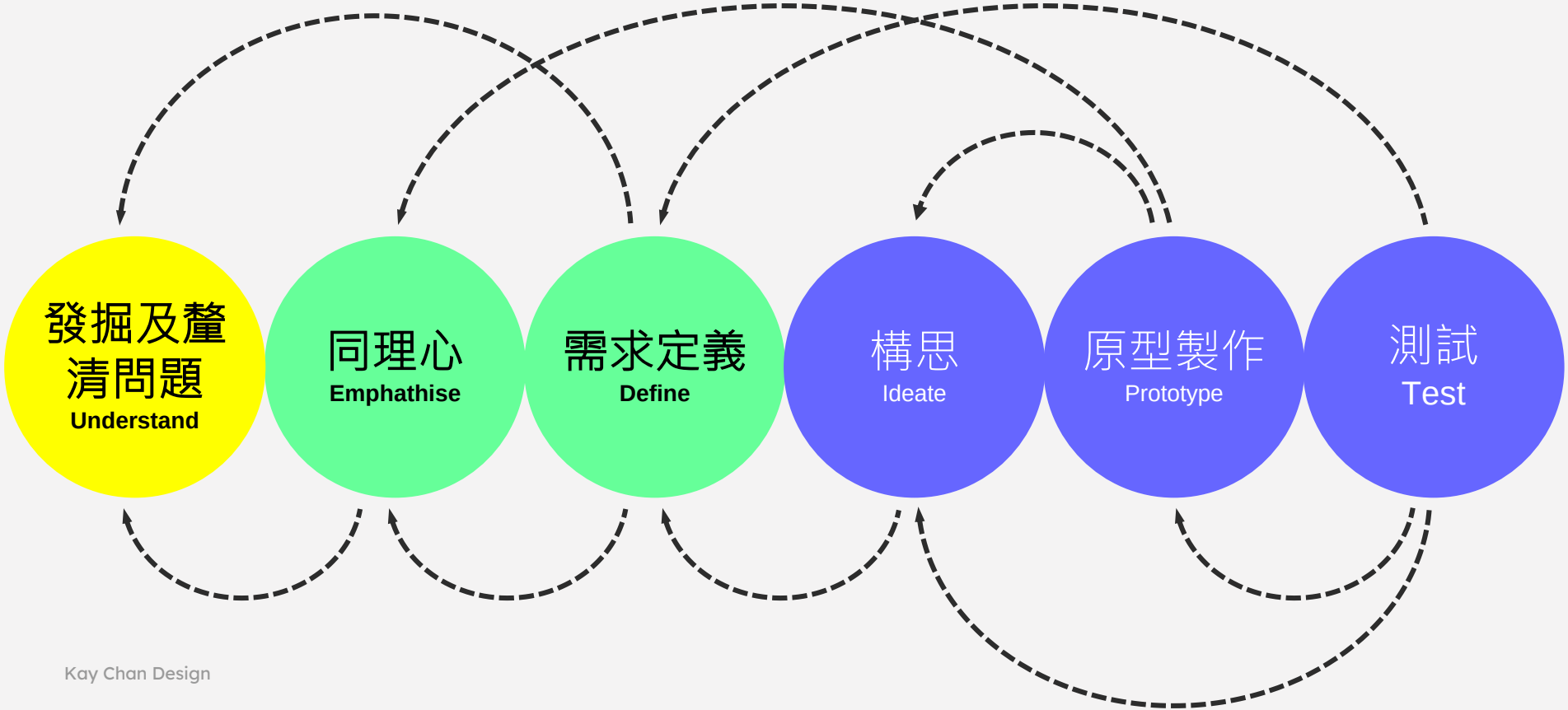
設計與科技知識增益系列：透過設計思維和創意解難發揮學生創造力工作坊

CSD020240626 / CSD020240673
19/07/2024 (星期五) / 02/11/2024 (Saturday/星期六)
09:30 – 12:30; 13:30-16:30 (6小時)

時間	內容/活動
09:30 – 09:45	• 設計思維和創意解難在設計與科技科目中的重要性 • 相關的學與教資源
09:45 – 11:00	• 經驗分享 • 介紹設計思維及創意解難
11:00 – 12:30	• 體驗活動
12:30 – 13:30	• 午膳時間
13:30 – 14:00	• 介紹不同的設計思維及創意解難工具
14:00 – 16:20	• 體驗活動 • 設計美學與設計原則
16:20 – 16:30	• 問與答

設計過程: 迭代
Design Process: An Iteration

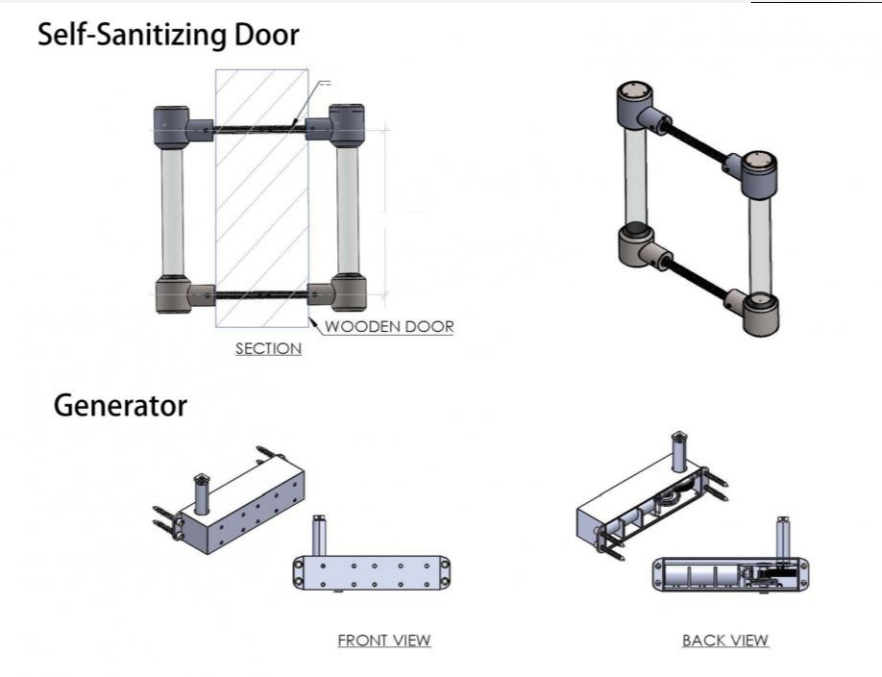


初中科技教育及高中設計與應用科技的相關學習內容

初中科技教育	高中設計與應用科技
科技教育發展的基本理念： ○ 除了讓學生了解科技在社會上的發展外，學校應培養學生敢於創新的素質及開拓與創新的精神，這些都是未來社會不可或缺的能力。	預期學生可從**必修部分**中培養出： ○ 創意思維、分析及明辨性思考能力； ○ 設計、模塑及傳意能力； ○ 在廣闊並相聯的不同設計情境中，有關設計實務和科技原理的理解；及 ○ 科技、社會和創業意識。
共通課題： ○ 設計及應用 – “基本設計元素”, “設計過程” **共通能力：** ○ 創造力 – 在科技教育中，創意的培養體現於學生構思意念、把舊有元素重新從新組合、運用不同策略以解決科技問題、發掘科技產品的不同設計特點等。 **正面的價值觀：** ○ 堅毅、同理心	**必修部分學習範疇— 設計與創新** ○ 運用各種設計方法（例如創意和理性方法、結構圖表法）及設計思考方法（例如水平與垂直思考法、具建設性的異議、改造、類比、腦力激盪法、具備深入了解的洞察力、概念發展） ○ 選擇及使用適當的研究方法，以蒐集、理解及報告有關設計的資料（例如文獻蒐集、實驗、專家評估、性能測試）

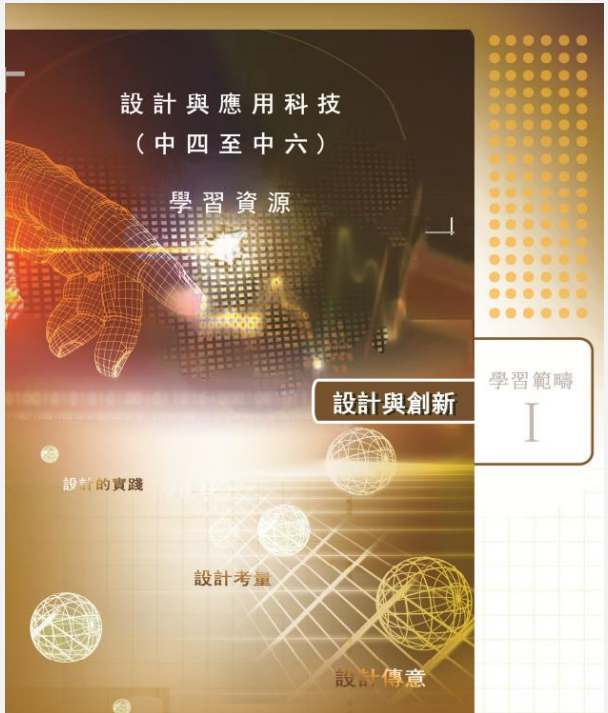
與不同STEAM學科的配合

...當時仍就讀中學的黃同學及李同學某天如廁後，聯想起大多數商廈及住宅仍以沾有消毒藥水的毛巾拭擦門柄，但消毒藥水本來就會為人體帶來傷害，更莫講那條拭擦過無數門柄及物件的毛巾本就極為污穢不堪，但一直只以紙巾開門也是無補於事。因此，他們決定嘗試設計一個可以自動消毒的門柄，防範傳染病再一次在香港肆虐。



相關的學與教資源

- 中四至中六 設計與應用科技 - 學與教資源
- 運用徒手草圖作為視覺思維及傳意工具
- 原型製作於產品設計過程中的應用 (試行版)



