LTE 2021 InnoSTEMer

Innovative Science/STEM Edu Learning and Teaching Packages

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This project is supported by Quality Education Fund (Project No. 2019/0640)

優質教育基金
Quality Education Fund

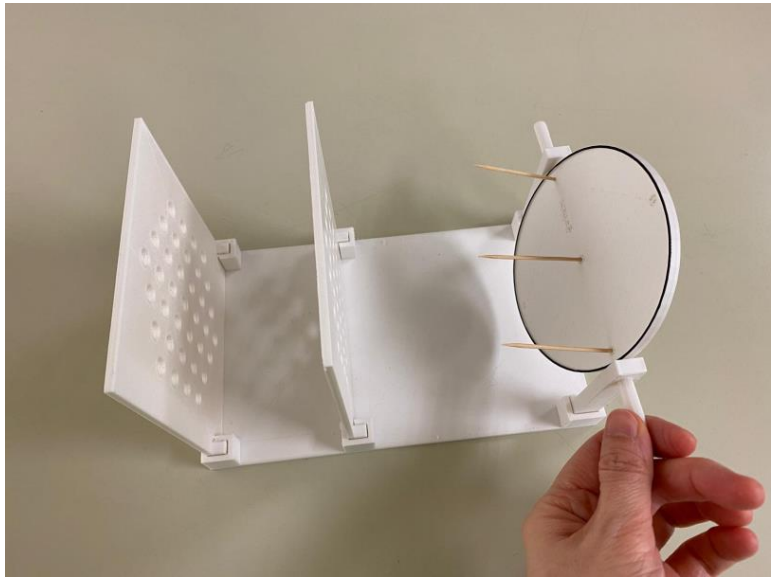
Faculty of Education
The University of Hong Kong
香港大學教育學院

Teaching Package Features:

(1) Two exemplars of 3D-printed interactive teaching models/tools

(2) Inquiry-based activities might promote students' learning interest.

(3) The designs were simple, low-cost and easy to replicate in all schools.



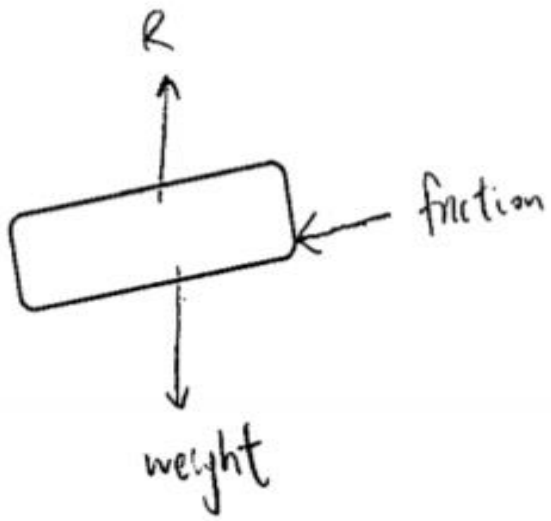
How to address alternative conception in learning Science?

- A heavier metal ball falls faster than a lighter metal ball
  - Students often observe the situation with a considerable effects due to air resistance

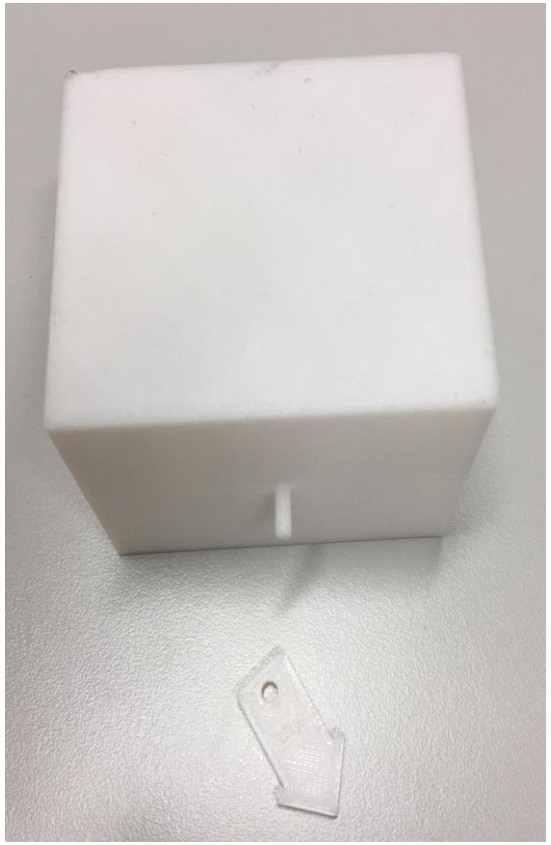
Teaching Strategy:
Demonstration

Sample of Student's Performance in 2015 HKDSE Question 4(c)

(c) Draw a free-body diagram to show the force(s) (with labels) acting on the block as it moves up the inclined plane after the push is removed. (2 marks)



Source: Hong Kong Examinations and Assessment Authority
http://www.hkeaa.edu.hk/en/hkdse/hkdse_subj.html?A2&2&20_25

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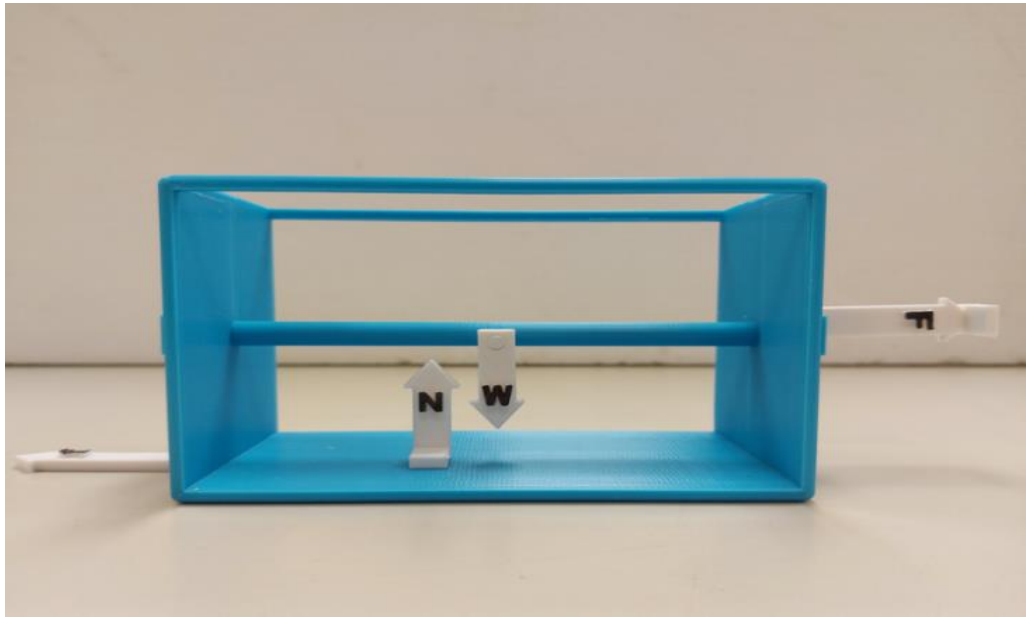
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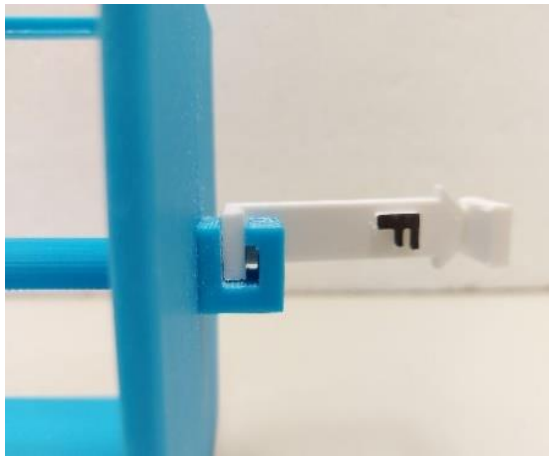


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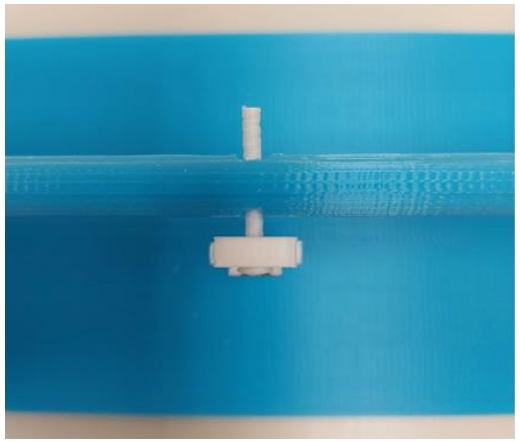

Dynamic Magnetic Flux Model

How teachers benefit from practicing STEM?

