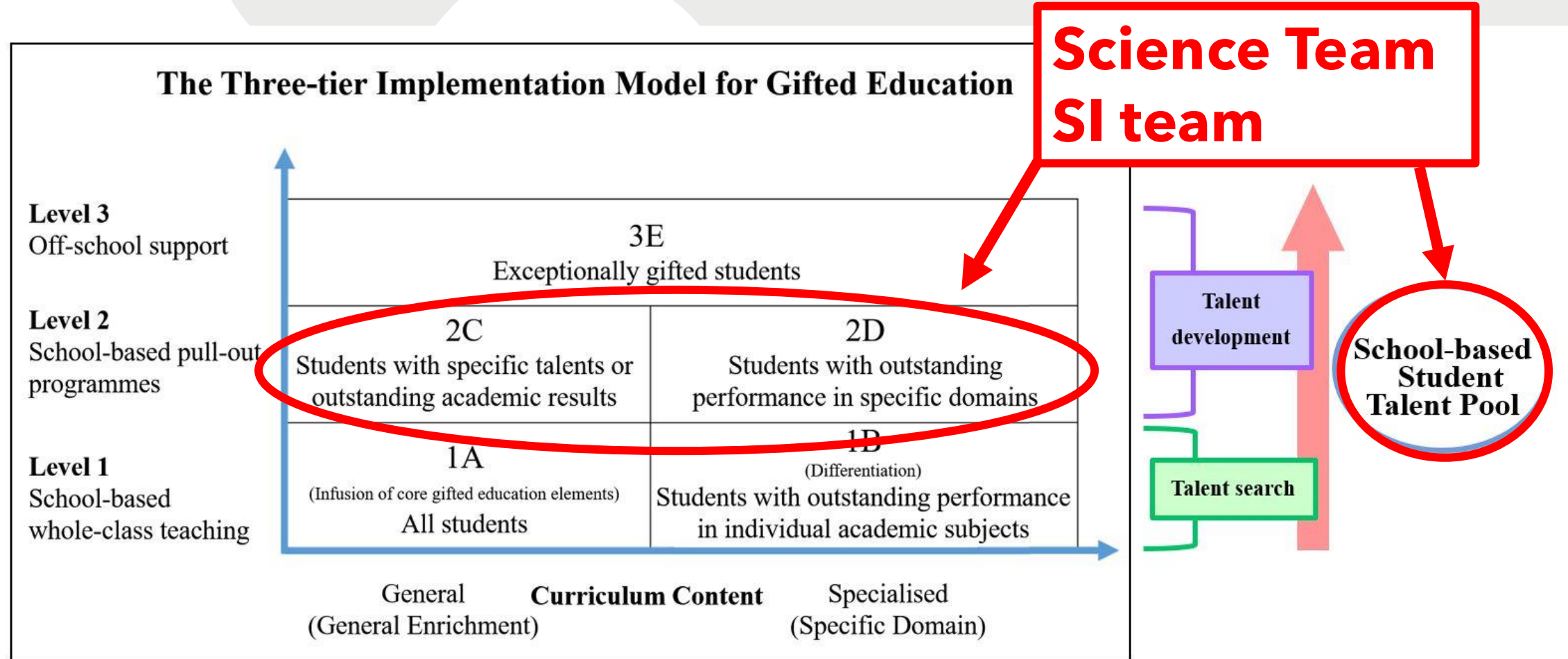
**To bridge between Tier 1 and Tier 3 in Gifted Education**