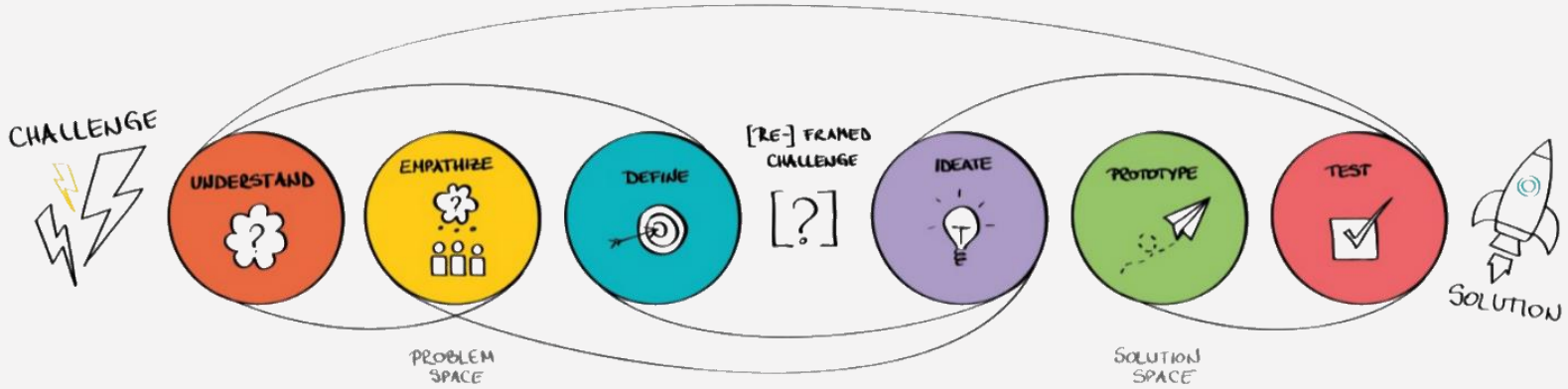
Creativity through

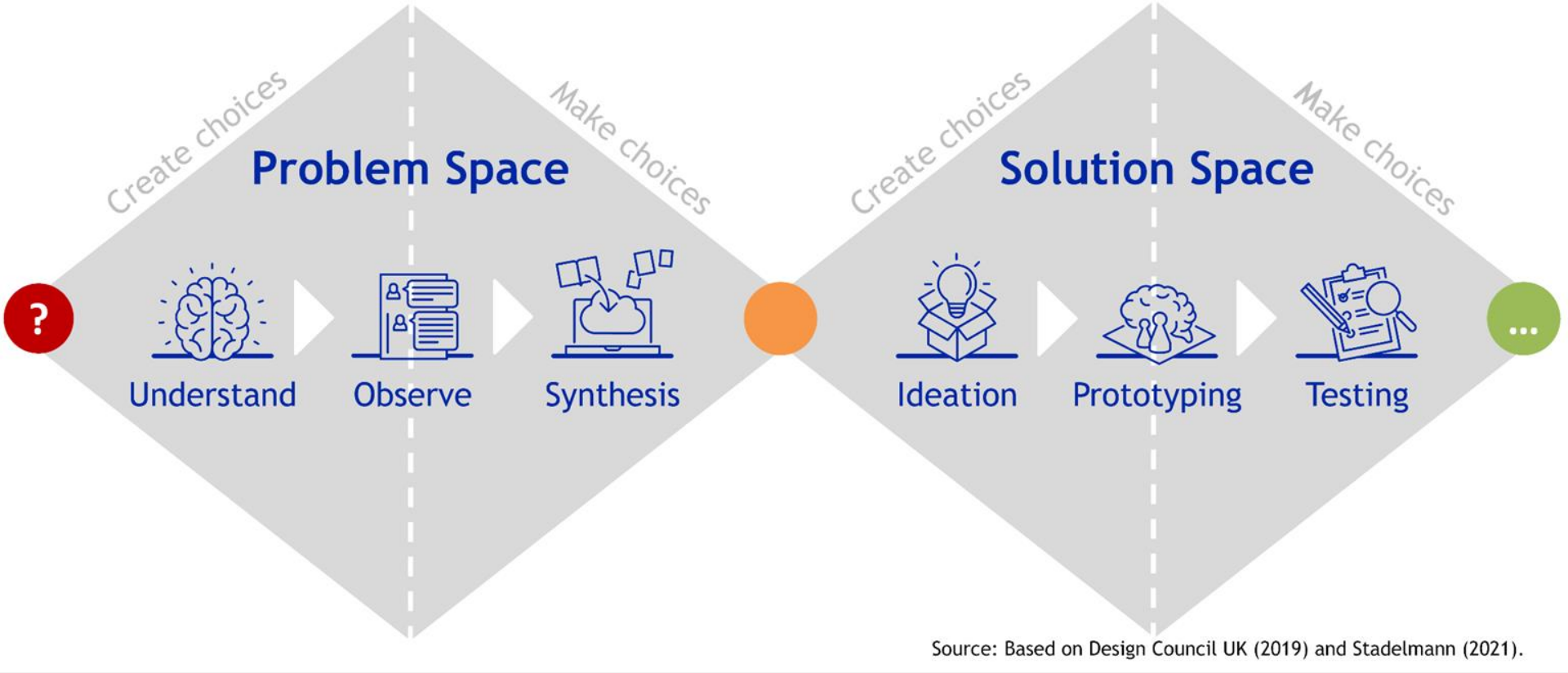
Design Thinking &

Creative Problem-Solving

https://kaychanwanki.com/

Design Thinking

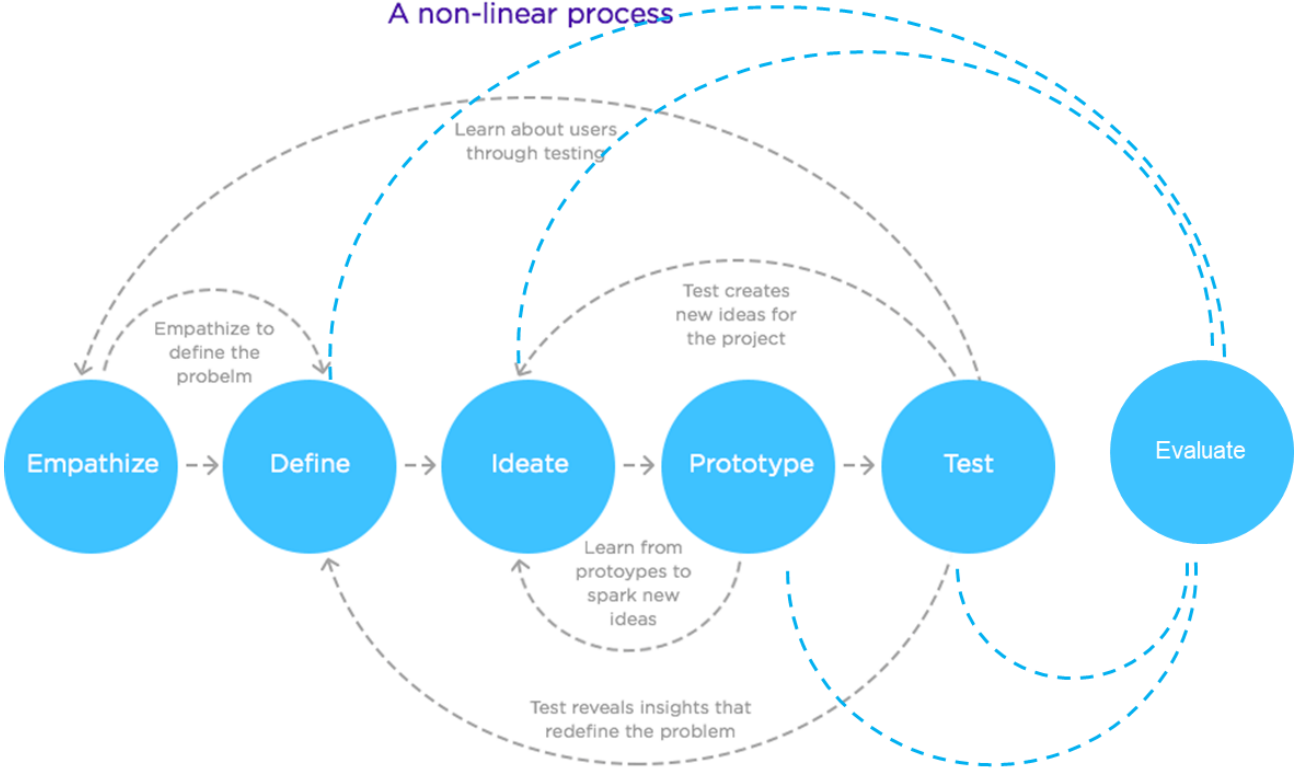

CHALLENGE
UNDERSTAND
EMPATHIZE
DEFINE
[RE-] FRAMED CHALLENGE
[?]
IDEATE
PROTOTYPE
TEST
SOLUTION
PROBLEM SPACE
SOLUTION SPACE



Source: Based on Design Council UK (2019) and Stadelmann (2021).