Chui Man Hin Eric

Leung Pui Fong

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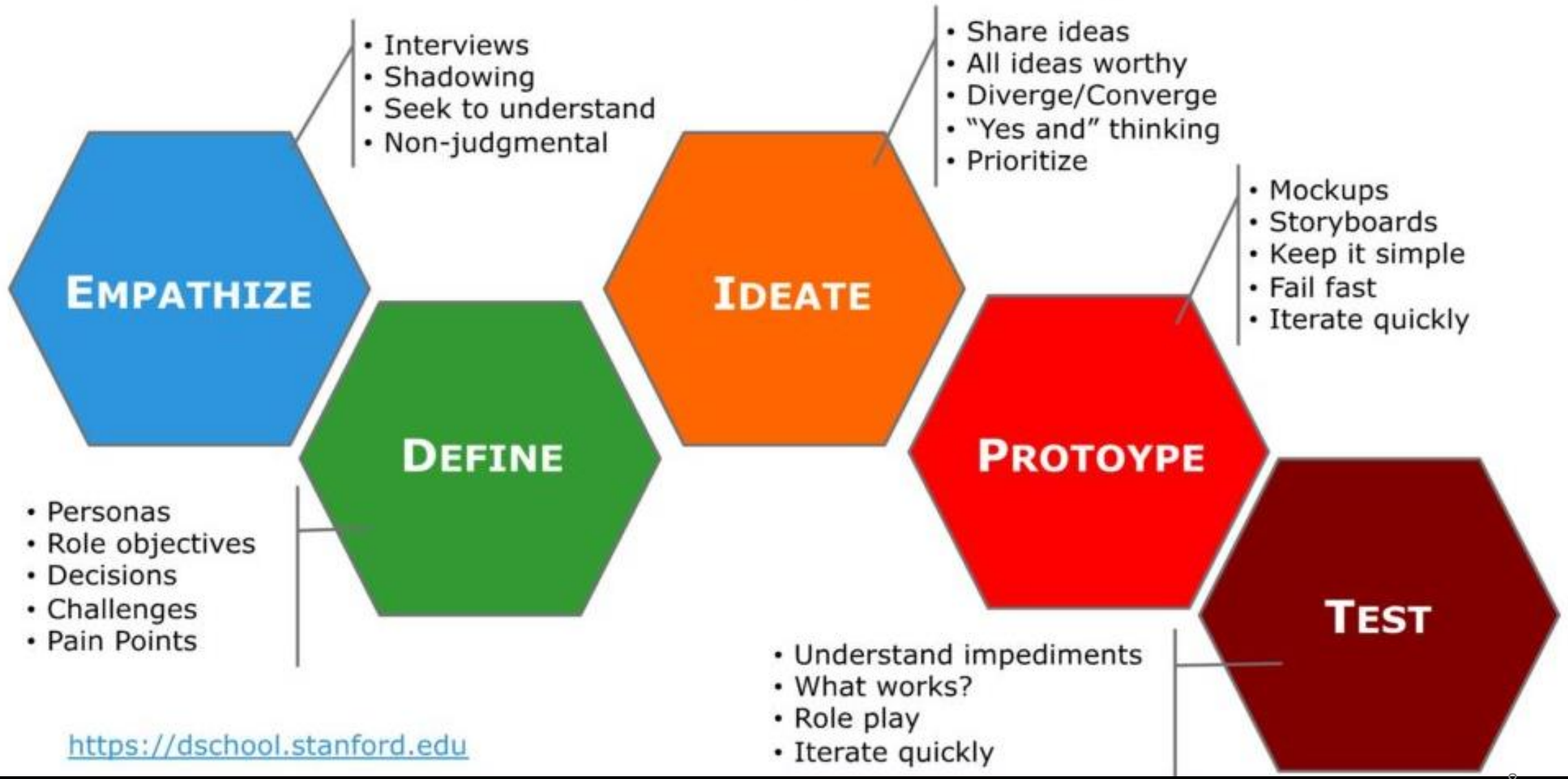
Stanford d.school Design Thinking Process



https://dschool.stanford.edu

Collecting feedback

1) There is a single-turn circular coil with diameter 5 cm.
The coil is placed in a uniform magnetic field 1.5×10^{-3} T, perpendicular to the magnetic field.

a) What is the magnetic flux through the coil? Show the calculation.

b) When the magnetic field increases from 1.5×10^{-3} T to 5×10^{-3} T,
   i. What is the new magnetic flux through the coil?
   ii. What is the change of the magnetic flux through the coil in (b)(i)?

1 EMPATHIZE
2 DEFINE
3 IDEATE
4 PROTOTYPE
5 TEST

I cannot see the flux...

It’s difficult to imagine!

Objectives

(i) To define magnetic flux $\Phi = BA \cos \vartheta$

(ii) To interpret magnetic field B as magnetic flux density

1 EMPATHIZE

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Using a MODEL

See things differently, unexpected inspirations

1 EMPATHIZE

2 DEFINE

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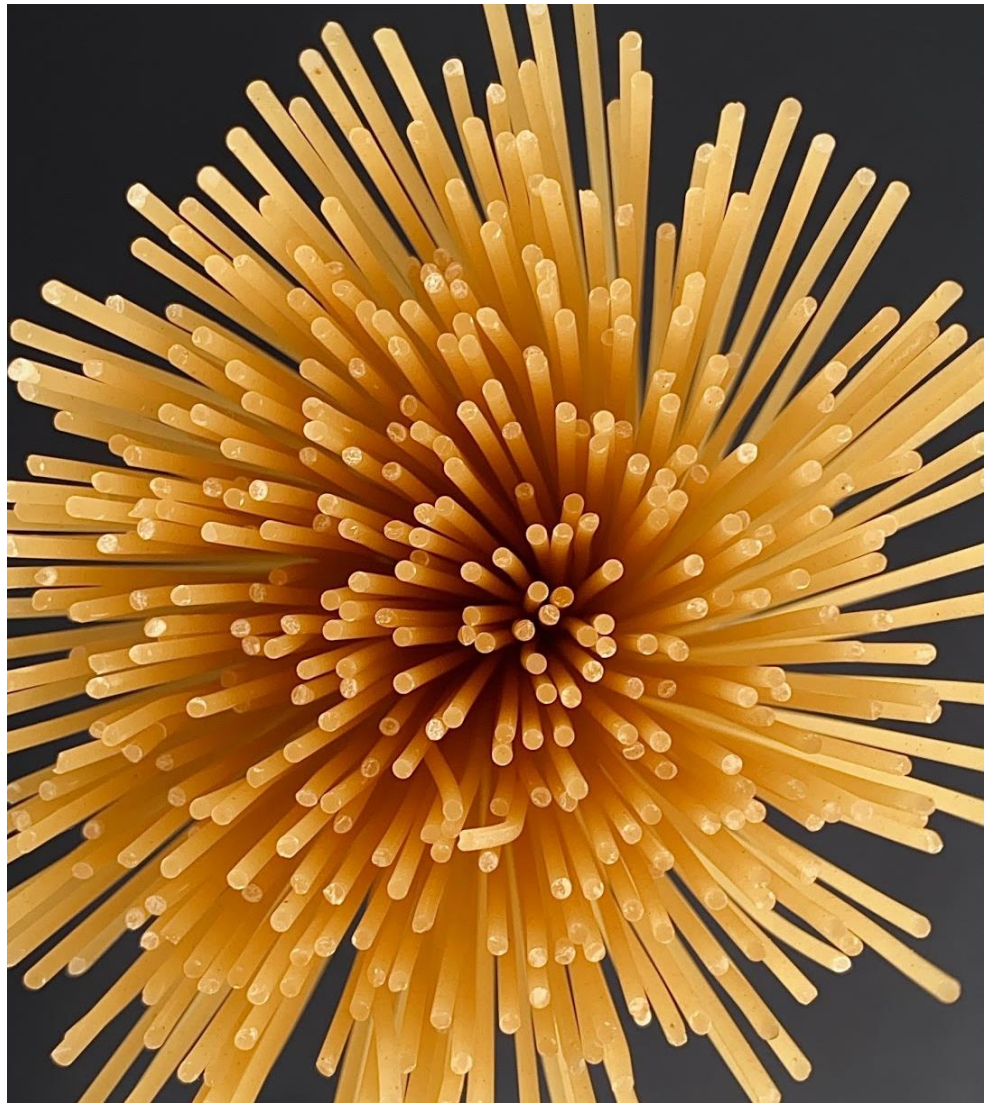