# Some rationale behind





# Some rationale behind



# Overview of Gifted education in Science and STEAM

## Gifted Education for all (Tier 1)

## Education for the Gifted (Tier 2 and Tier 3)



### Talent training

- MITIA
- Apple developer
- Competitions
- AI-900
- 校外進階學習課程

### Beyond curriculum

- SI team

### In-curriculum

- STEAM curriculum

### Outside competition /resources

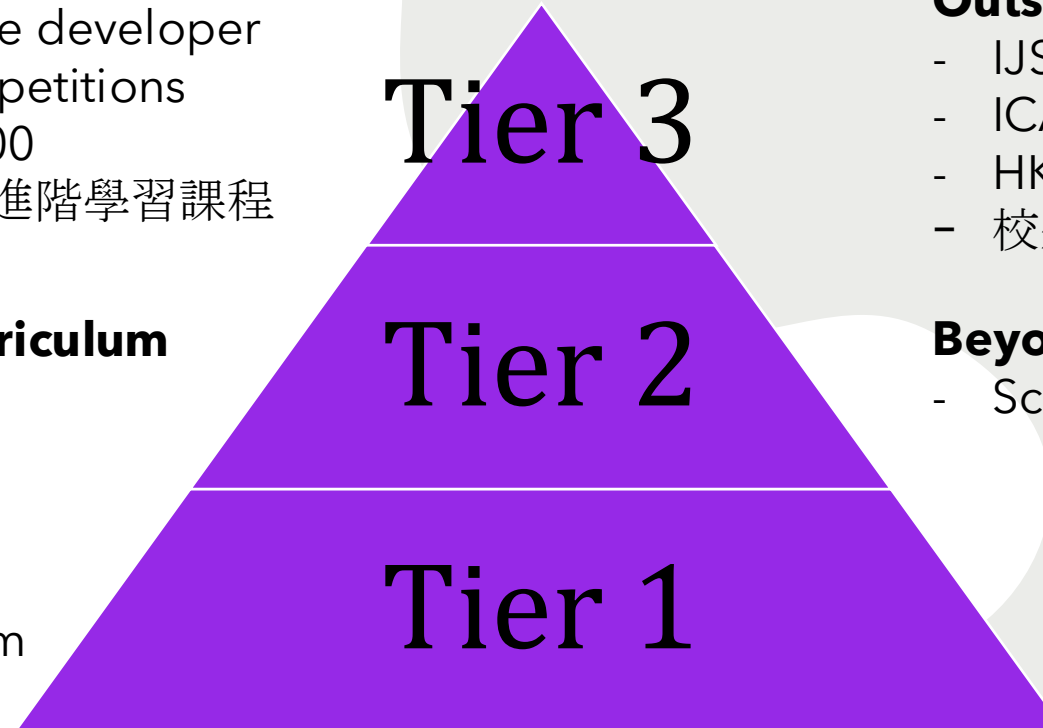
- IJSO
- ICAS
- HKAGE
- 校外進階學習課程

### Beyond curriculum

- Science team

### In-curriculum

- Science curriculum
- JSSOSS





Schoolhouse  
giftedness



Creative productive  
Giftedness

# Two views about gifted students



# Two Areas for sharing



## SCIENCE

Schoolhouse giftedness



## STEAM

Creative productive  
giftedness



SCIENCE



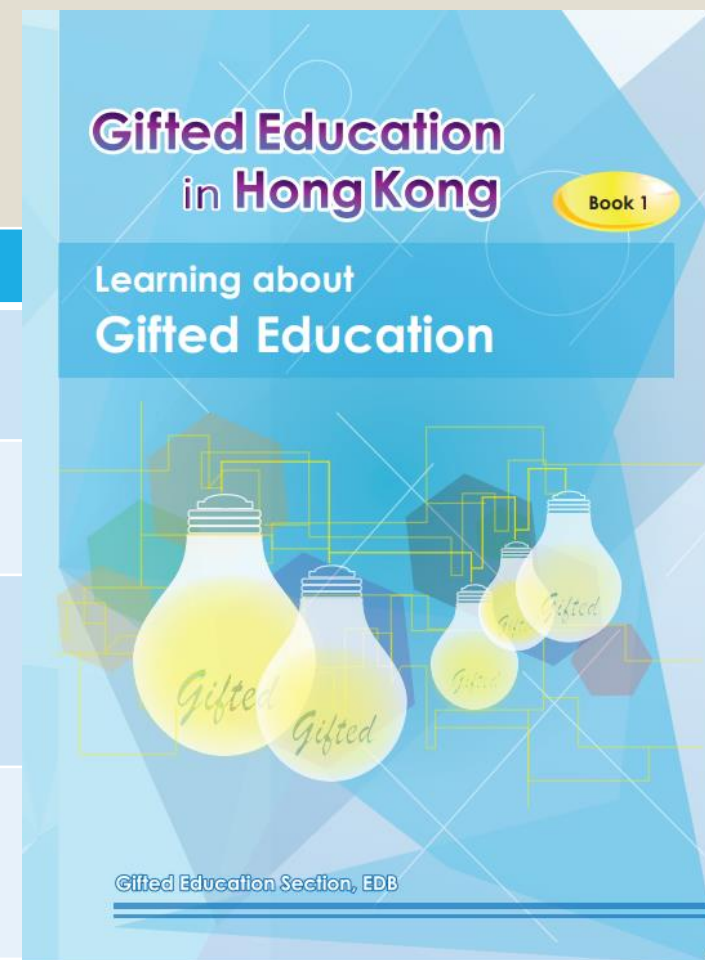
STEAM

# Two dimensions of gifted education

broad definition of giftedness adopted by EDB

## Area of talent search and development

- |   |   |
|---|---|
| 1. a high level of measured intelligences       |   |
| 2. specific academic aptitude in a subject area |   |
|   | 3. creative thinking – high ability to invent novel and elaborate ideas                 |
|   | 5. natural leadership of peers – high ability to inspire others to achieve common goals |



YLMASS Science  
Team

# Different Tiers in YLMASS Science Team

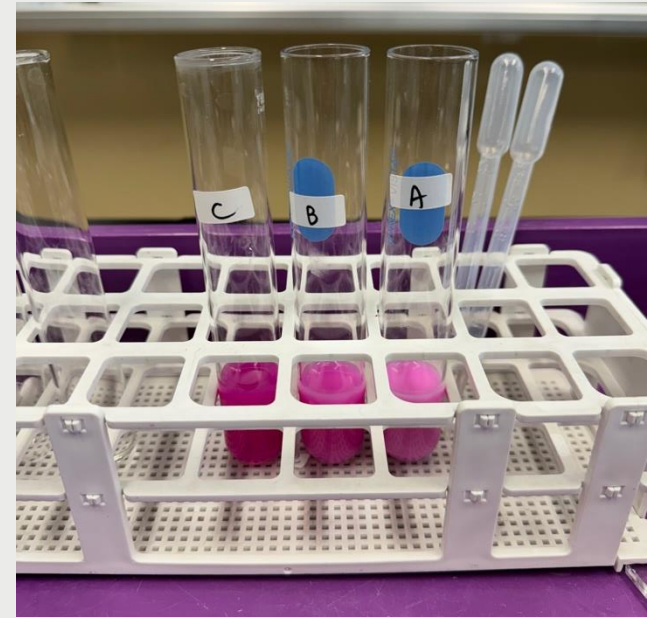
## Tier 1: Talent Search

- Differentiated curriculum, assessment

## Tier 2: Developing Talent at school

- Science team curriculum

## Tier 3: Talent development outside school



# Talent Search: What are the ways to let the science gifted students to “standout”?

- Problem: typical summative assessment might not be valid enough
- Solution:
  - Core, challenging questions in norml in-class discussions
  - High-order questions in school exams
  - Screening test for the Science team

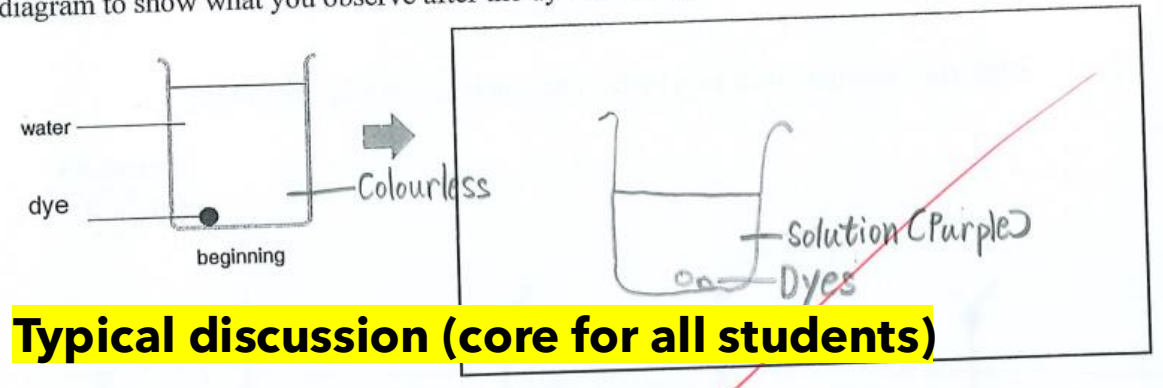


# Talent Search: What are the ways to let the science gifted students to “standout”?

## Differentiated curriculum (in-class discussion)

- Challenging discussion question
- Task focus: apply and integrate their conceptual understanding and transfer to an unfamiliar situation