DESIGN THINKING:

A non-linear process



Research on your target user

研究您的目標用戶

Research method

- Field study
- 實地考察

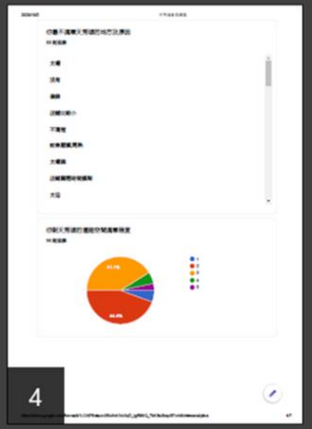
- Interview
- Survey/Poll
- 訪問
- 調查/民意調查

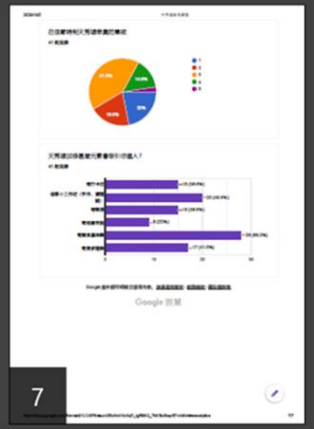
- Online research
- 網上研究

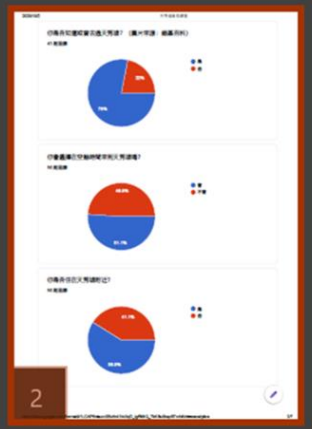
- Case study
- 案例分析

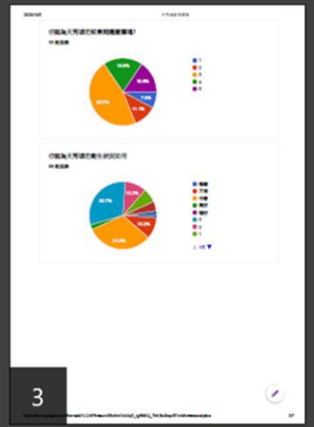
Interview 訪問

Survey/Poll 調查/民意調查









Define the problem and cause

研究您的目標用戶

Define Stage = Analyses To Synthesize > Problem Statement

定義階段 = 分析到綜合 問題陳述

Synthesis:
Creatively placing the complexity together to form the whole idea. It is the act of combining separate ideas, beliefs, and thoughts to create something creative.

Analysis:
Breaking down complex concepts and problems into smaller, easy-to-understand constituents. It is a result of careful examination.

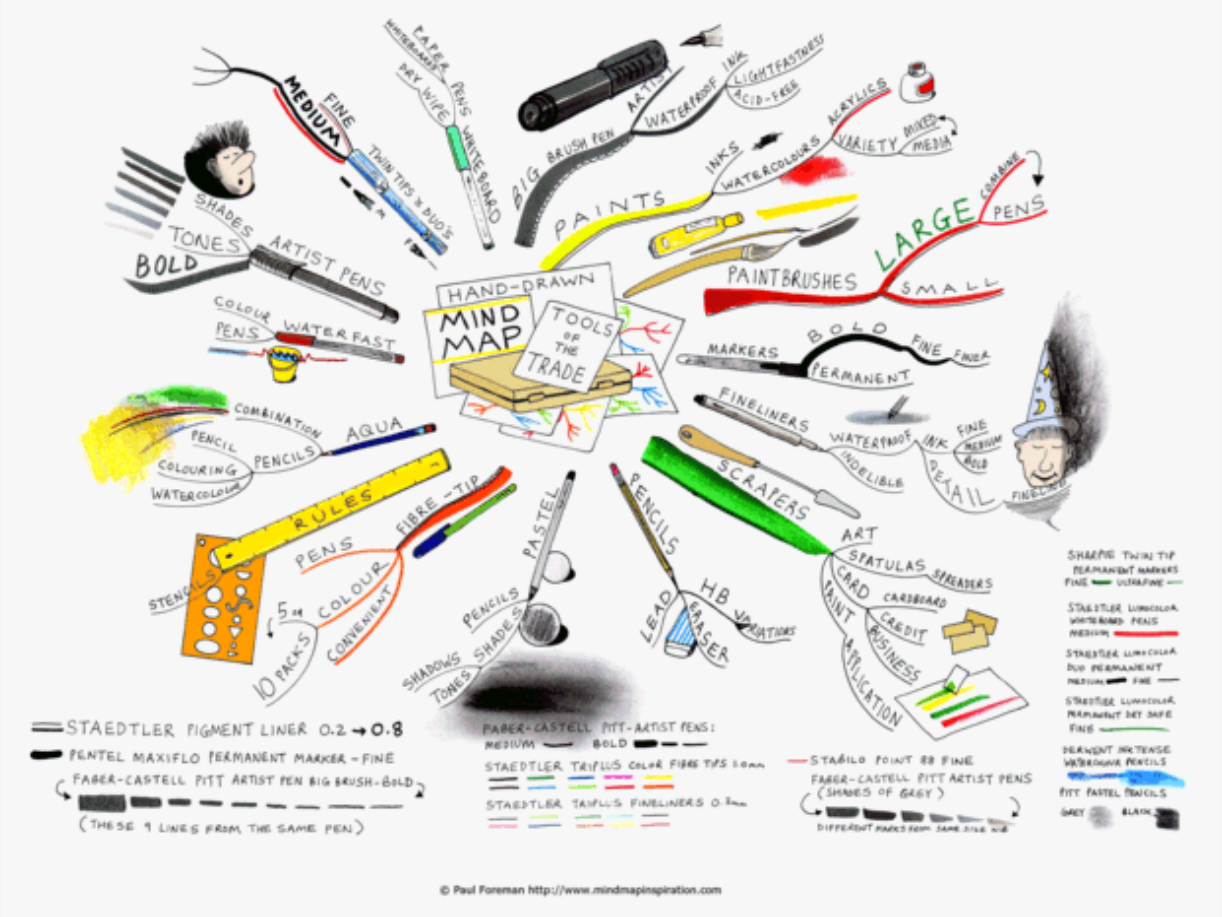
Problem Statement:
Problem statement defines a current problem and focuses on the goals which have to be achieved in the design thinking process. A problem statement should be human-centered and a base for the ideation process.

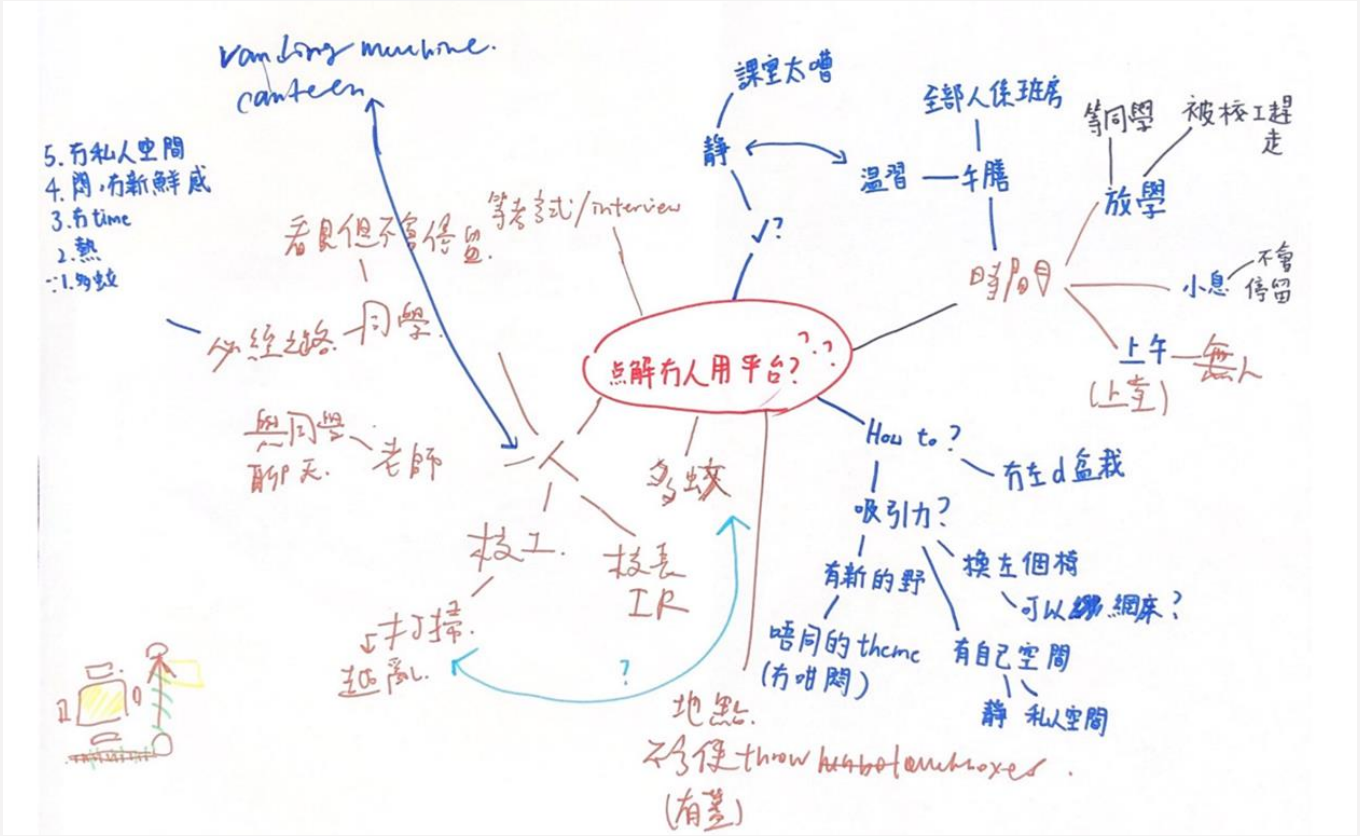
Mindmapping

- Encouraging attitude
- Try to add some drawings to clarify the meanings

Online mindmapping tools

- Miro
- Canva
- EdrawMind




vending machine.
canteen
5. 有私人空間
4. 閂，有新鮮感
3. 有time
2. 熱
1. 多蚊
課堂太嘈
靜
溫習
全部人係班房
午膳
等同學
被校工趕走
放學
時間
小息
不會停留
上午
(上堂)
無人
等考試/interview
睇見但不會係留.
分流路
同學
點解有人用平台?
與同學
聊天.
老師
人
多蚊
How to?
有左d蚊我
吸引力?
有新的野
唔同的theme
(有咁閪)
換左個椅
可以轉個床?
有自己空間
靜
私人空間
地點.
校工.
打掃.
越亂.
校長
IR
?
?
?

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Brainstorming with creative phases for ideas that could solve the question respectively problem.