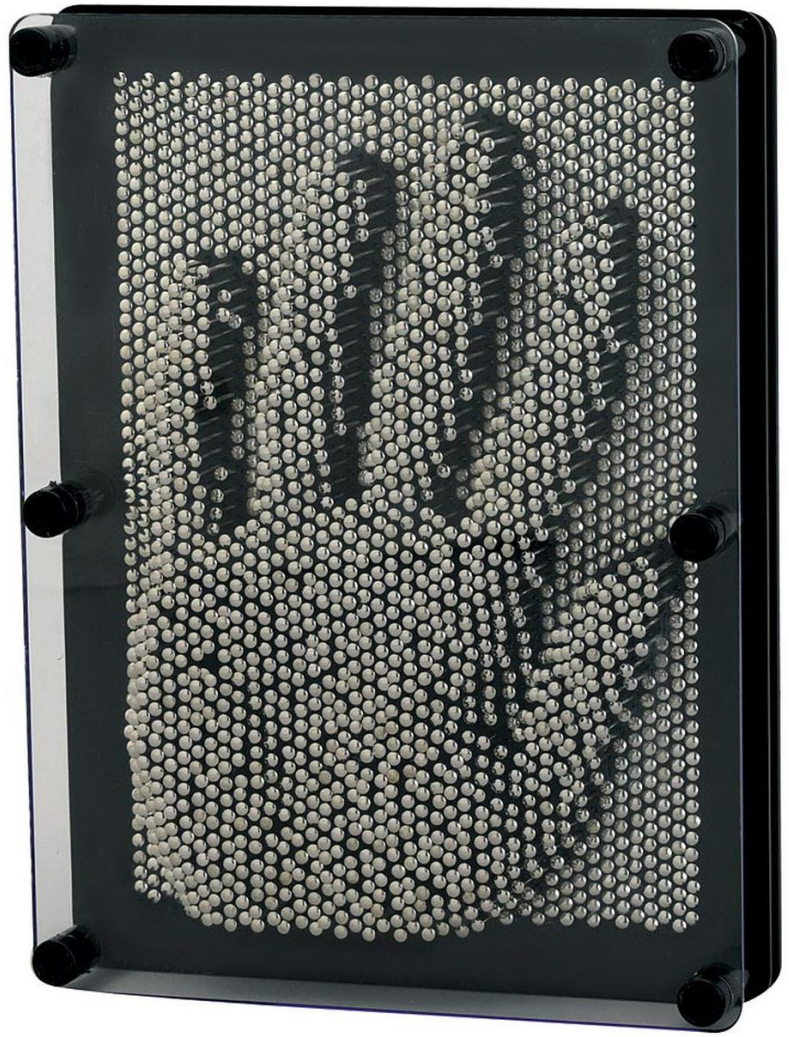

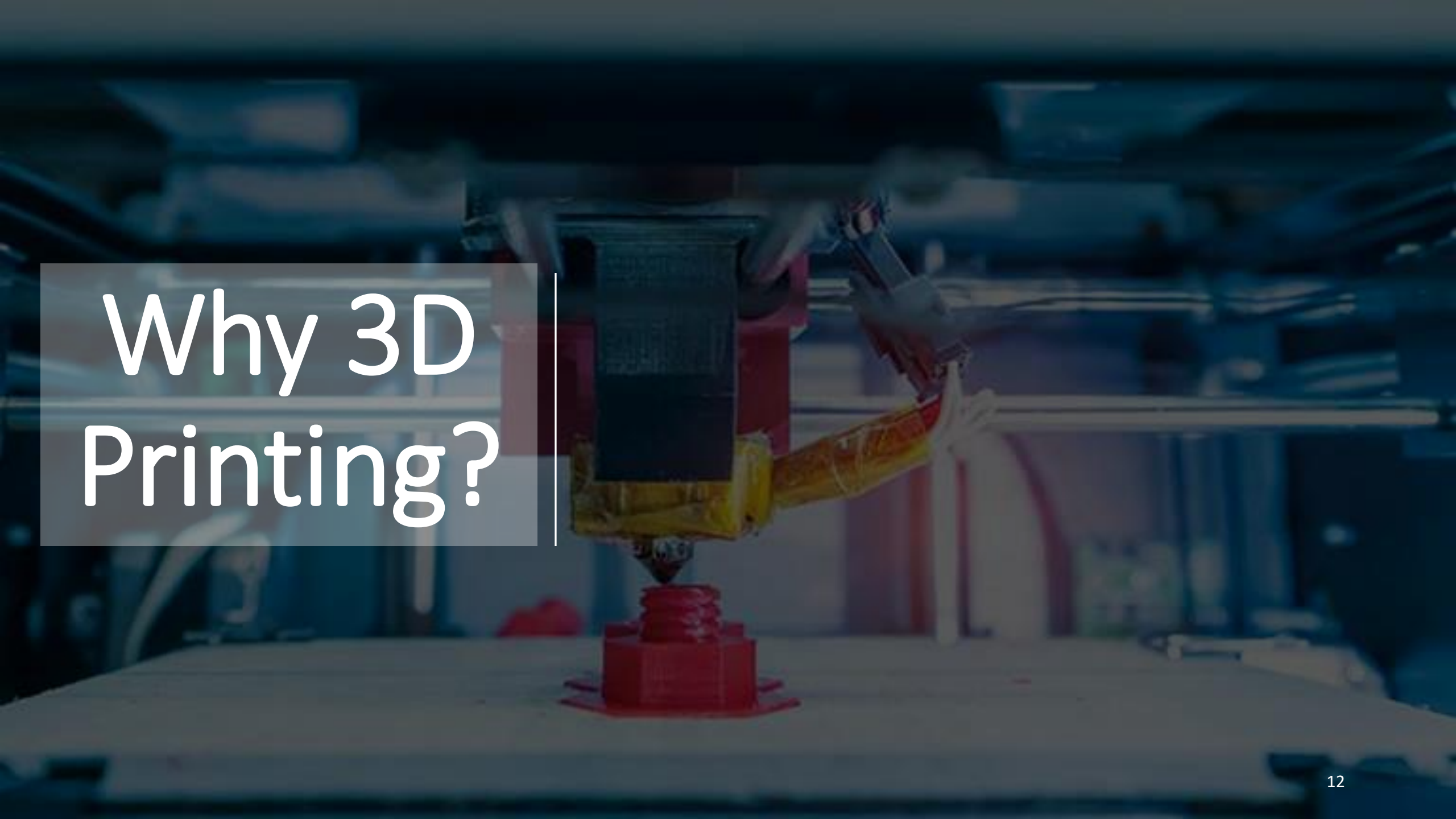

Why 3D Printing?

Easy to replicate, share and modify

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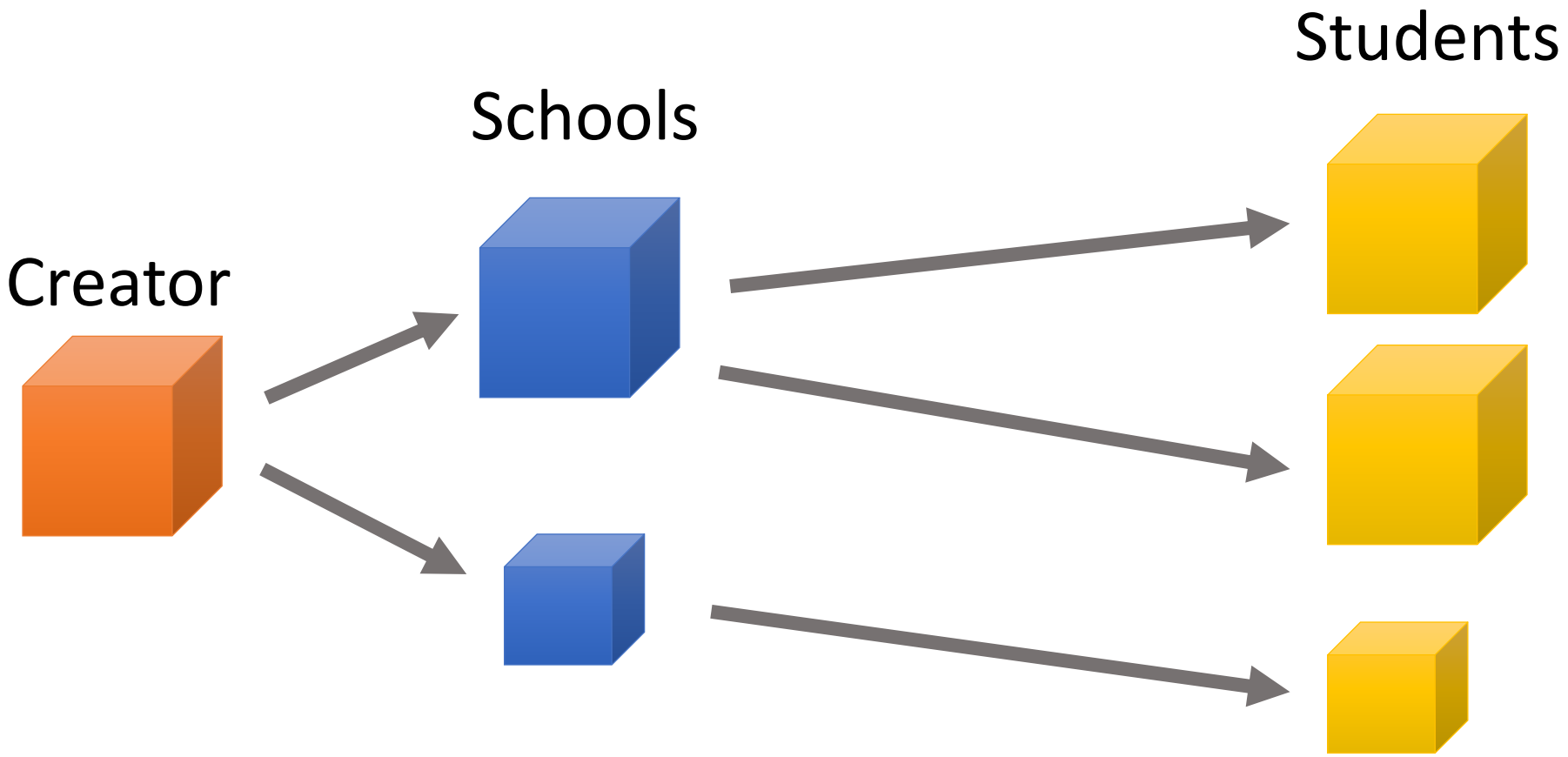
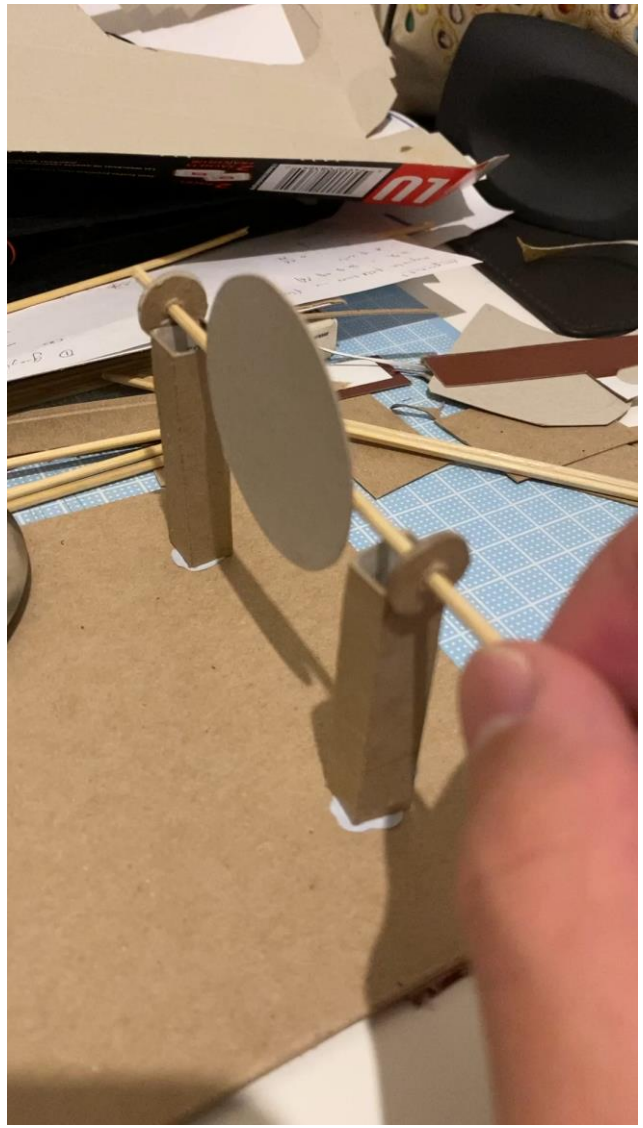
5 TEST