1. Draw a diagram to show what you observe after the dye dissolves



7. Challenging Question:

1. Do volume and mass change when dye dissolves in water?
2. Can you explain your answer with your model?

Volume will change but mass will not.  
The dye particles will go inside the spaces between the water particles. Therefore, the volume of solution will be less than the total volume of dye and water before dissolving.  
The total number of particles remains unchanged in dissolving so the mass is conserved.

7. Challenging Question:

1. Do volume and mass change when dye dissolves in water?
2. Can you explain your answer with your model?

No, I don't think the volume and mass change with dye when it dissolves in water. Refer to the model, the dye particles still have the same number of particles, so the dye dissolved in water. The water's volume and mass shouldn't be changed after.  
Think about: does the volume of solution only relate to the number of particles?

**Challenging Question (for talent search)**

# BONUS Question in School Exams

(Out-of-syllabus but talented students should be able to transfer learning and create new knowledge)

## Extended Questions (S1 Unit 6 Particles)

**Challenge point:**  
**Using an accurate model to**  
**explain phenomenon**

5.

- (a) Frankie reads a textbook. It says that “*the density of matter in solid state is usually higher than the density of it in liquid state*”.

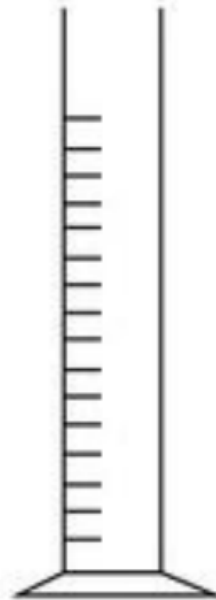
Therefore, he puts the same mass of solid and liquid into two measuring cylinders.

Draw a particle model to explain what the textbook says.

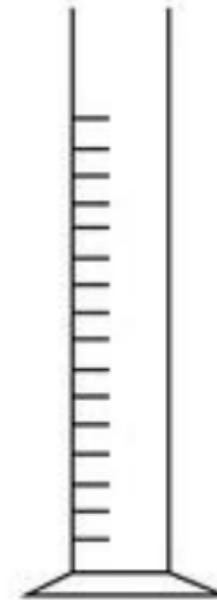
Your diagram should show around 9-12 particles.

(1 mark)

Solid state:



Liquid state:





# BONUS Question in School Exams


(Out-of-syllabus but talented students should be able to transfer learning and create new knowledge)

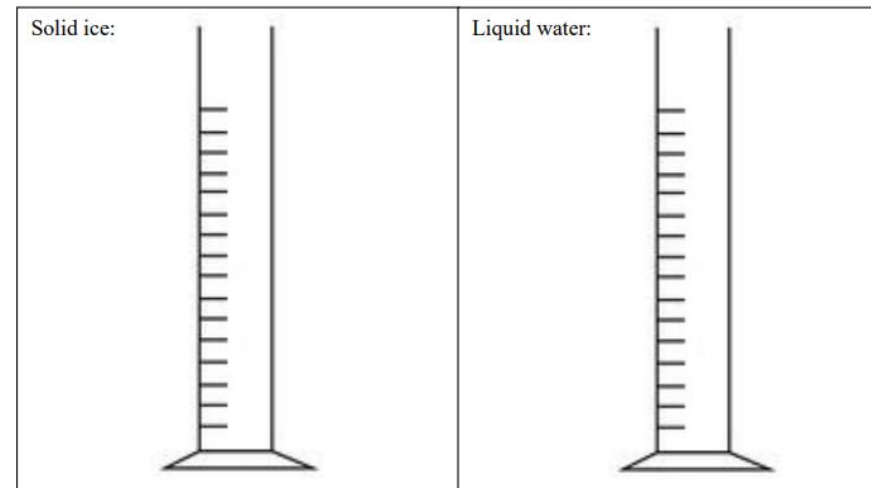
## Extended Questions (S1 Unit 6 Particles)

Challenge points:

1. Comprehend information and transfer knowledge to unfamiliar situation
2. Apply their learning to daily-life situation

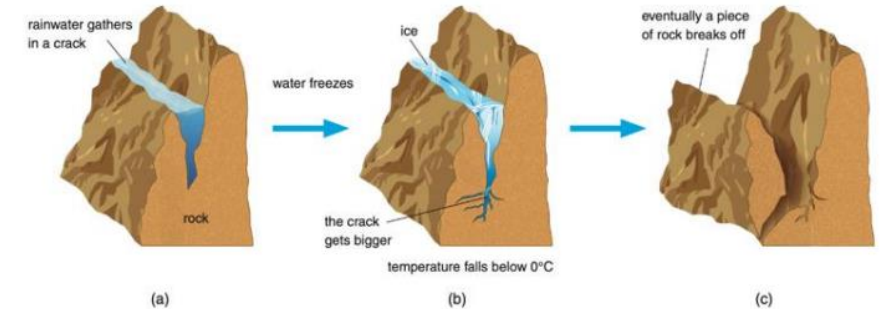
However, the density of solid ice is **lower** than the density of liquid water. Using the information shown below, draw a particle model to explain this. Your diagram should show around 9-12 water particles. (1 mark)

Shape of water particle	Density of liquid water ( g / cm <sup>3</sup> )	Density of solid ice ( g / cm <sup>3</sup> )
<p>V-shape</p>  <p>This figure shows the shape of ONE water particle.</p>	1.0	0.9



### Why does freezing of water speeds up the break-down of rocks?

- As shown in figure a below, water (e.g. from rain) can fill cracks in rocks.
- When the temperature drops below 0°C, water freezes and form ice (Figure(b)). This causes the rocks to break apart (Figure (c)).
- Freezing water to form ice is the important process which makes the rock break off.