Rules of Brainstorming

1 — Defer Judgment 延期判決

Creative spaces are judgment-free zones—they let ideas flow so people can build from each other's great ideas.

2 — Encourage Wild Ideas 鼓勵瘋狂的想法

Embrace the most out-of-the-box notions. There's often not a whole lot of difference between outrageous and brilliant.

3 — Build on the Ideas of Others 建立在他人的想法

Try to use "and" instead of "but," it encourages positivity and inclusivity and leads to tons of ideas.

4 — Stay Focused on the Topic 專注於主題

Try to keep the discussion on target. Divergence is good, but you still need to keep your eyes on the prize.

5 — Be Visual 形象化

Use colored markers and Post-its. Stick your ideas on the wall so others can visualize them.

6 — Go for Quantity 追求數量

Crank your ideas out quickly. For any 60-minute session, you should try to generate 100 ideas.

Six Creative Ways To Brainstorm Ideas

https://youtu.be/yAidvTKX6xM?feature=shared

1. Colours

2. Material

3. Texture

4. Character

5. Value

6. Form

7. Space

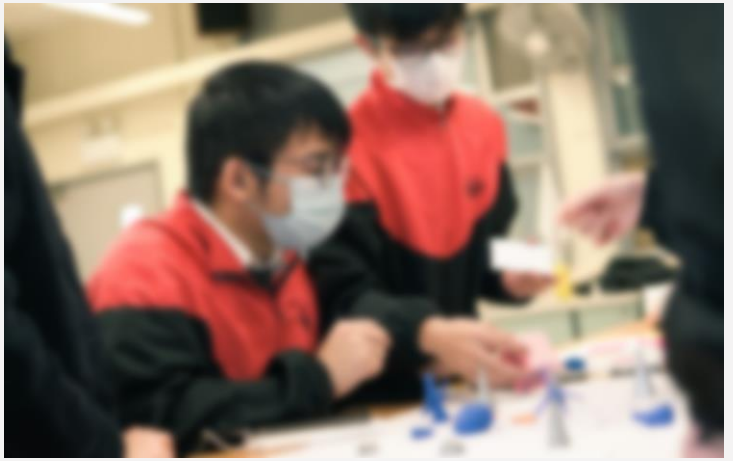
8. Smell

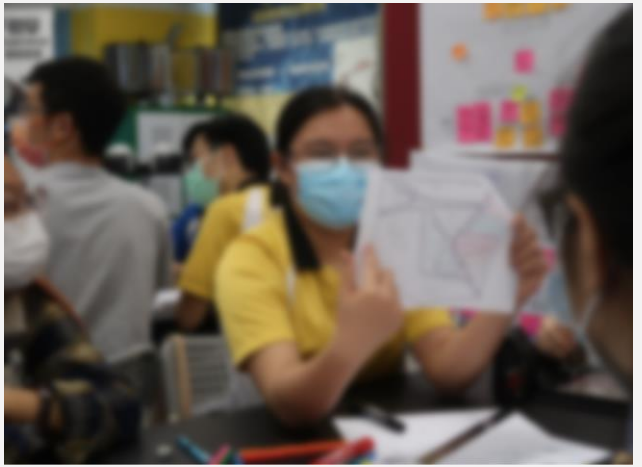
9. Sound

10. Scenario

11. Function

Build (a) prototype(s) of selected ideas to test its technological feasibility. Make sure that the idea(s) match your objectives.





Let stakeholders test and interact with the prototype

Get structured feedback to improve your prototype.

The insights and learnings gained from the evaluation stage are fed back into the earlier stages of the design thinking process, enabling the team to refine and improve their solutions based on the feedback received.

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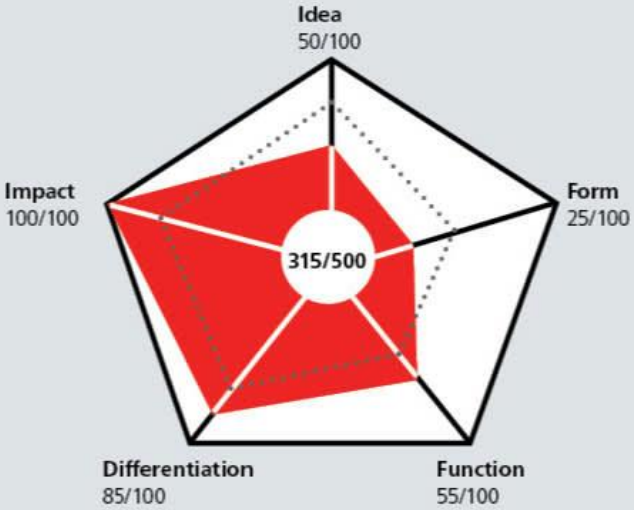
Example of Evaluation



Idea
Task
What was the task?

Relevance
Is it relevant?

Fit for purpose
Is the idea appropriate?

Form
Aesthetics
Is it beautiful?

Emotional appeal
Does it engage the user?

Execution*
Is it made well?

Function
Usability*
Can it be used with ease?

Efficiency*
Does it work well?

User Benefit
Does it serve the user?

Differentiation
Innovation
Is it new?

Brand Differentiation
Does it support the brand?

Impact
Effect
What targets have been reached?

Social Benefit
Does it serve society?

Sustainability
Is it sustainable?

Idea
- Relevance
- Fit for purpose

Form
- Aesthetics
- Emotional appeal
- Execution

Function
- Usability
- Efficiency
- User benefit

Differentiation
- innovation
- Brand differentiation

Impact
- Social benefit
- Sustainability

理念
- 相關性
- 適合目的

形態
- 美學
- 情感上的吸引力
- 執行

功能
- 易用性
- 效率
- 用戶利益

差異化
- 革新
- 品牌差異化

影響力
- 社會效益
- 可持續發展

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POLYU DISCI SOINNO tools

Open source materials

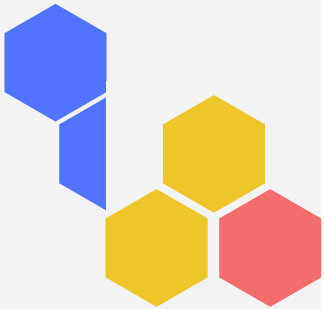
Soinno Design Thinking tools website

Programme Planning Tool

Website

This tool helps **visualise** your lesson planning.

You can depends on the **duration** of each session to put on the appropriate size of the hexagon(A whole or half of it).



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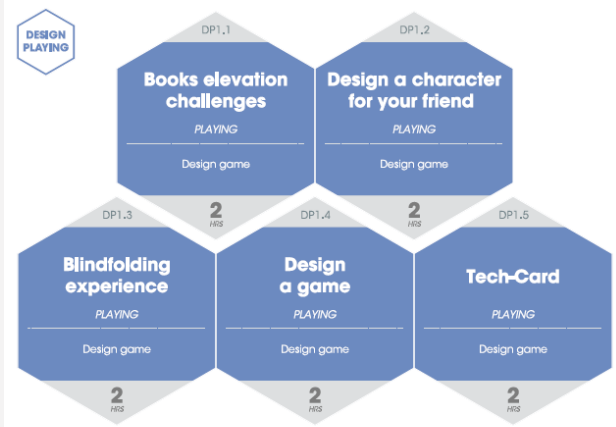
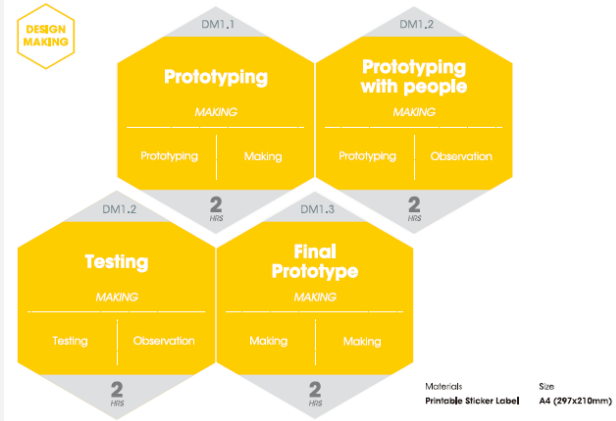
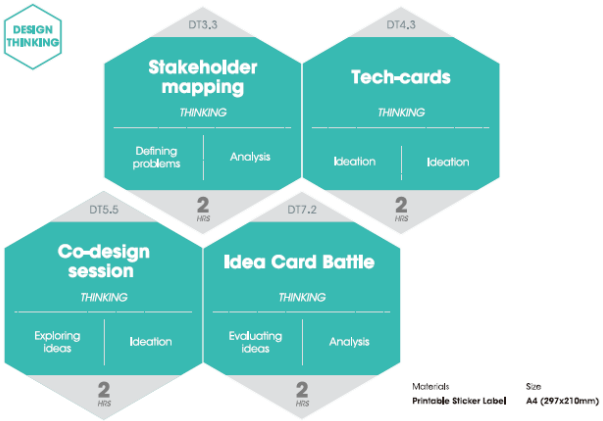
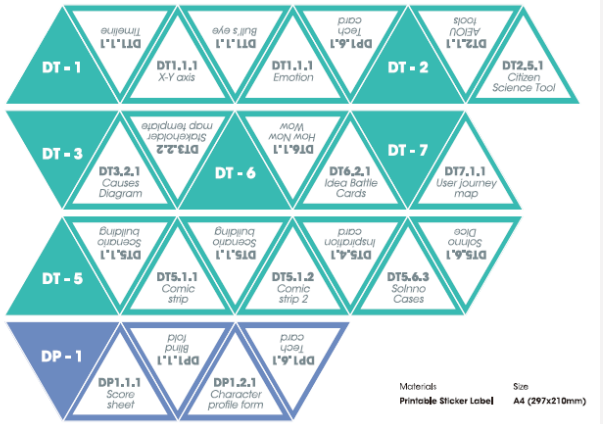
Website