Prototype 1



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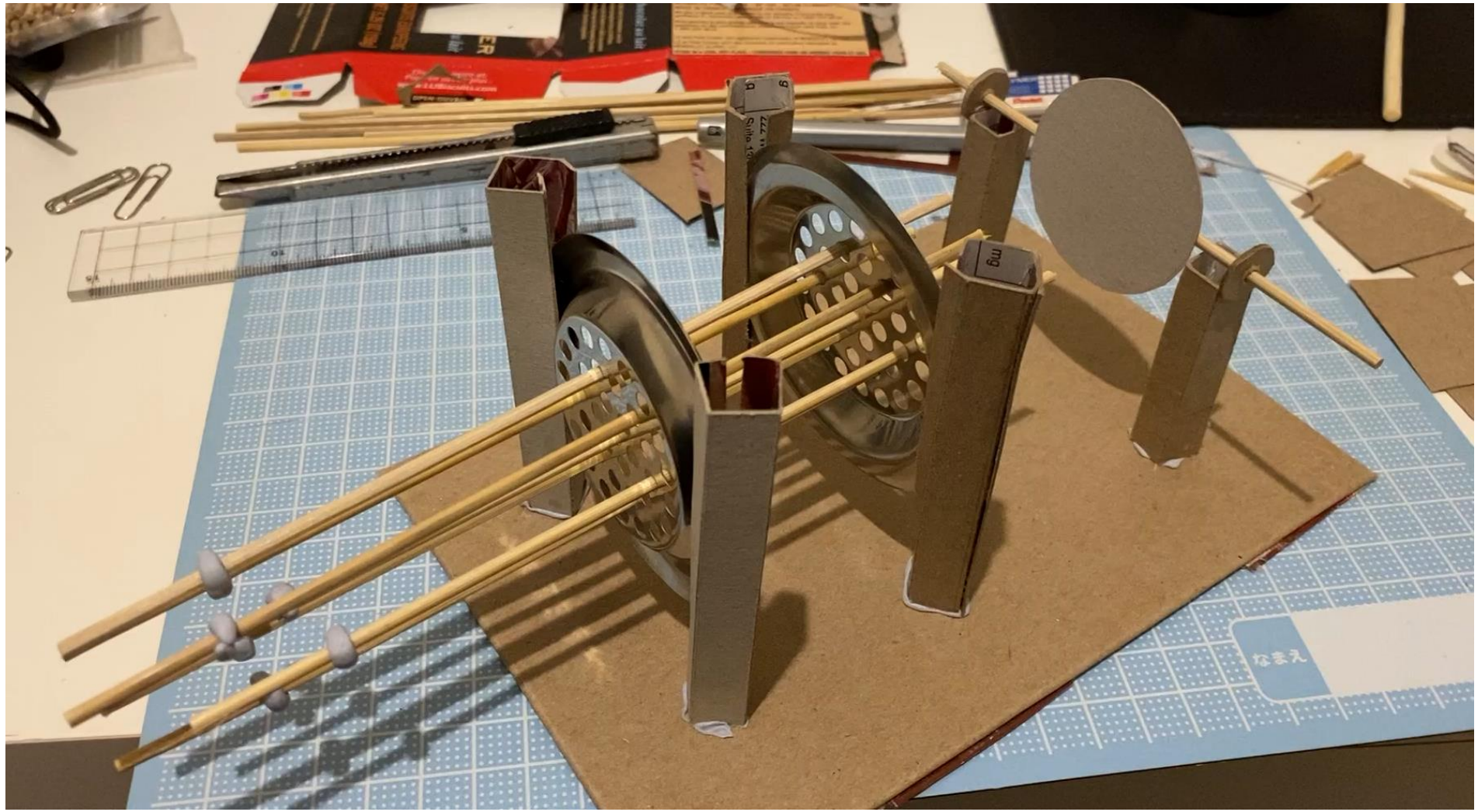

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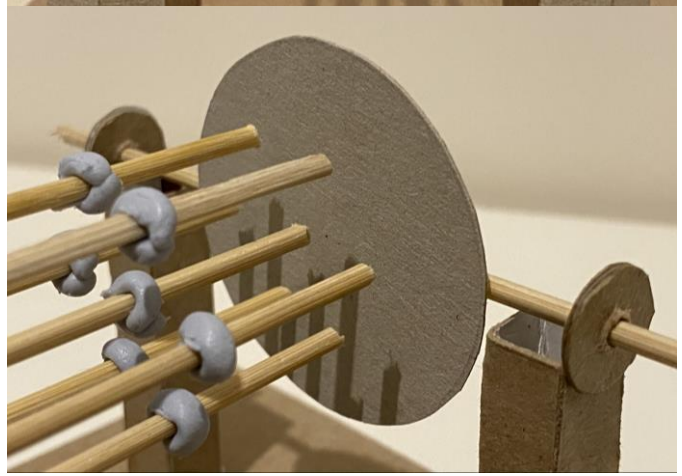