- (i) Why does break-down of the rocks happen more often in mountain regions and desert areas but not in other areas? (1 mark)

- (ii) Briefly explain why break-down of the rocks happen when water freezes to form ice every day. (1 mark)

# Talent Search: How to differentiate if the student is a "science student"?

## Extended Questions (S1 Unit 2 Water)

- BONUS Question in school exams

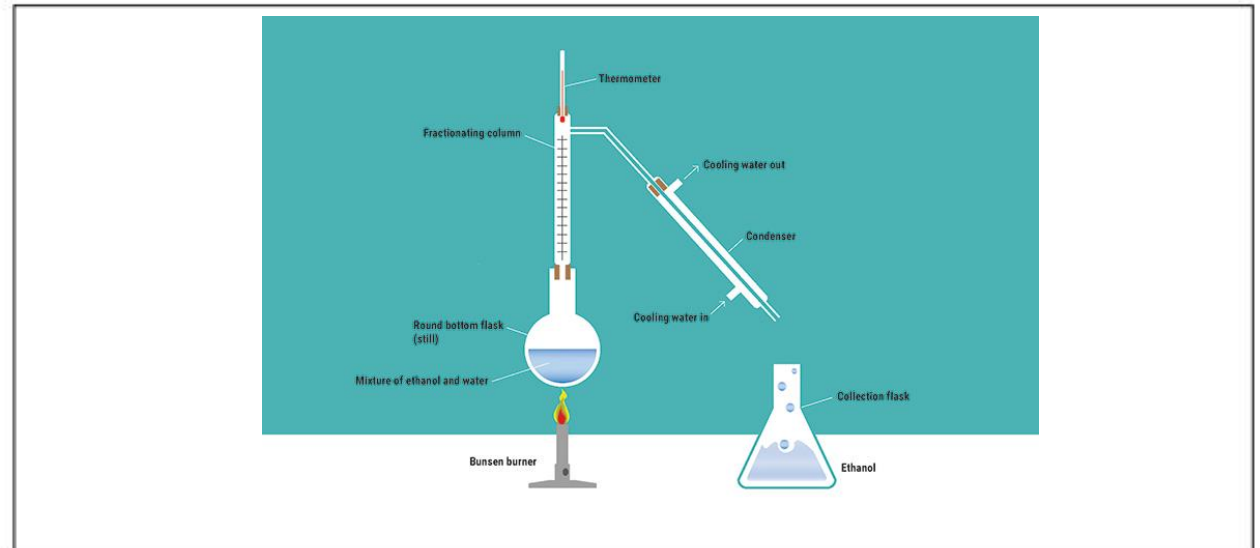
The table below shows some information about ethanol.

Soluble in water?	Boiling point (°C)	Colour
yes	78	colourless

A bottle is mixed with water and ethanol only. A student wants to separate and collect both liquids.

According to the information above, AND your own knowledge, suggest a method to help the student.

- (a) Draw a labelled vertical section diagram for the method. (2 marks)

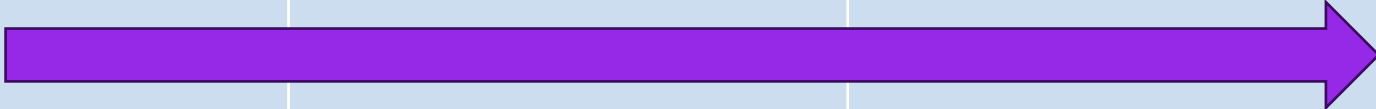


- (b) Briefly describe the method and explain how this method works. (2 marks)

# Tier 2: Curriculum Design (Match + Extension)

- Around 20 1.5-hour sessions in a school year (**accelerated program**)
- Example: Chemistry curriculum as a match to S1 Science syllabus

Tier	Normal Curriculum	Pull-out Curriculum	Experiment session	Tier 3
Content	<b><u>S1 Science U6</u></b> Particle theory Using particle models to explain phenomena	Atoms, molecules Periodic Table Bonding and Structure	Design an investigation to compare reactivity of metals	Typical reactions of elements  Conservation of mass, mole concept



Another example:

- Dissection activity: learn about cells, organs and systems

Extra practical work  
to extend student's  
learning

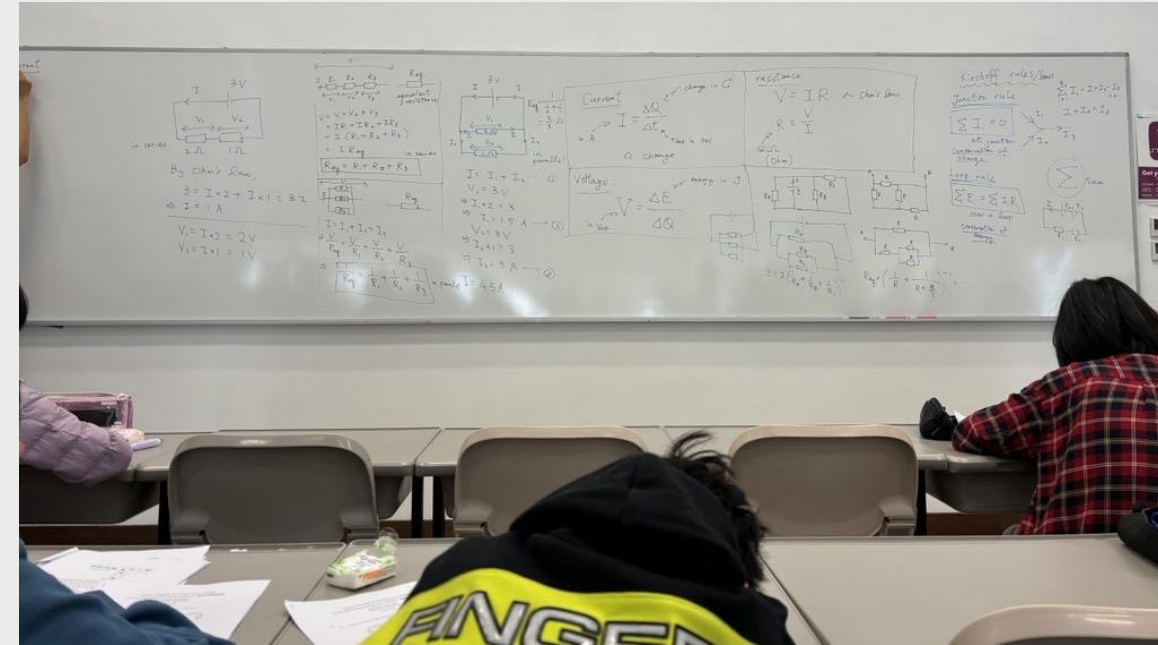
# Science camp for the science team

- to cultivate their interest in learning science

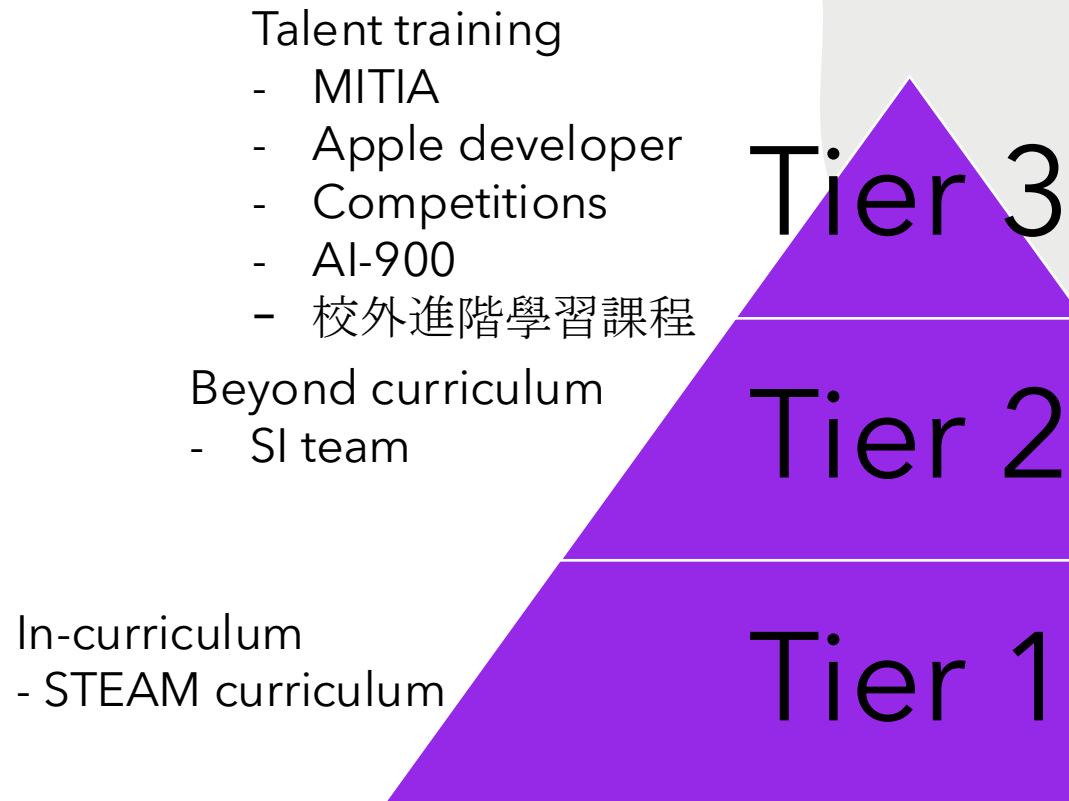


# Tier 3

- Gifted Education Fund: Off-school Advanced Learning Programmes
- HKAGE
- IJSO HK Screening and Training for the international competition
- CUHK Science Academy for YOUNG TALENT
- Etc.



# School based STEAM education





# Tier 1 in STEAM education

Conceptual:  
What are the needs of  
users?  
(*perspective-taking*)  
What should we do?



The diagram consists of two solid purple circles connected by a thin horizontal line. The left circle contains the text 'Service Learning' and the right circle contains the text 'Technology Education'. The circles are positioned in the center of the slide, between the 'Conceptual' text on the left and the 'Practical' text on the right.

Service  
Learning

Technology  
Education

Practical:  
How to implement  
the idea?

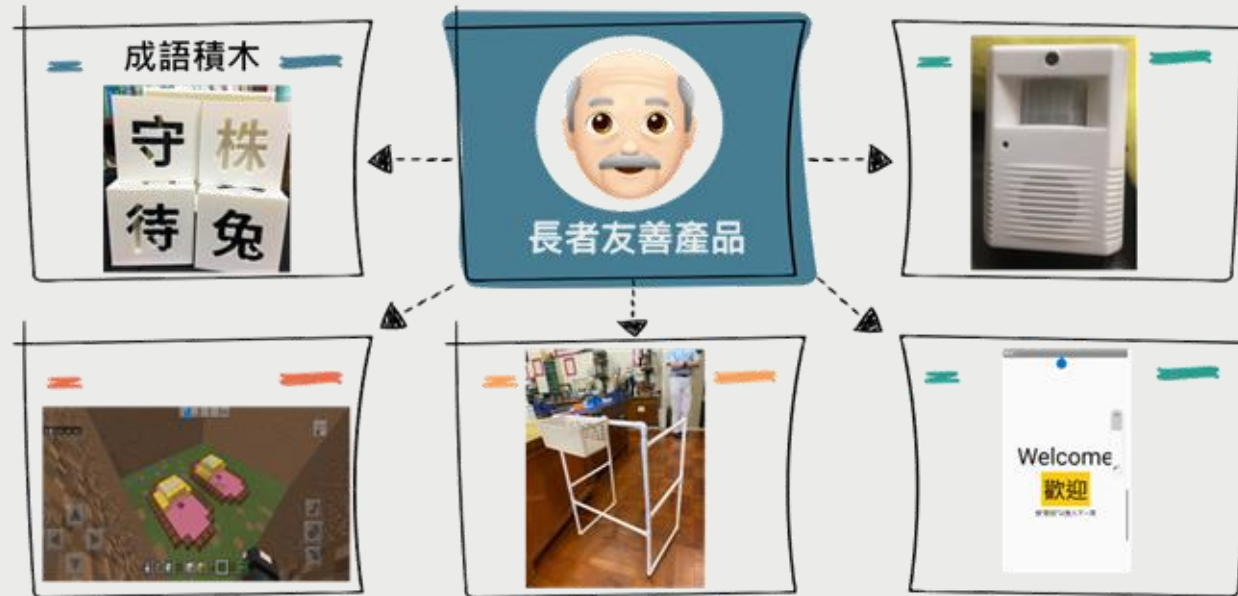
# Curriculum mapping

- Creating the context for the application of technology
- Adding elements for students to differentiate their ability via project-based learning
  - Coding (basic and advanced)
  - Product development (creativity)