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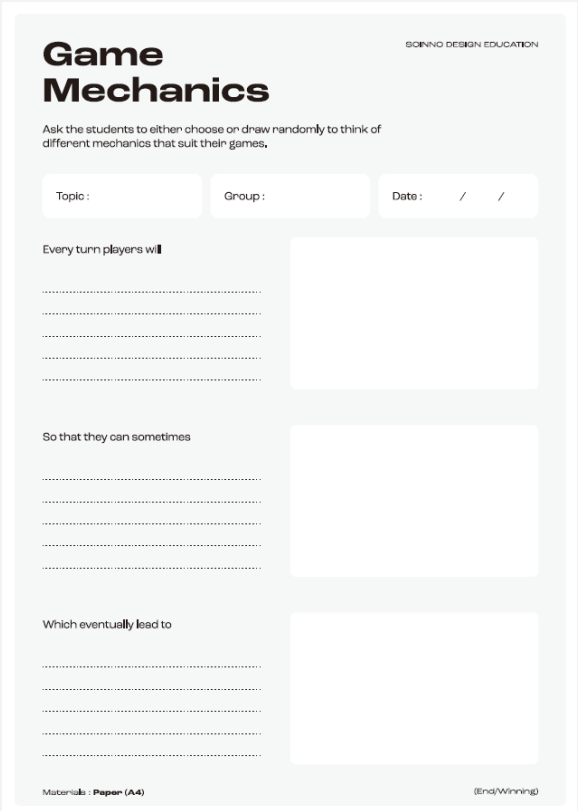
Design thinking tools

Website

The Game Kits

Website



Develop a game helps students **interpret** the knowledge and information they acquired. It is an efficient way to **strengthen** the understanding and **transform** into a different context.

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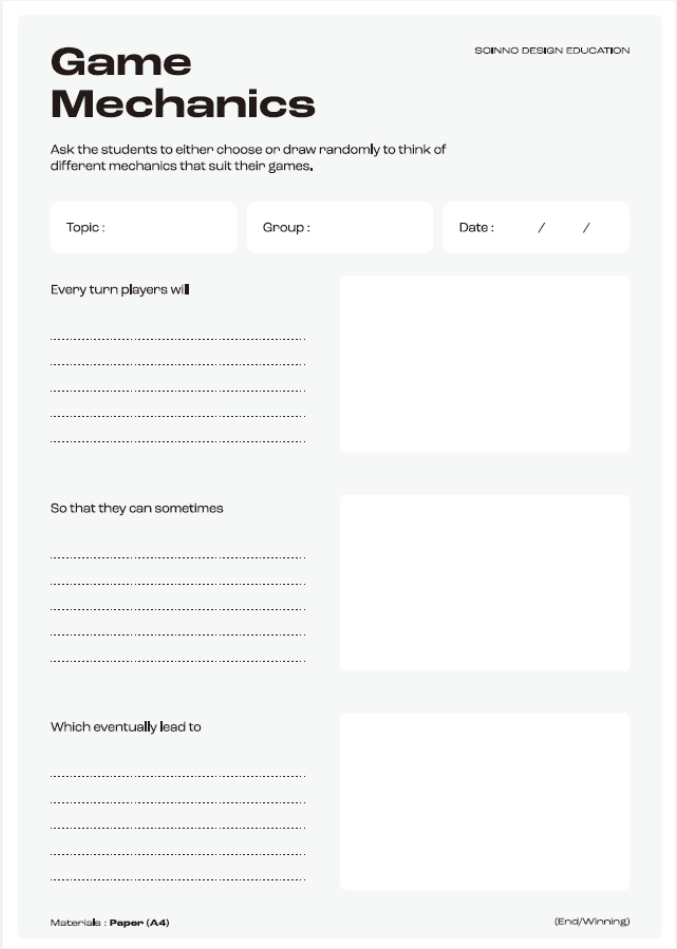
Website



Game Mechanics

SOINNO DESIGN EDUCATION

Ask the students to either choose or draw randomly to think of different mechanics that suit their games.

Topic :

Group :

Date : / /

Every turn players will

So that they can sometimes

Which eventually lead to

Materials : **Paper (A4)**

(End/Winning)

1. Choose several games or a **genre** of game. Why choosing this game?
2. Analyse the **mechanism** of the game. Look into details.
3. Prototyping. Simple to complex
4. Simple = 2 ppl with 5-10 moves…
   -> add more steps to make it complex

水能
地熱能

Forced Combination

Website 1 | Website 2

5 words

related to the topic

Pick 1 word

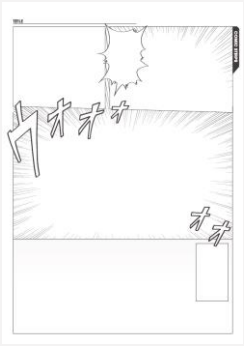
5 words

Random words from the environment (e.g. magazine, street….)

Pick 1 word

Force combining

1+1 → >20 ideas



Scenario building

Comic-strips

Divergence

a Design Thinking Game Kit

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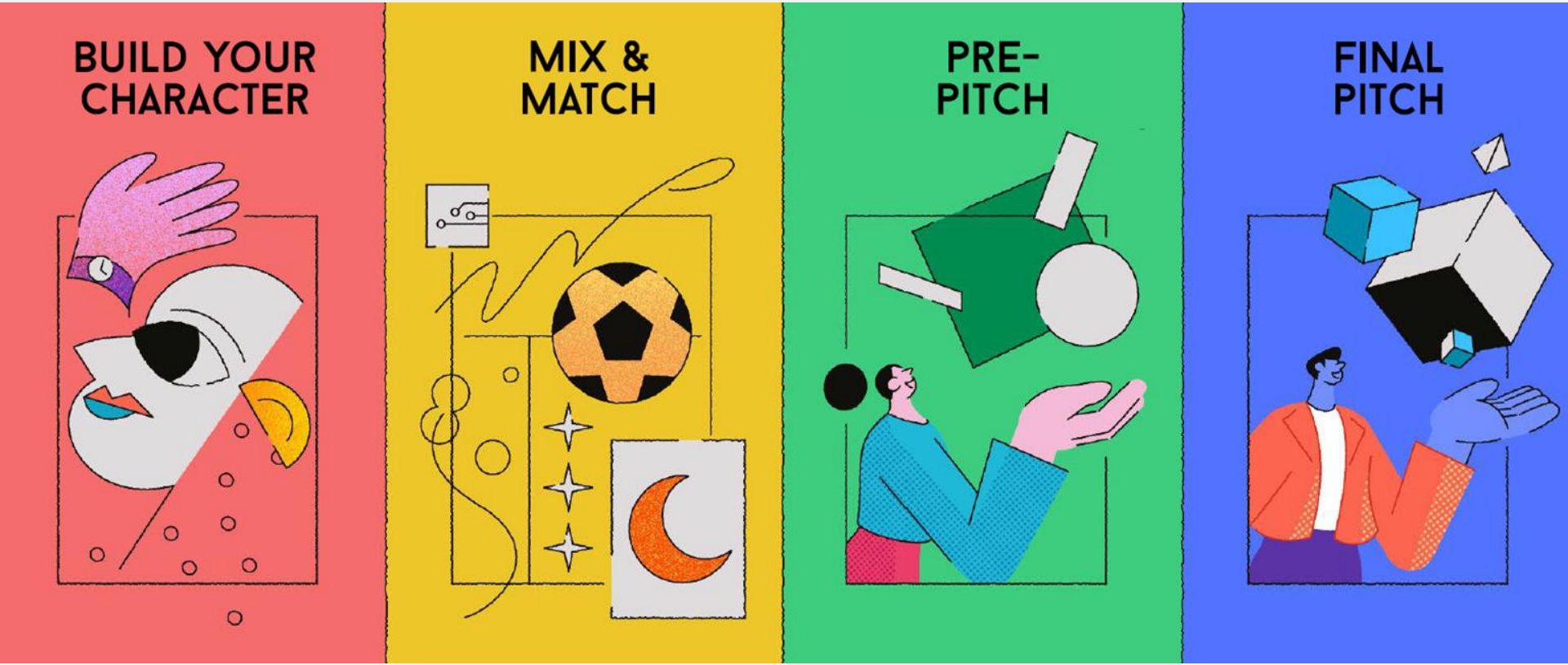
Website

Warm up

Brainstorming

Developing

Solution



Character

Background

Characteristic

*Use **'Yes, and'** sentence to follow previous description to encourage positive comments

Build up a

character

characteristic and background

角色卡

CHARACTER PROFILE 角色資料

NAME
名字

What's your character's name?
角色的名字是什麼?

CHARACTER PROFILE 角色資料

AGE
年齡

How old is your character?
角色的年紀?

CHARACTER PROFILE 角色資料

ROLE
職責

What's your character's demographic and / or occupation?
角色代表的群組與職業?

CHARACTER PROFILE 角色資料

PERSONALITY
個性

Choose from below:
二選其一:

Spontaneous 衝動
Cool-headed 冷靜

問題卡

Try combining different opportunities together

Score counter

Explore a new

opportunity

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Explore a new

opportunity

1. Spend points to get the **desire opportunities**
2. Try to explore **different combinations** to create new and unexpected ideas

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Explore a new

opportunity

1. Random pick 3 Pitch Strategy Cards
2. If you apply Pitch Strategy, you can get **extra point**!
3. But it is more **challenging** to the presentation.

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Present **as many ideas as you can** with at least two opportunity cards.

*'Pitch Strategy' may help you to get more points.

Give your **feedback** to provide a different perspective to the presenter.

Develop potential

design ideas

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Present your **final idea** after adjusting from pre-pitch feedback.

*'Pitch Strategy' may help you to get more points.

Q&A sessions & **score** the idea.