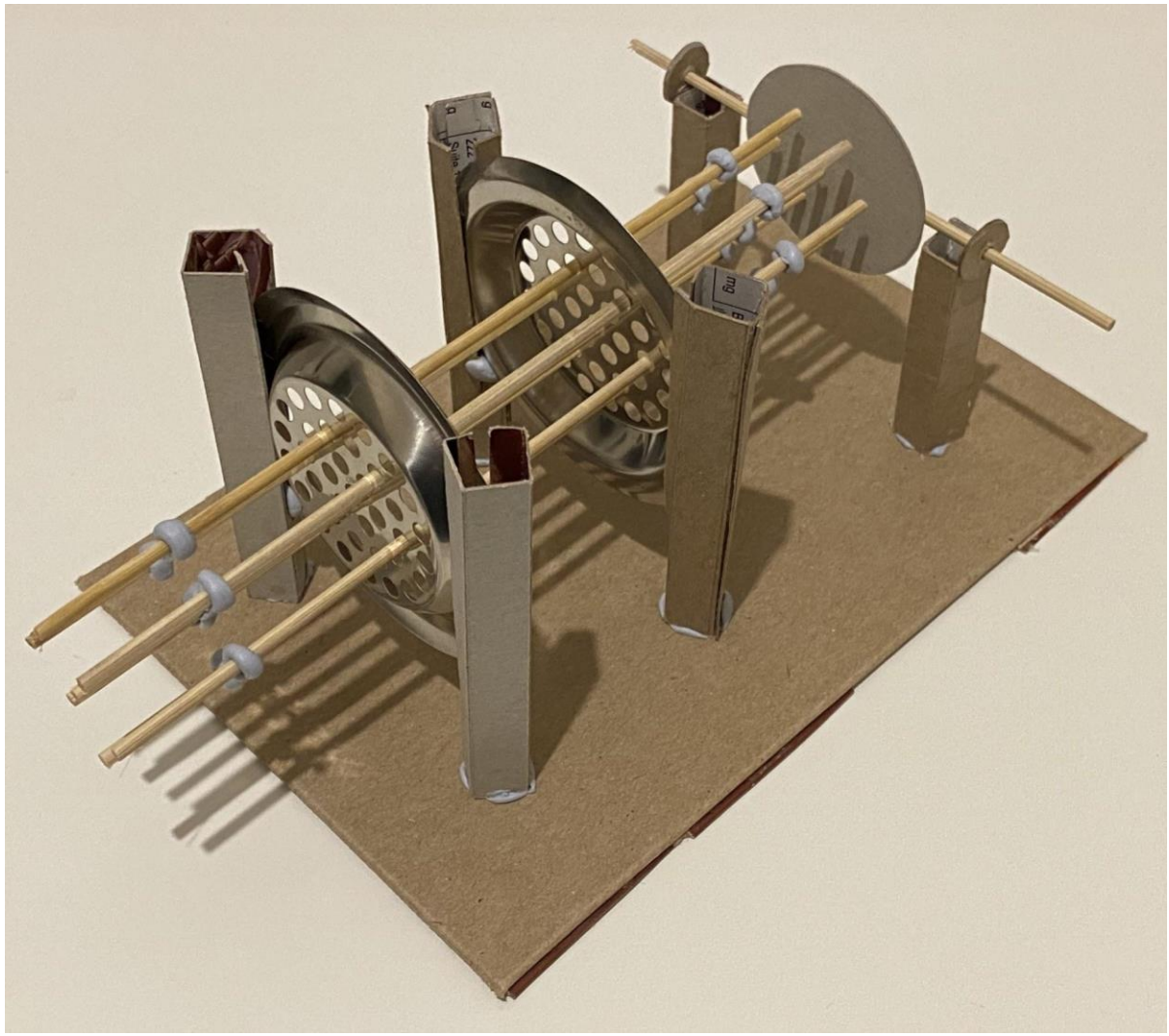

1 EMPATHIZE

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Test 1: Among Peers

1 EMPATHIZE

2 DEFINE

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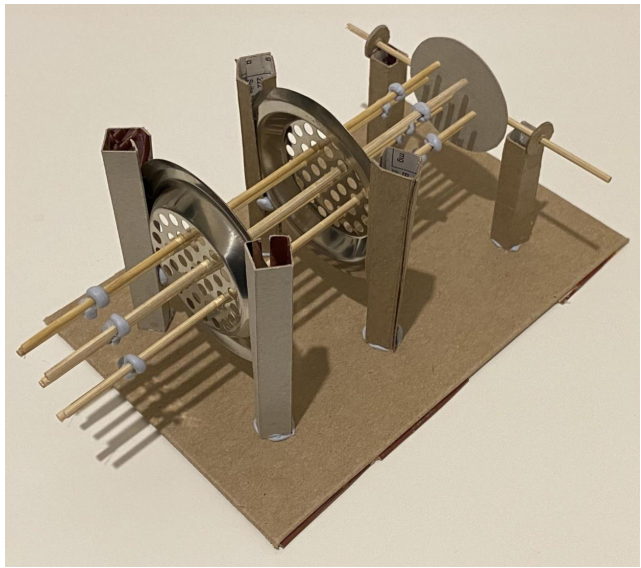
5 TEST

Add a coloured stick to represent the normal

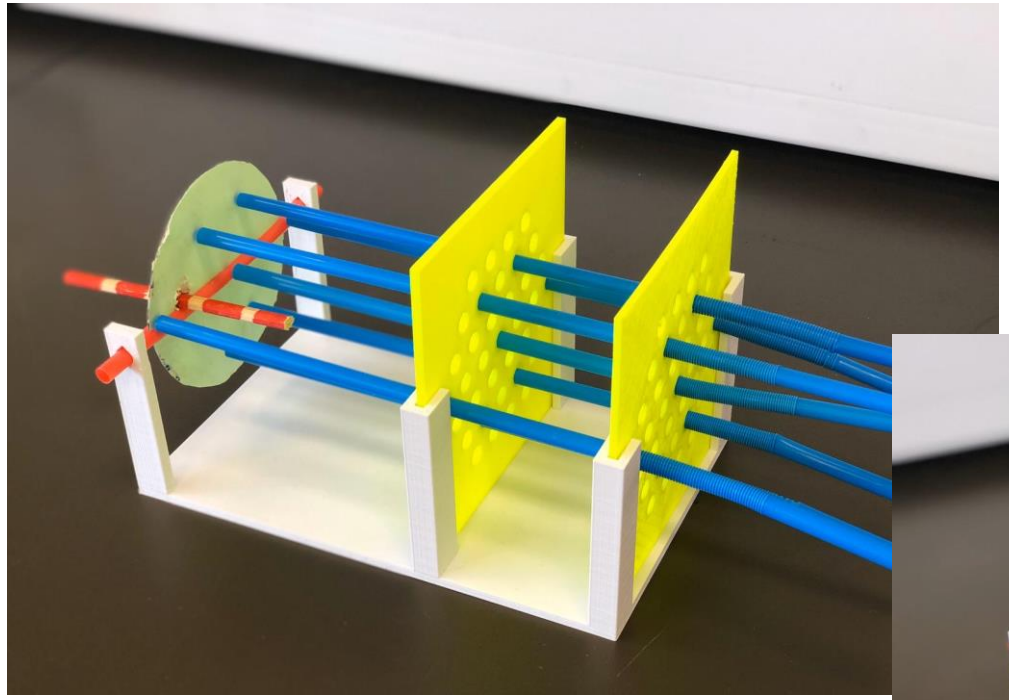
Larger size of the device and colour coding