Overview of the curriculum

		Technology Education			Service Learning	Life and Society
		Home economics	Design and Technology	Computer literacy		
S.1 elderly-friendly product	Block 1	Module 1A: Needlework	Module 1B: IG shop	Module A: Micro: bit	生命故事冊	
	Block 2	Module 1A: Needlework	Module 1B: IG shop			
	Block 3	Module 2A: Cookery	Module 2B: Advanced Micro: bit	Module B: Presentation	Self-directed project: elderly-friendly product	
	Block 4	Module 2A: Cookery	Module 2B: Advanced Micro: bit	Module C: IT and Society		
	Block 5	Module 3: Self-directed project: elderly-friendly product				
S.2 environmentally friendly product	Block 6	Module 4A: Sewing Machine	Module 4B: Structure	Module D: Basic idea of AI	SDG goal	
	Block 7	Module 4A: Sewing Machine	Module 4B: Structure			
	Block 8	Module 5A: Cookery	Module 5B: Application of AI	Module E: Video processing	Video of initiative	
	Block 9	Module 5A: Cookery	Module 5B: Application of AI	Module F: Spreadsheet	Module 6: self-directed project: environmentally friendly product	
	Block 10	Module 6: self-directed project: environmentally friendly product				
S.3 Startup 1001	Block 11	Module 7A: Cookery	Module 7B: Mechanism			
	Block 12	Module 7A: Cookery	Module 7B: Mechanism			Business proposal
	Block 13	Module 8A: Fashion Design	Module 8B: Product design	Website building		Website building
	Block 14	Module 8A: Fashion Design	Module 8B: Product design			Start up 1001

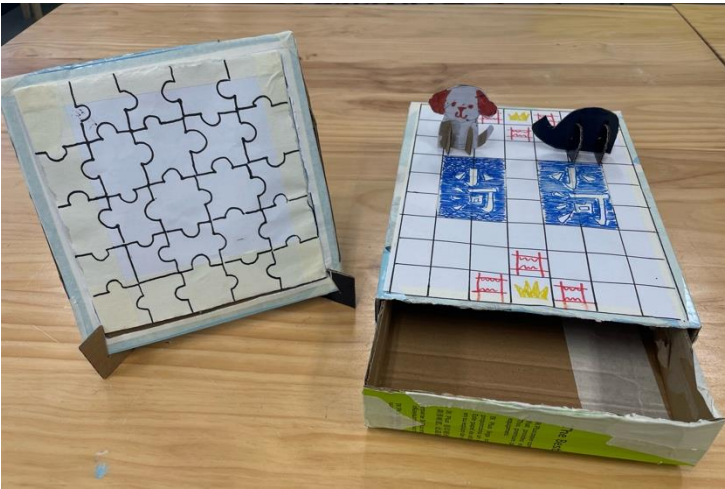
## 服務學習：長者友善產品



## S.1 and S.2: Collaboration with service learning

# S.3: Startup 1001

- Students learn some BAFS ideas in DT lesson as a taster programme
- Students are asked to create a company for selling a product



# Initial talent search for building the school-based talent pool



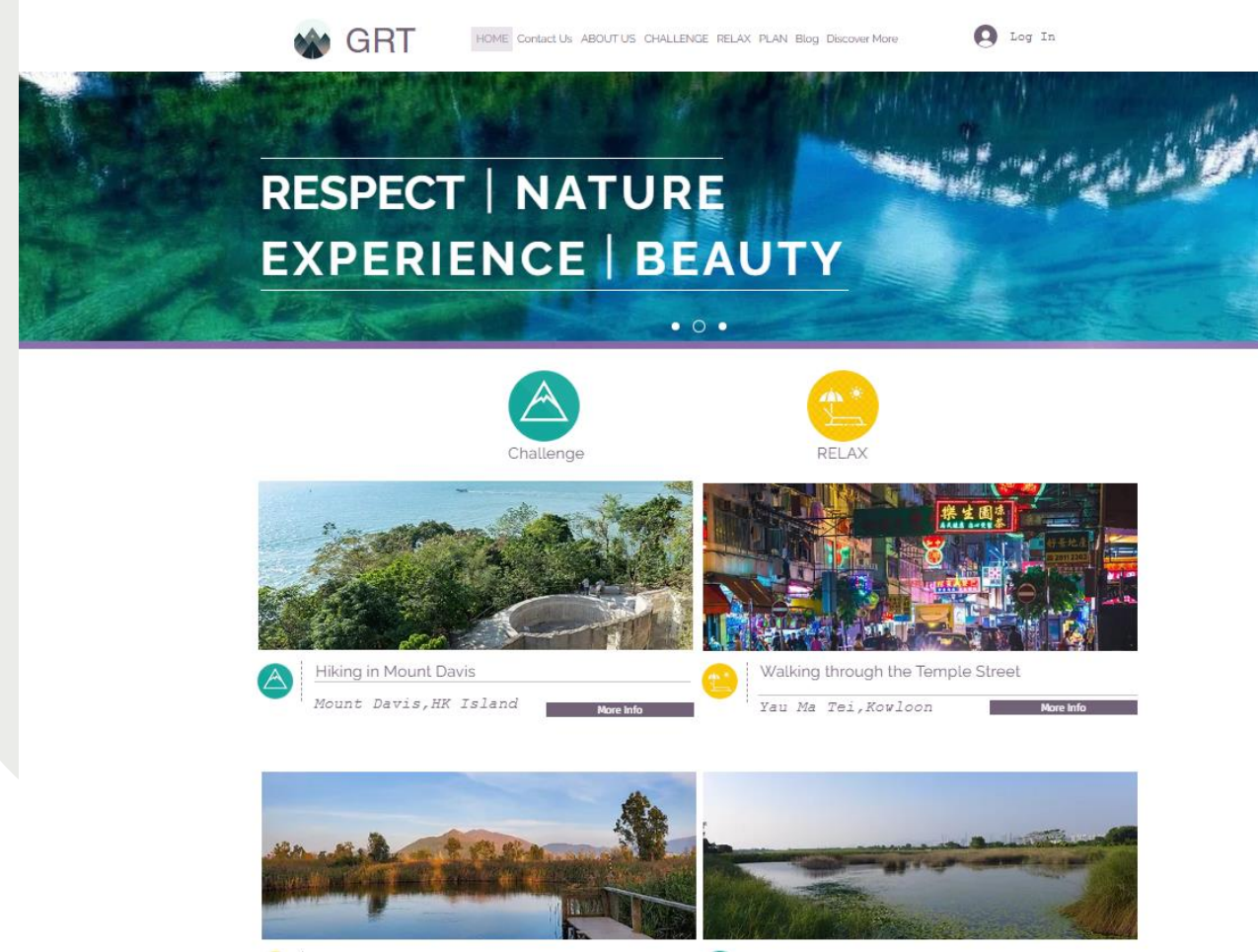
Providing chances for students to perform in different area