Deliver your

solution

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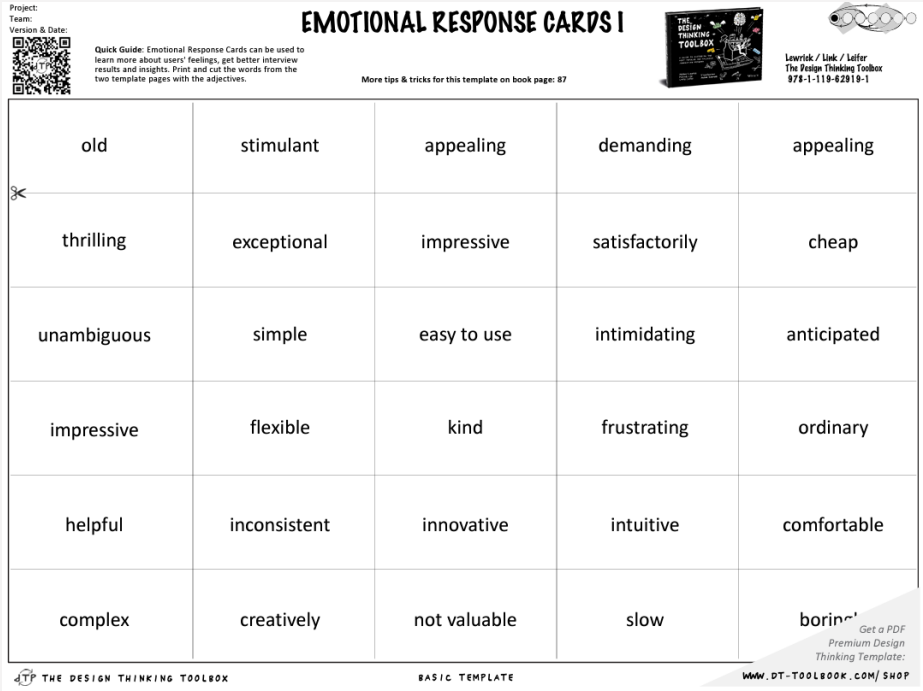
The one who has **highest** score wins.

Emotional Response Cards

The Design Thinking Toolbox



Project:
Team:
Version & Date:

EMOTIONAL RESPONSE CARDS I

Quick Guide: Emotional Response Cards can be used to learn more about users' feelings, get better interview results and insights. Print and cut the words from the two template pages with the adjectives.

More tips & tricks for this template on book page: 87

Lewrick / Link / Leifer
The Design Thinking Toolbox
978-1-119-62919-1

old	stimulant	appealing	demanding	appealing
thrilling	exceptional	impressive	satisfactorily	cheap
unambiguous	simple	easy to use	intimidating	anticipated
impressive	flexible	kind	frustrating	ordinary
helpful	inconsistent	innovative	intuitive	comfortable
complex	creatively	not valuable	slow	boring

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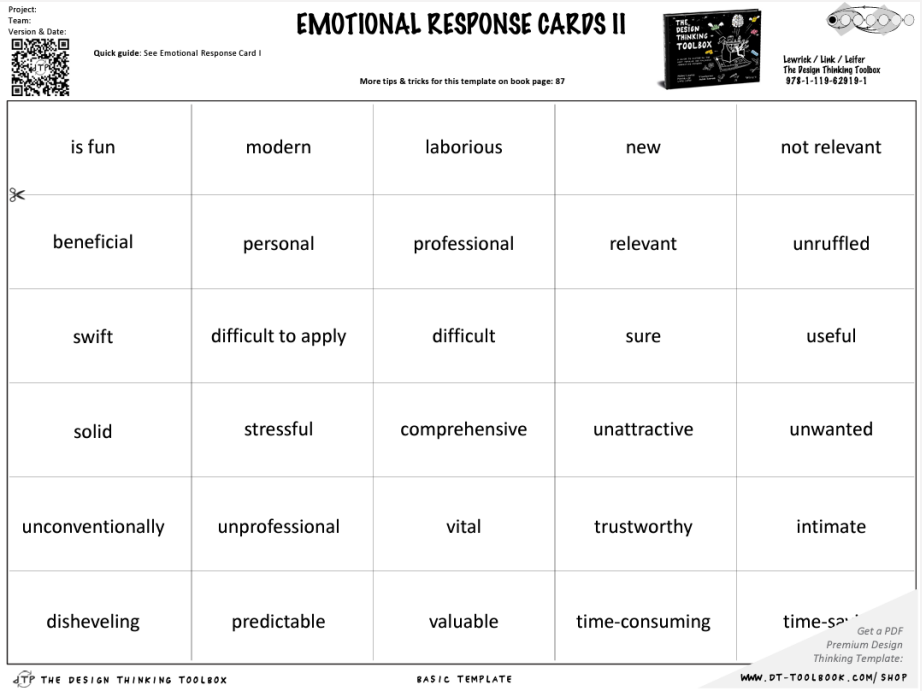
THE DESIGN THINKING TOOLBOX BASIC TEMPLATE



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Version & Date:

EMOTIONAL RESPONSE CARDS II

Quick guide: See Emotional Response Card I

More tips & tricks for this template on book page: 87

Lewrick / Link / Leifer
The Design Thinking Toolbox
978-1-119-62919-1

is fun	modern	laborious	new	not relevant
beneficial	personal	professional	relevant	unruffled
swift	difficult to apply	difficult	sure	useful
solid	stressful	comprehensive	unattractive	unwanted
unconventionally	unprofessional	vital	trustworthy	intimate
disheveling	predictable	valuable	time-consuming	time-sa

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THE DESIGN THINKING TOOLBOX BASIC TEMPLATE

Emotional Response Cards

- Understand the user emotions while testing different stages of the service / products
- Learn more about other products, brands and experiences
- Collect statements on strategy, information architecture, interaction, aesthetics, and speed

HOW TO PLAY

- Choose the related emotions to each touchpoint
- Review each to discover the potential directions

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~10mins Break~

Let’s getting started!

Remember to update your

Logbook

throughout the workshop

我想改變 _____，

因為 _____。

我們會就 _____

_____ 著手，透過

_____

或者我們可以試一下_____

_____

最後我們決定 _____

_____，因為

_____。

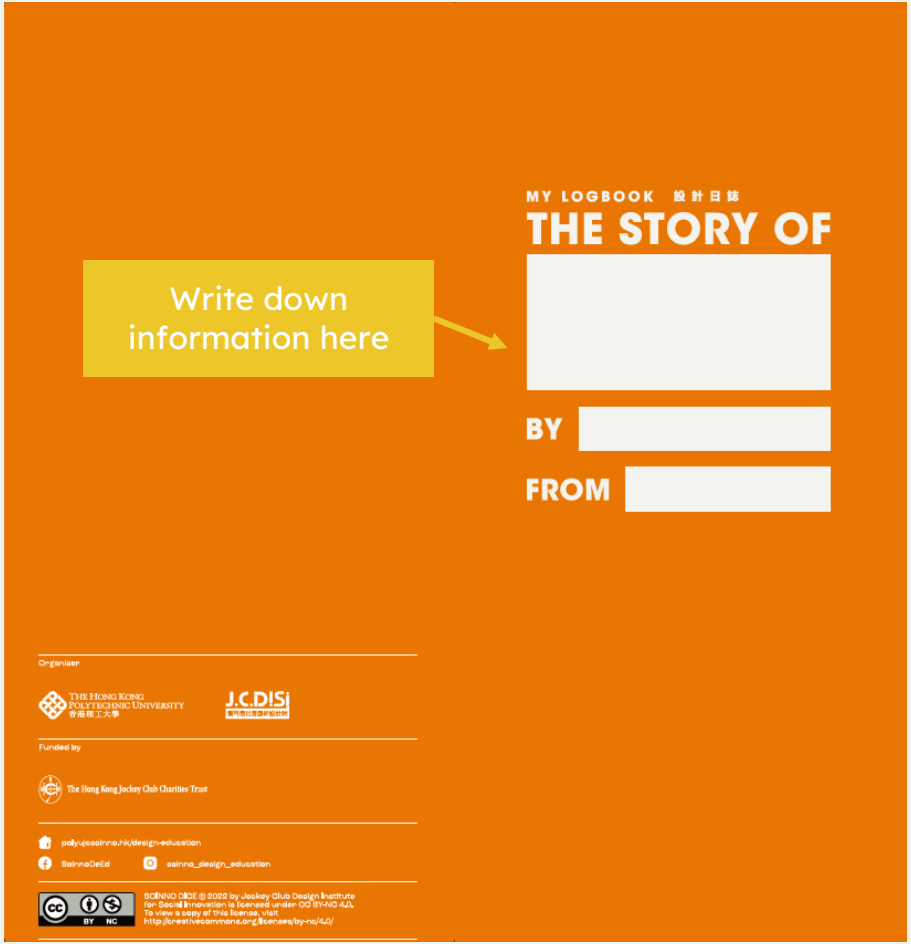
人們覺得這樣 _____

_____

因為 _____。

最後讓我們向你介紹 _____

_____。



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Website

MY LOGBOOK 設計日誌

問題 PROBLEM	發現 INSIGHTS	方向 DIRECTION	意念 IDEAS	解決方案 SOLUTION DIRECTION	設計原型 PROTOTYPE
我想改變 / / 因為	我們會就 / / 著手	透過 / /	或者我們 / / 可以試一下	最後我們決定 / / 因為	人們覺得這樣 / / 因為