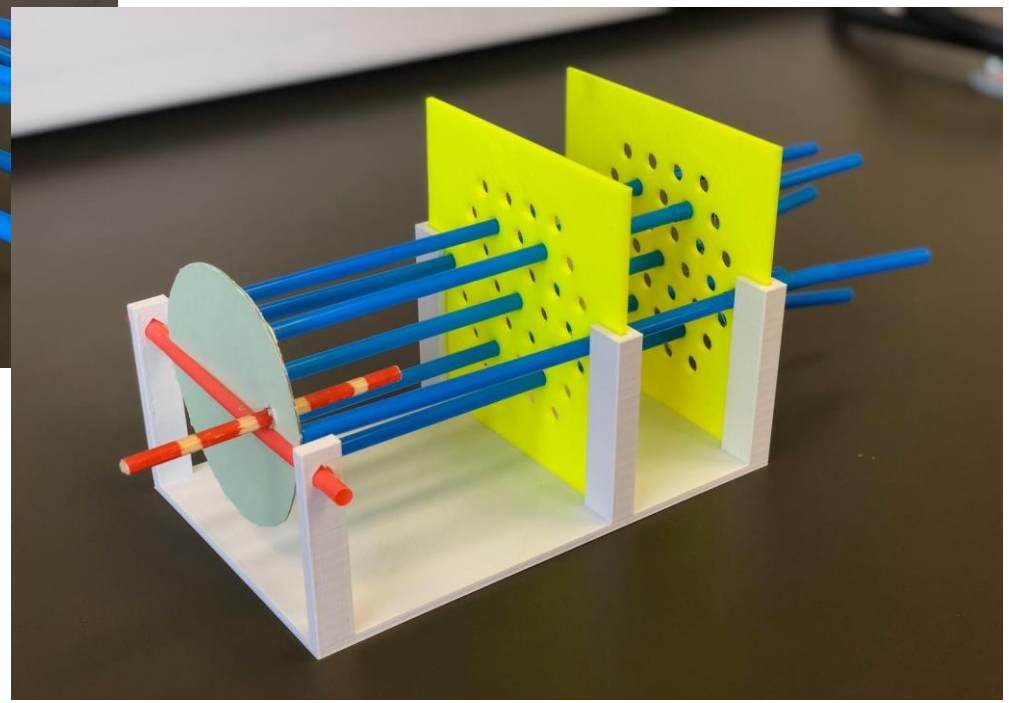
Use thicker sticks

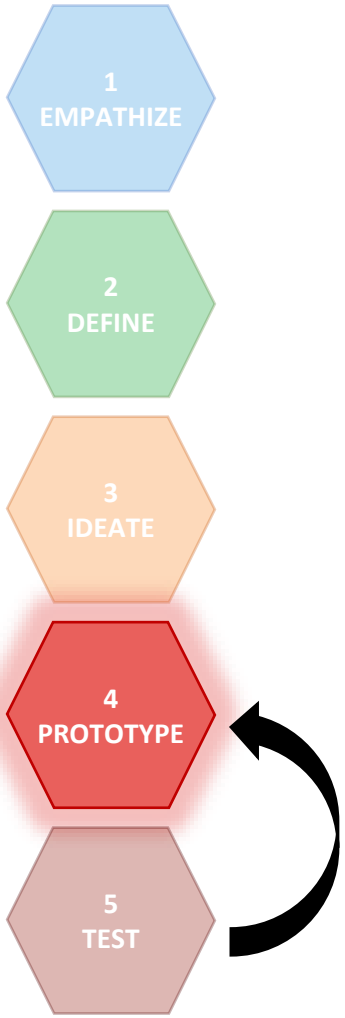
……



Prototype 2

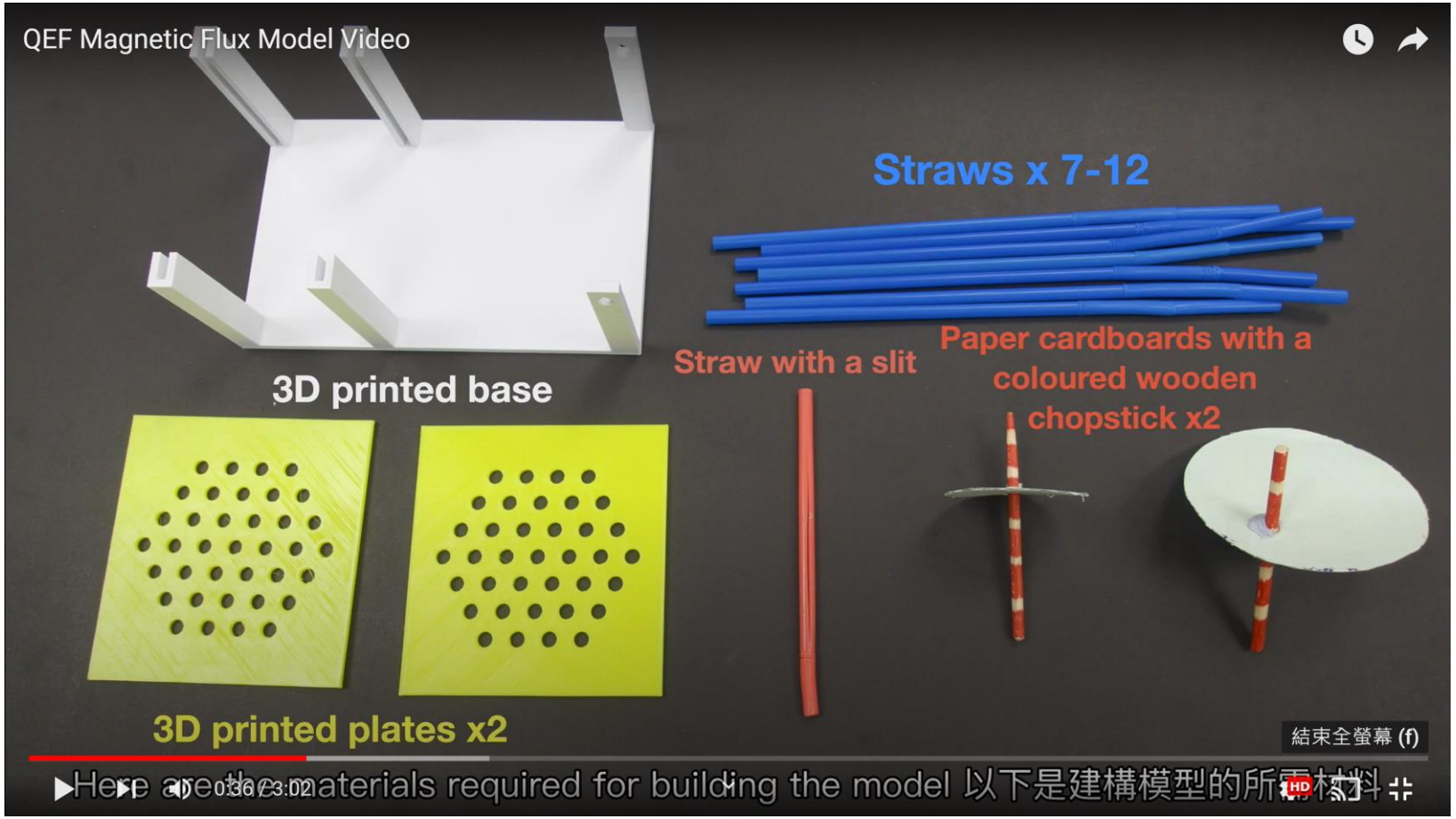






Prototype 2

Dynamic Magnetic Flux Model 睇通「磁通量」



https://youtu.be/ihUOcYOGGs4

1 EMPATHIZE
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Test 2: In Schools

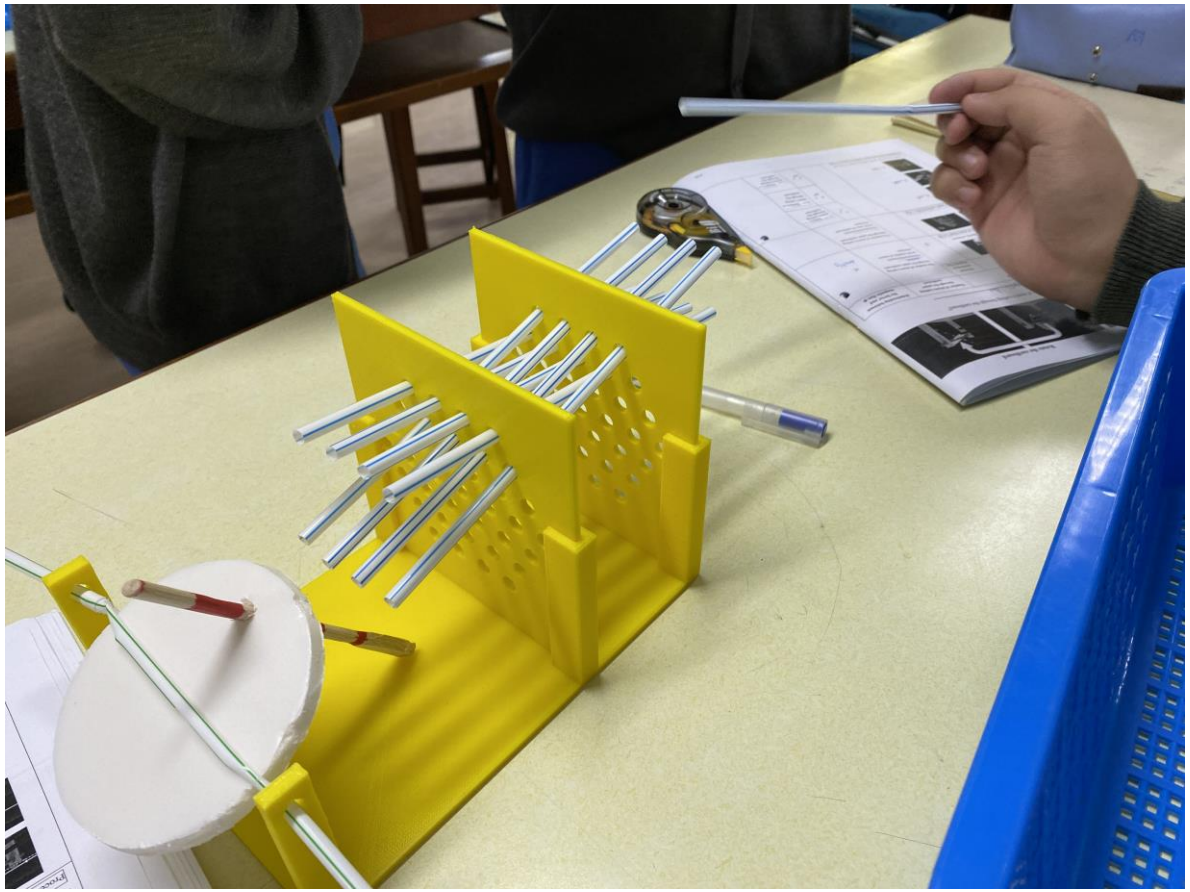