# Pitching Session

- Providing opportunities to students with different talents
- As a small-scaled Tier 2

# Company website and advertisement

Providing different opportunities for students to perform - as a talent search





# Using poster for pitching

- For searching students who are creative.



**貝貝之智能藥盒**  
製作團隊：貝貝之家

**我們的設計目的？**  
因為老人家的記憶較差，經常忘記吃藥，所以我們的智能藥盒設計強調提醒老人家記得準時食藥的。並且有可愛的「貝貝」吉祥物無時無刻陪伴著老人家食藥，無比窩心。

**產品目的**  
因為老人家的記憶較差，經常忘記吃藥，所以我們的智能藥盒設計強調提醒老人家記得準時食藥的。並且有可愛的「貝貝」吉祥物無時無刻陪伴著老人家食藥，無比窩心。

**時間設置**  
透過按排合適的時間間隔，令老人家準時食藥。(模型展示為5秒間隔)

**藥盒自動打開**  
當到達設定時間時，藥盒可自動打開。

**聲音提醒**  
「噠噠噠」，到達設定時間時，microbit會有提示音響

**智能藥盒的功能？**

**產品設計技術？**  
該產品有什麼特色？

- 以microbit 編程和servo motor技術設計出服務長者的產品♥
- 產品操作性簡單，適合老人家使用，按鍵即暫停響鬧進入下一段計時。

~貝貝之家——令老人家都感受到家的溫暖~

**智能拐杖的三大獨特之處**

1S詹鎧蔚 1S羅靖匡 1S梁家嘉 1S馮耕成

**功能一**  
有兩個支撐老人家的支撐點

和其他的拐杖不同，我們設計的拐杖有兩個支撐點，而普通的拐杖只有一個。而兩隻腳比一隻腳好的原因是在於老人行樓梯時。老人家可以將腳比較粗的放在上面的梯級，將較長的放在與自己並排的梯級，從而令長者在行上樓梯的時候可以扶著拐杖，更加不用擔心安全性的問題和令長者更容易可以行上樓梯。

**功能二 警報功能**  
當老人家受到碰撞或跌倒，就會觸發警報器。警報器可以讓路人發現，提醒路人老人家需要幫助

**功能三 有電筒功能**  
當老人家需要晚上散步時，就會很難看到路，而我們的拐杖就有電筒功能，按下A制能打開電筒，而按下B制就能關閉電筒。

# Using website as pitching

- For students who are creative and with a high task commitment



S · TRAVEL

  Log In

[Home](#) [Our company](#) [Meet our team](#) [Products](#) [Contact us](#) [Links](#)

## Our Slogan

S · TRAVEL · Your Gateway to Incredible Cycling Adventures



## Our story

S · TRAVEL was founded in 2023. As we discovered many people who are always stressed by their busy city life and want someone to accompany them when travelling and like travelling with bikes. You can relax yourselves in this trip with a professional coaches. He/she would coach you cycling and have a cycling travel with you at the same time.

Since we opened our doors, we have dedicated ourselves to planning trips that provide travelers with beautiful memories for years to come. Whatever type of trip you're dreaming of, we've got it all covered. Get in touch today and let us take care of the rest.

 Let's Chat!



# Tier 1 education serves as a talent search

- Students with a strong interest in STEAM.
- Students with a good presentation skills.
- Students with a good leadership.
- Students with a good creativity.

# Tier 2 in STEAM education – SI TEAM

- For students who have a strong interest in STEAM.
- Self-nomination and no selection criteria
- Pull-out programme for students to study STEAM (1 session per week)
- Deeper discussion on:
  - Artificial intelligence
  - Internet of things (IoT)
  - Advanced Programming
  - Database, App development, etc.

# Students' learning task in Tier 2

- To learn advanced technology (some of them are aligned with HKDSE ICT curriculum – accelerated programme)
- To hold a project to solve problems
- Presentation to all students in school and vote for “Project of the Year”.

# Previous themes and projects in Tier 2

Not focusing on prize winning but to create a platform in nurturing students' passion and ability.

- A better school-life
  - Languagemate (AI language learning APP)
  - Fingerprint doorlock
  - M-pass (registering student card to iPhone)
- A New traffic solution
  - Traffic terminator ( AI traffic camera)
- Health-hack
  - Green window

# Constant training for enrichment

Student performance is constantly observed

Potential students will be picked to Tier 3



# Stronger support in Tier 2

- The project will be endorsed after board interview
- Each project will be allocated with one teacher/trainer for continuous support.