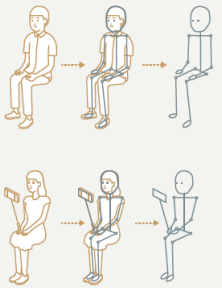
Task 1: AEIOU

Website

Activities	Environment	Interaction	Objects	Users
A	E	I	O	U

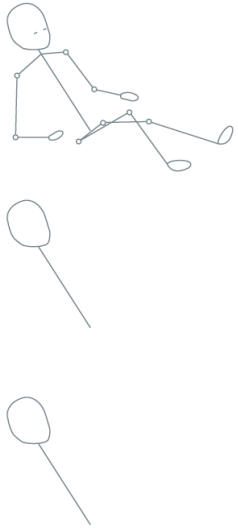
Draw the Gestures

SIT 坐



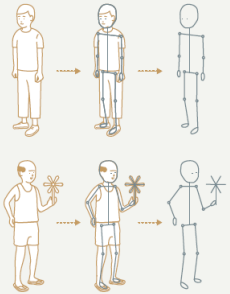
Draw the Gestures

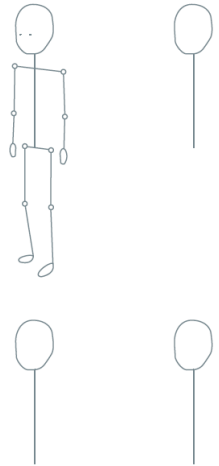
LIE 瞓

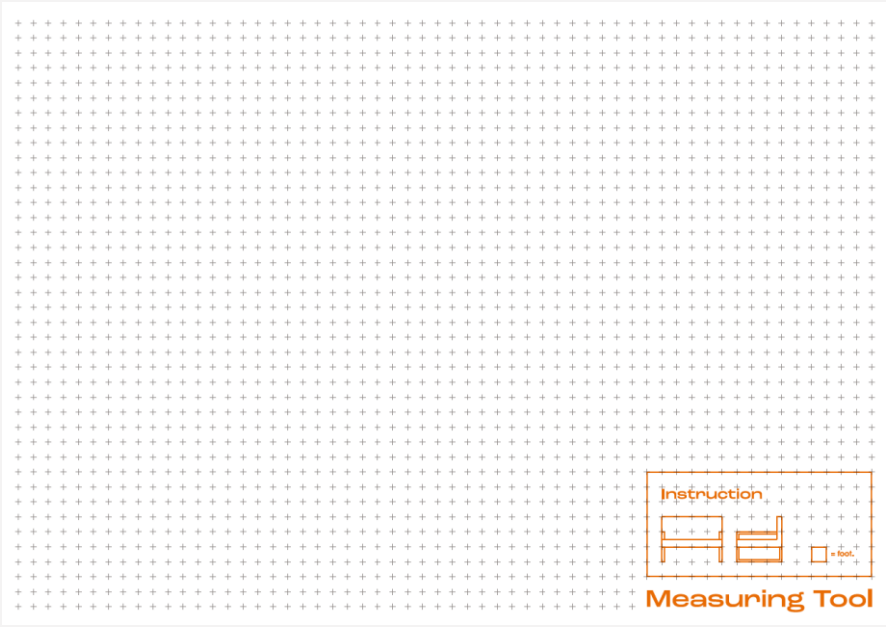


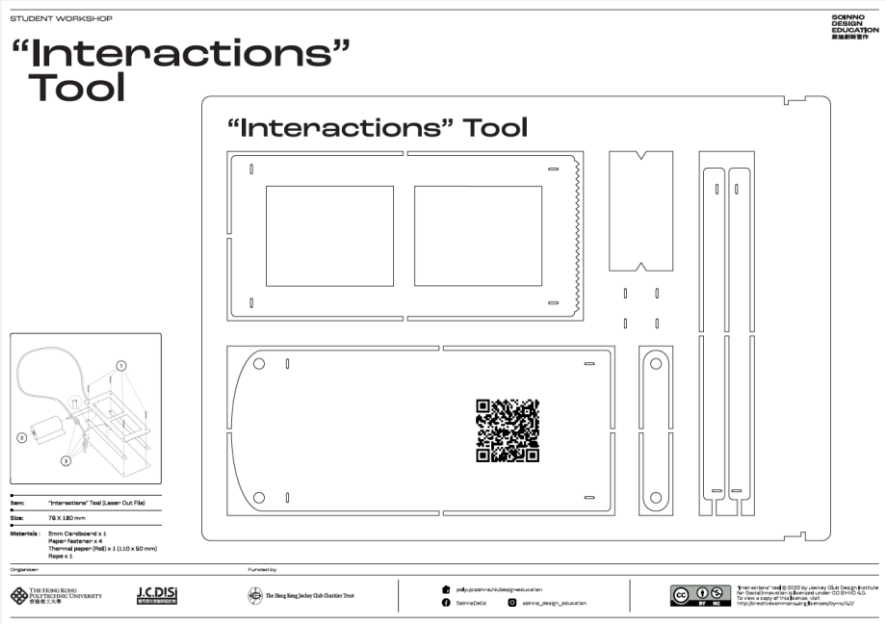
Draw the Gestures

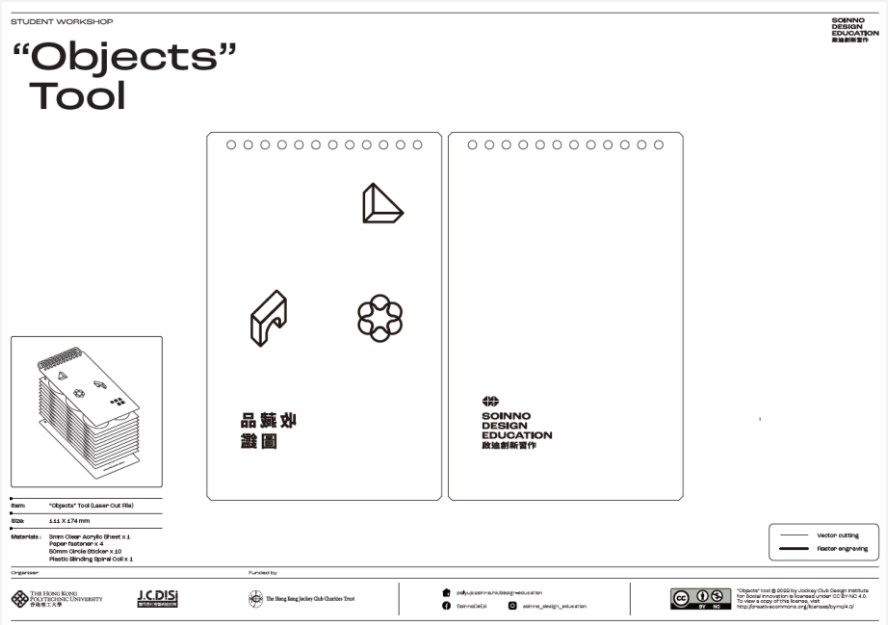
STAND 企



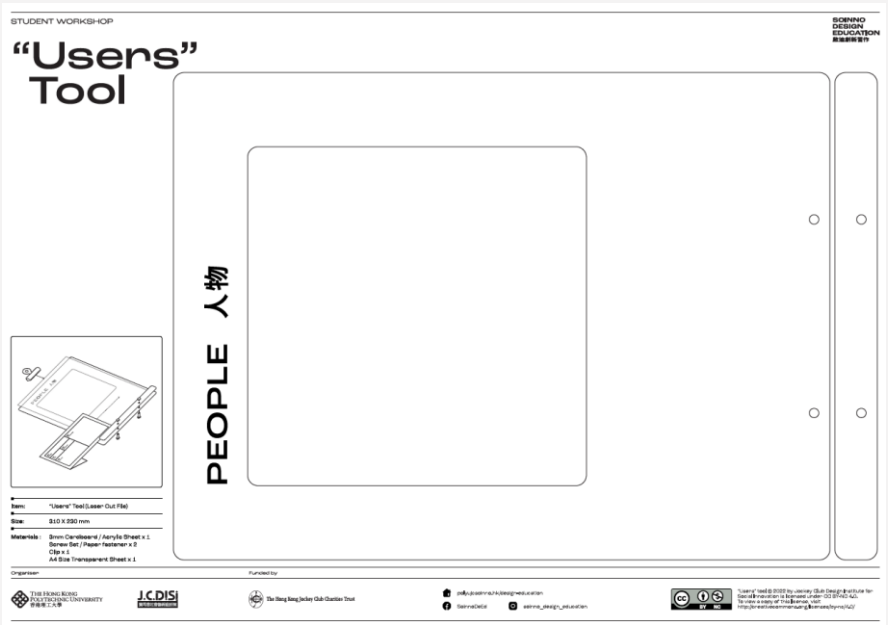



Instruction
Measuring Tool


STUDENT WORKSHOP
“Interactions” Tool
“Interactions” Tool


STUDENT WORKSHOP
SOINNO DESIGN EDUCATION
“Objects” Tool
SOINNO DESIGN EDUCATION
Vector cutting
Raster engraving