1 EMPATHIZE

2 DEFINE

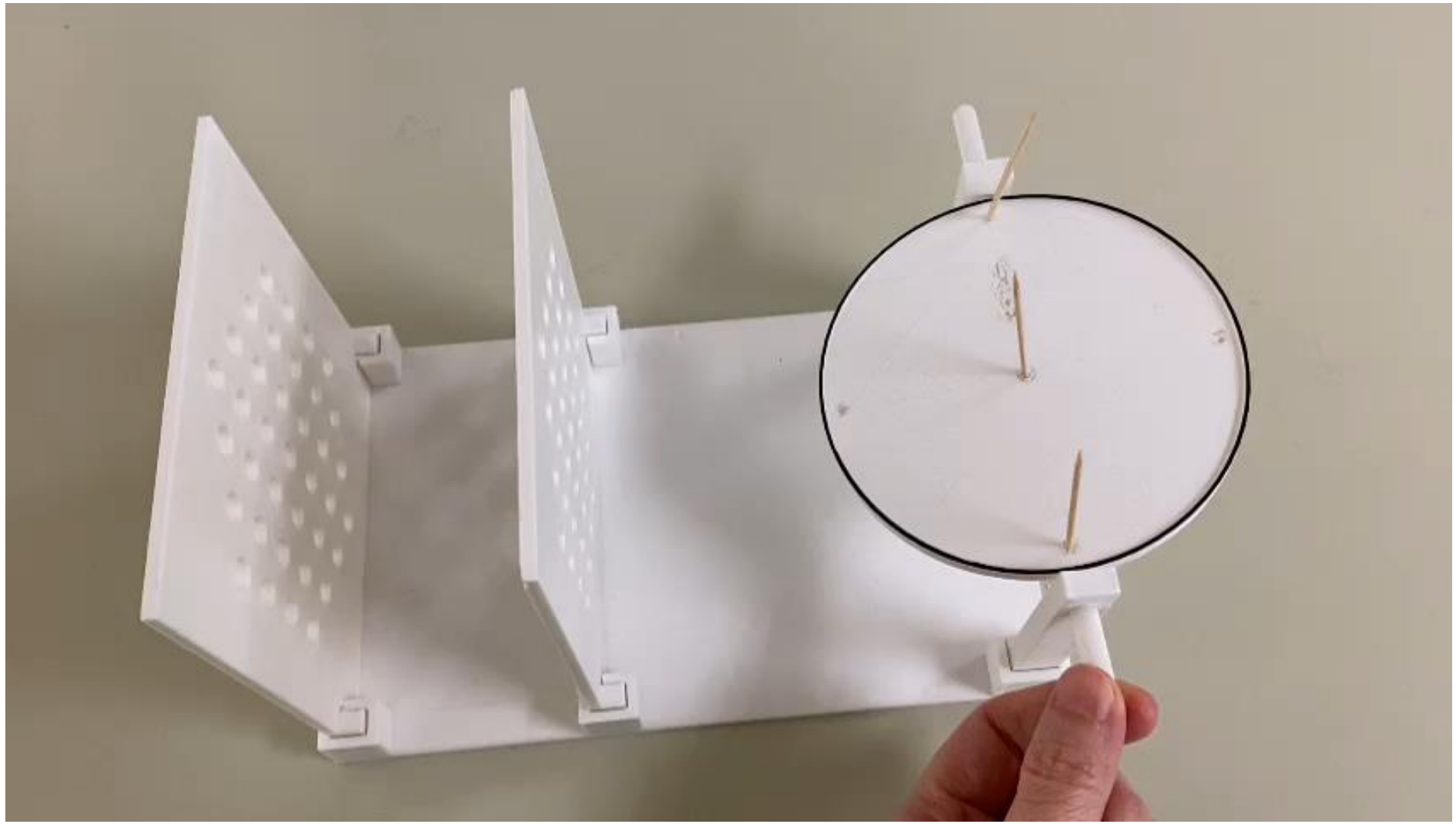
3 IDEATE

4 PROTOTYPE

5 TEST



Prototype 3



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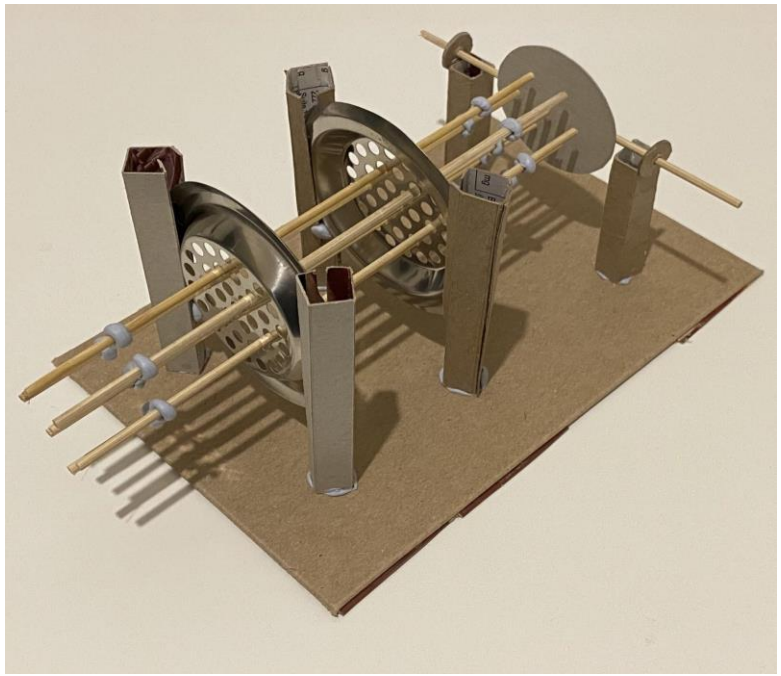
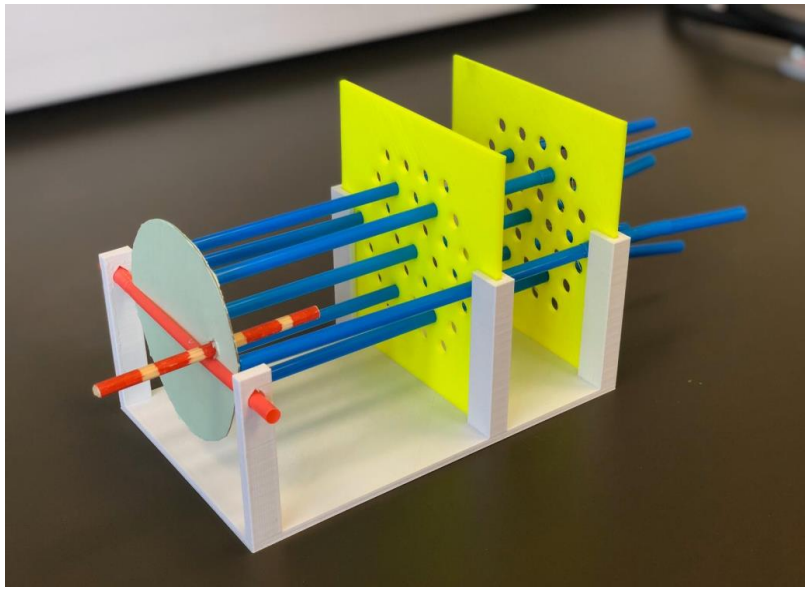
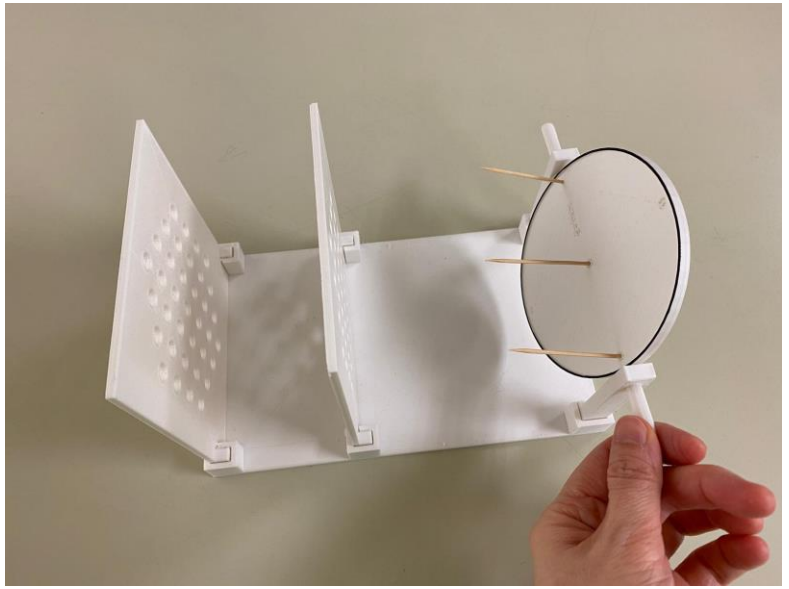
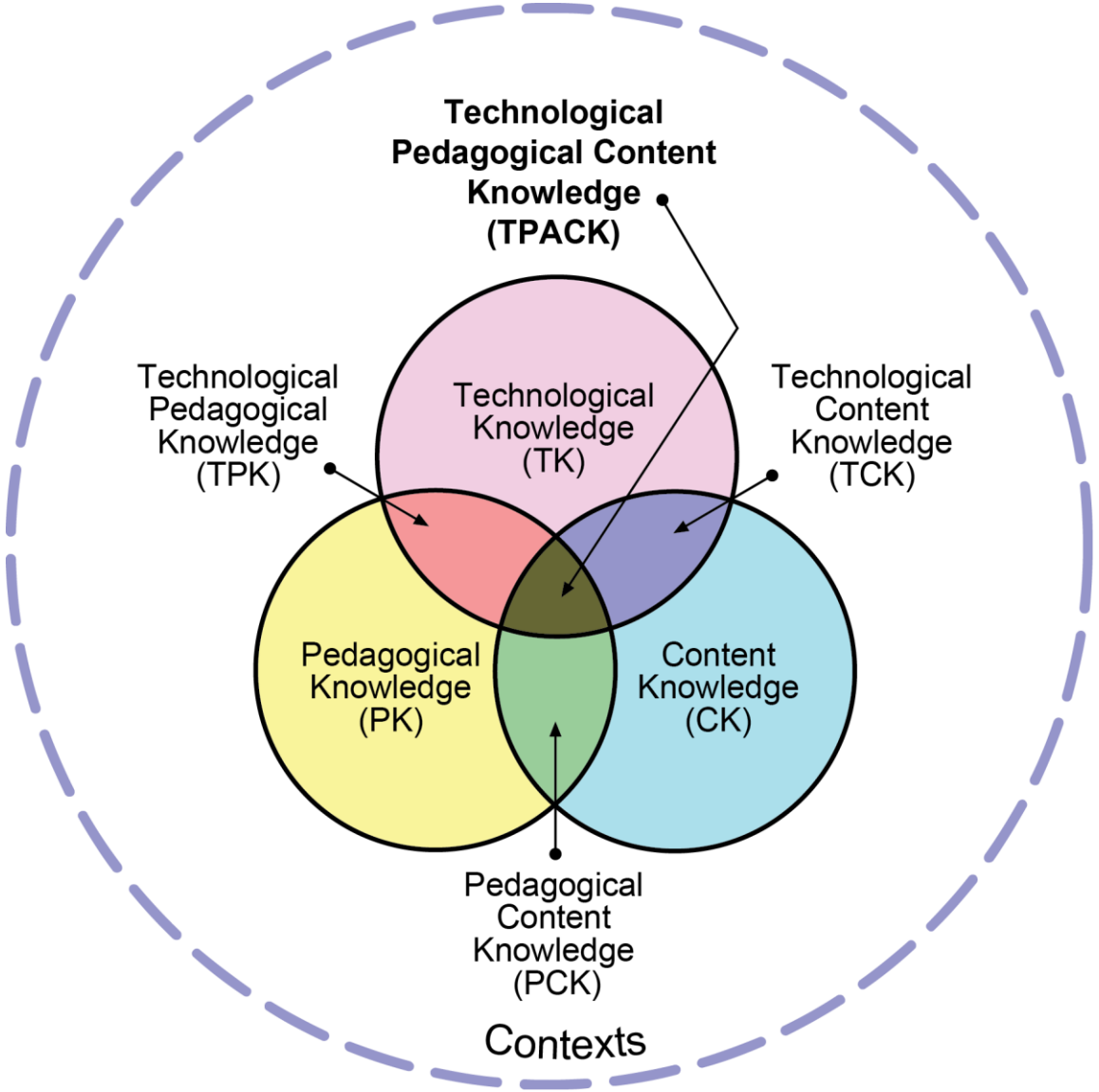
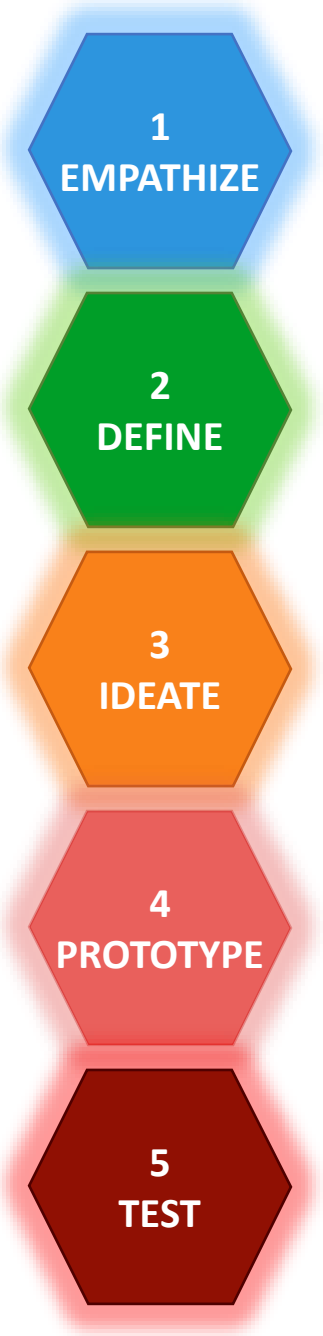