## The general flow of entrance and the corresponding requirement

### Associate member:

1. Everyone can join this part as an associate member.
2. One mentor teacher will be assigned to each research project
3. Associate members cannot use the S.I Lab until they can pass the board interview and become a full member

### Full member:

1. Full members have the right to use the lab whenever the committee members present.
2. Full members can freely use the budget approved by teachers for research purpose.
3. Full members must attend progress report meetings which are held once a month.
4. Full members must finish their project by May and they must take part in S.I fiesta.

potential member recruitment



3-4 trainings in writing research proposal



research proposal



board interview



main research



Interschool competition



S.I. fiesta

### Items required:

1. Research question
2. Theory
3. Budget

To be conducted by the committee member & teachers

### Requirement:

1. Product
2. Research report
3. 1m x 1m Poster

### Aim and objective:

To share the work with other students.

Students will experience  
a “simulated” tier 3  
experience

# Tier 3

- Talented students will be referred to different outside activities according to their talent.
- Below are some examples:
  - MIT innovation academy
  - AI-900
  - Apple developer programme
  - 校外進階學習課程

# Overview



**For students, from 1 to 3**



**For teachers to design:**

backward engineering  
Each tier is the simulation of the  
next tier

Talent training

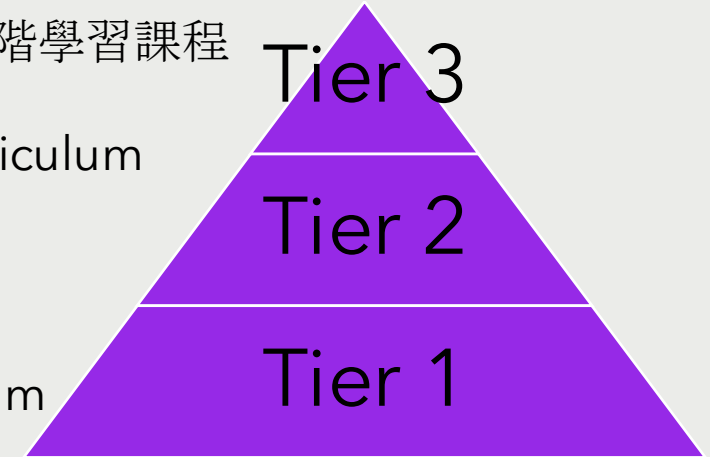
- MITIA
- Apple developer
- Competitions
- AI-900
- 校外進階學習課程

Beyond curriculum

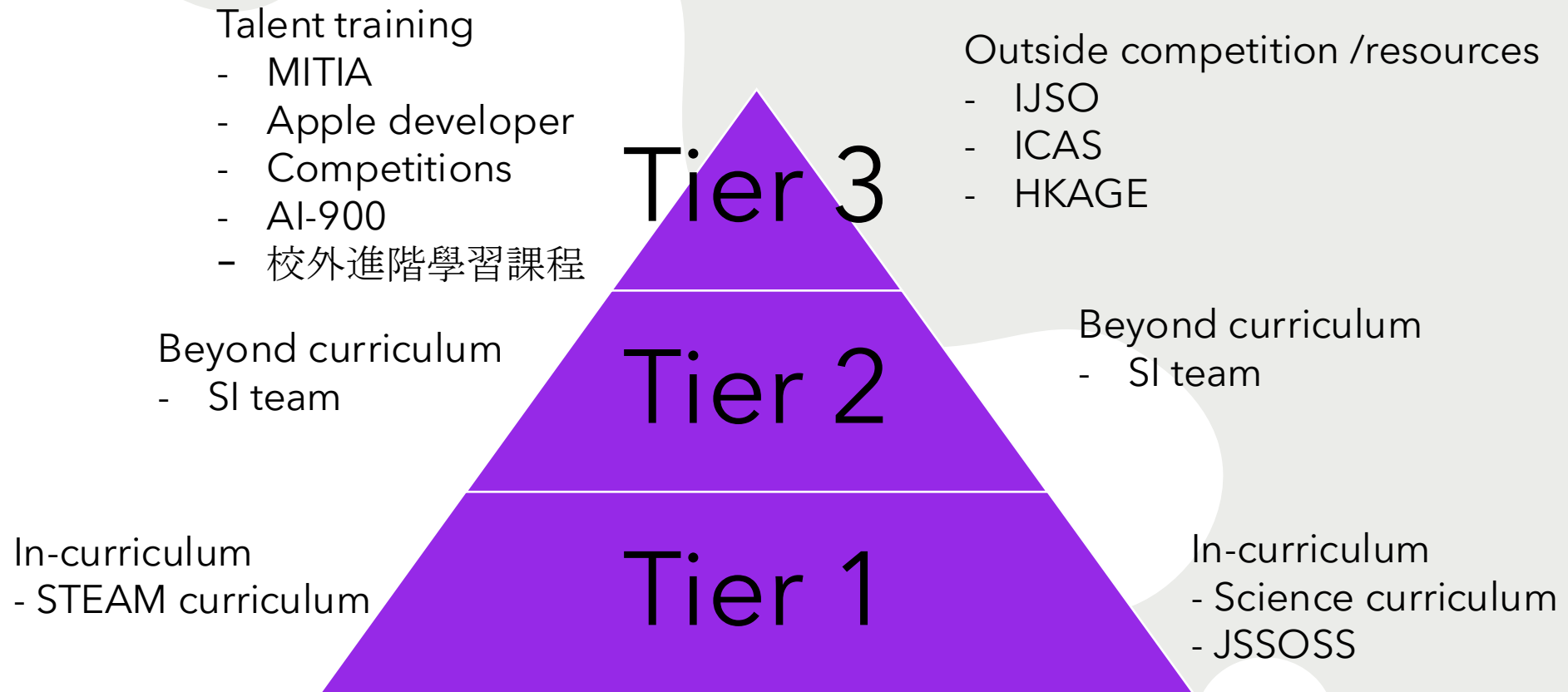
- SI team

In-curriculum

- STEAM curriculum



# School based STEAM education



# A WAY FORWARD

Teaching and  
Learning issue is the  
Key

With the pull-out programme (Tier 2), Gifted education can be bridged from classroom level to the global level

Especially for the students with low social-economical status



Rome was not built in a day