Enhancing TPACK





Why Design Thinking?

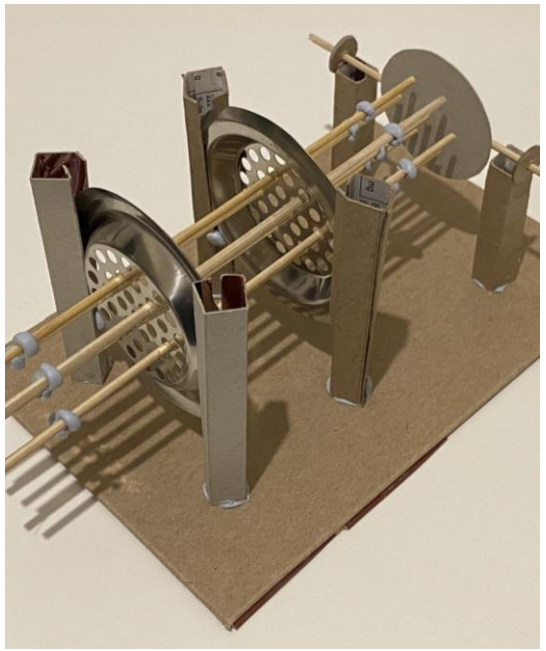
- Systematic approach
- Emphasizes innovation through iteration and learning through doing
- Cognitive, strategic and practical processes
- Related to the development of the 21st century skills

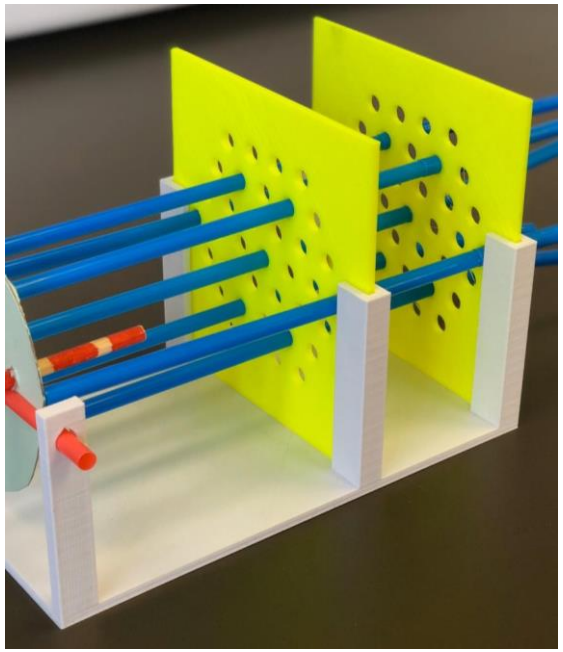
21st century skills

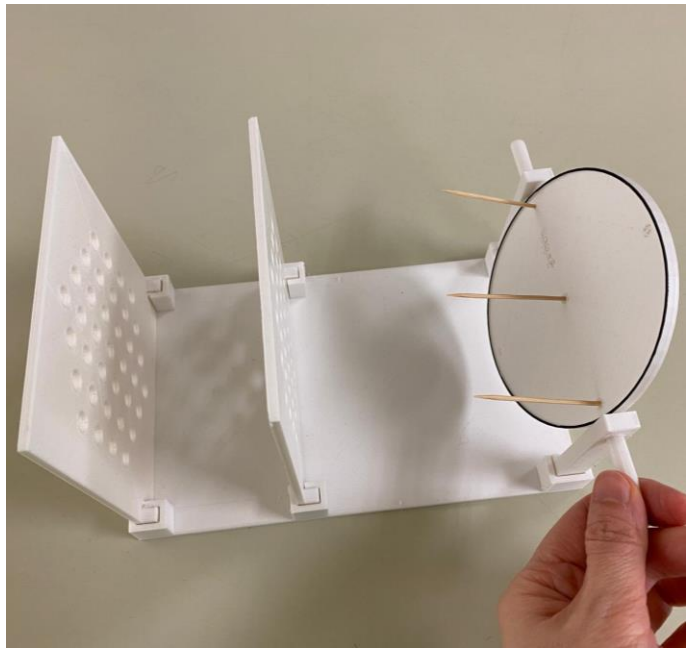
Problem Solving

Communication and Collaboration Skills

Creativity and Innovation Skills







A journey to become a **STEM literated** teacher

Education Bureau
教育局

Training Calendar 培訓行事曆

Hands-on and Minds-on Teaching Packages Dissemination in Physics-related (STEM) Topics

16 Feb 2022 (Wed) PM

17 Feb 2022 (Thur) PM