Activities A | Environment E | Interaction I | Objects O | Users U



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30MINS

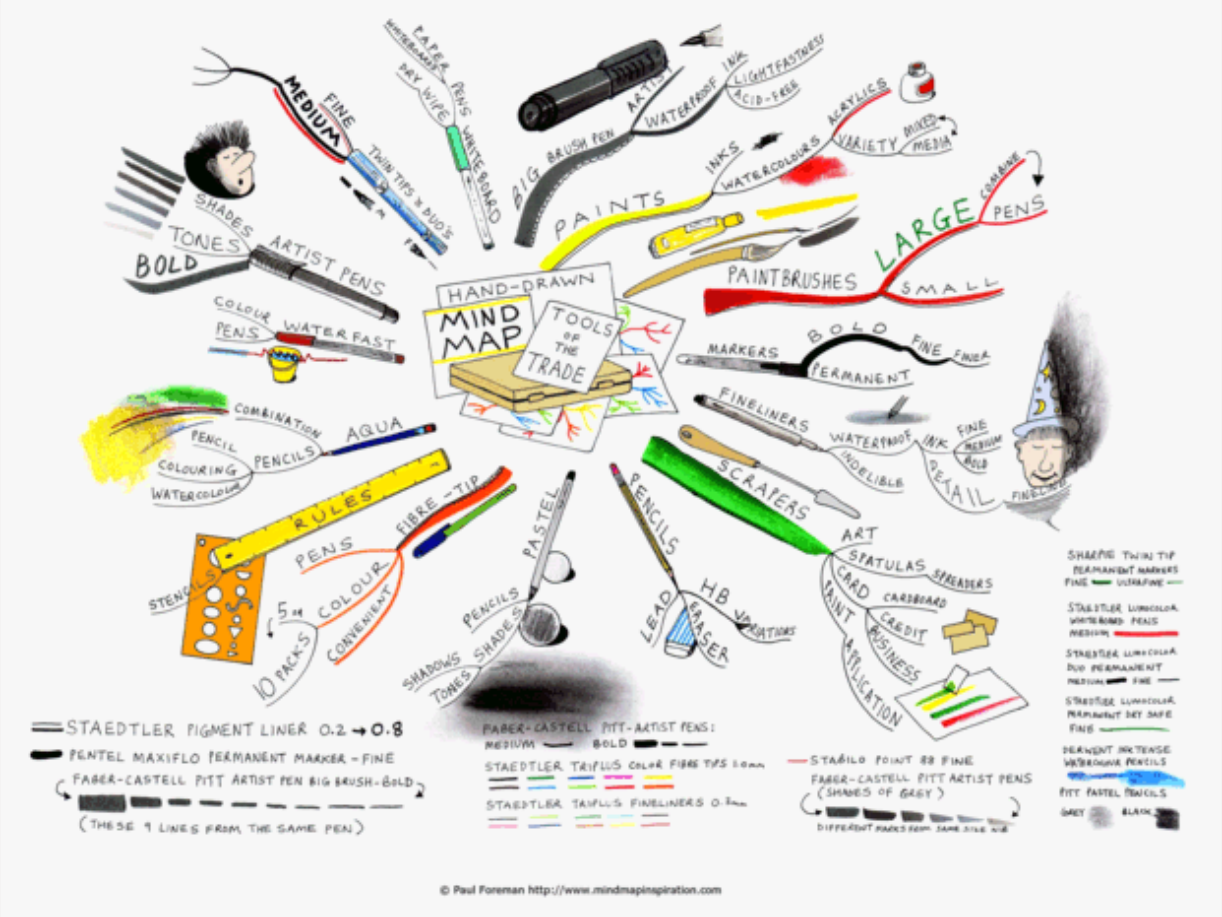
Task 2: Mindmapping

Mindmapping

- Encouraging attitude
- Try to add some drawings to clarify the meanings

Online mindmapping tools

- Miro
- Canva
- EdrawMind



When?

What?

Who?

Where?

Why?

How?

Let’s start with
5W+Hs Questions

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20MINS

What is/are

the problems

users facing?

Fill in the

Problem Statement

in your logbook!

~See you after lunch~

Review

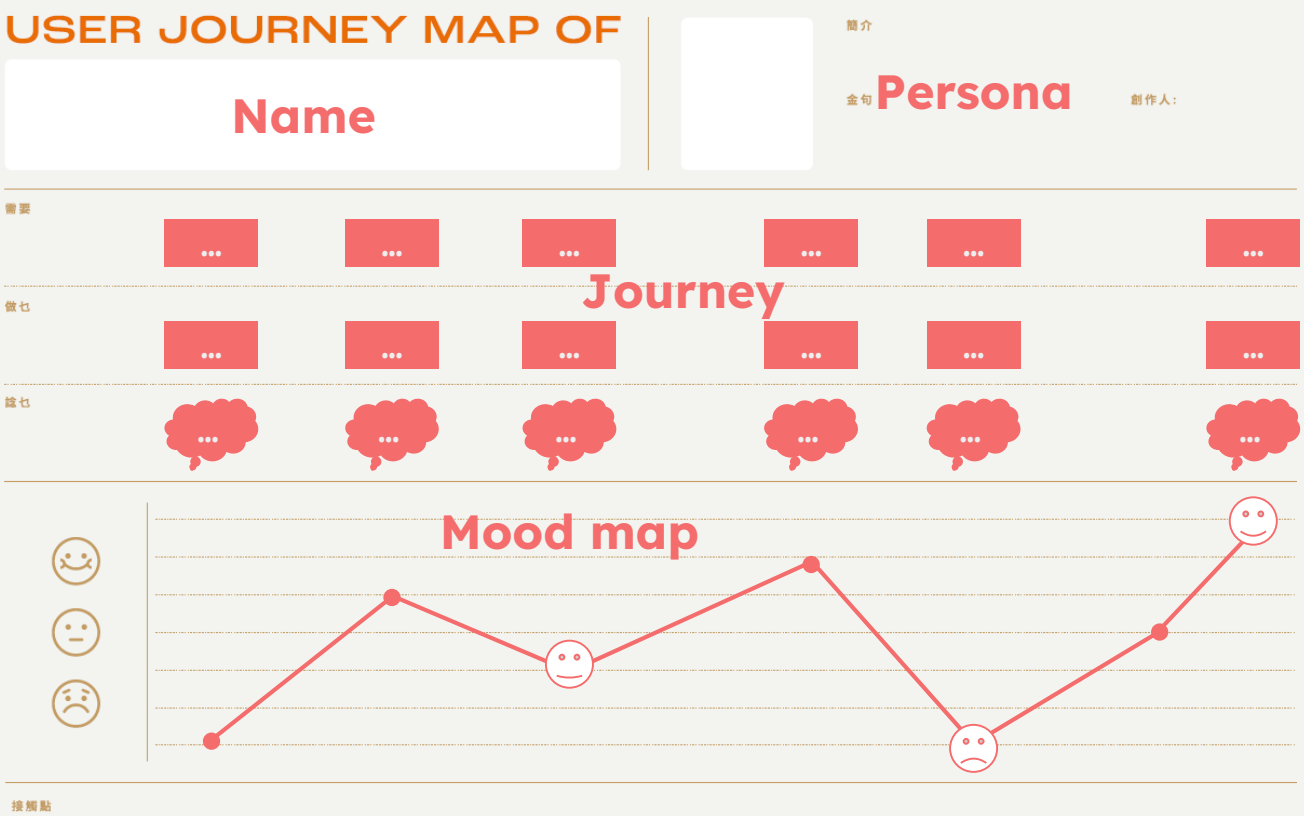
User Journey Mapping

Website

1. Introduction

- Goal of the session and steps that students will go through

2. **Imagining the persona**
   - Create the main person who is using the products or services
   - Write description and background
3. **Breaking down the user journey**
   - 3-4 critical phrases
4. **Graphic feelings**
   - Imagine the thoughts and feelings
   - Note the touchpoint(artefacts, interface, person, etc...)



Website

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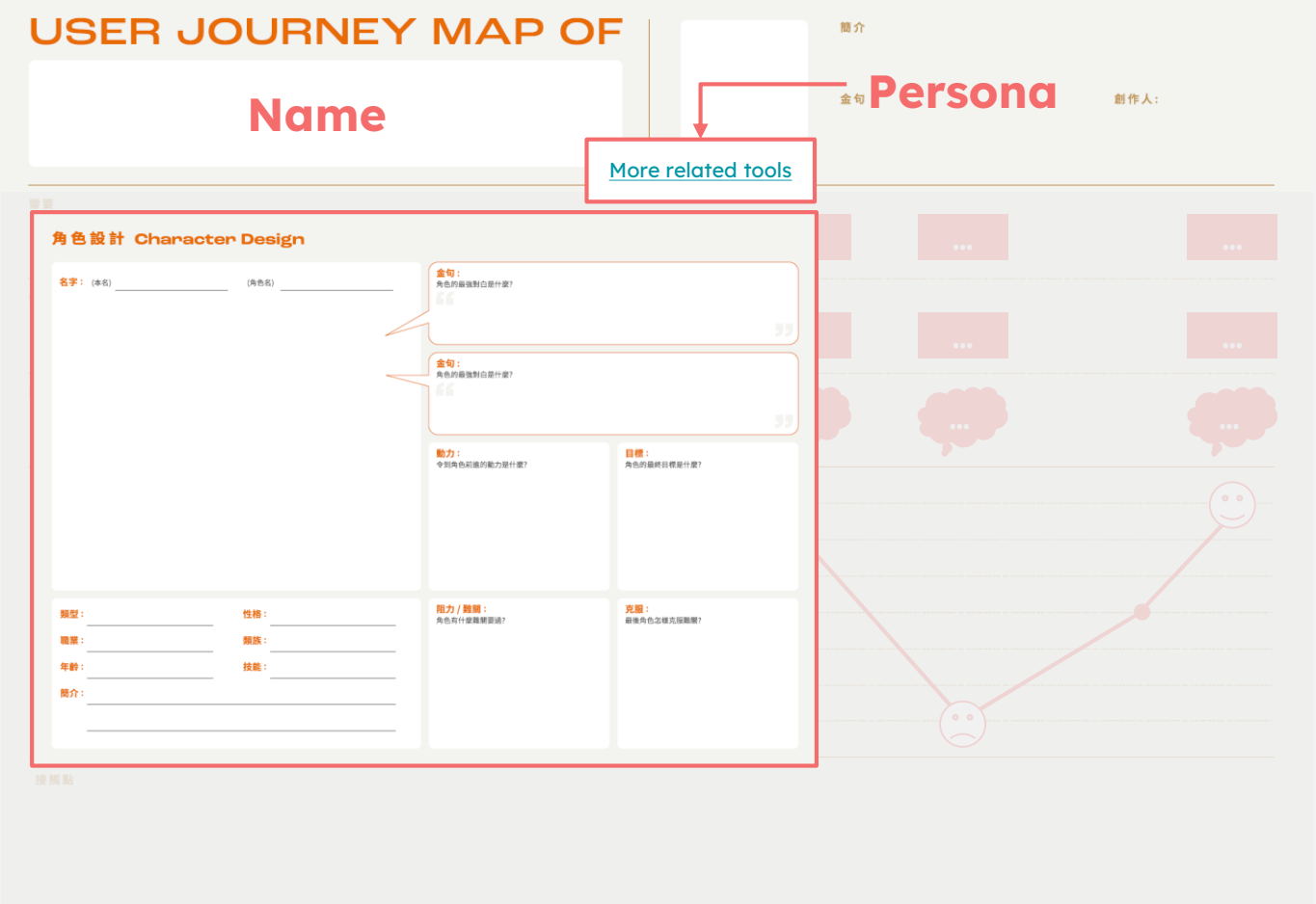

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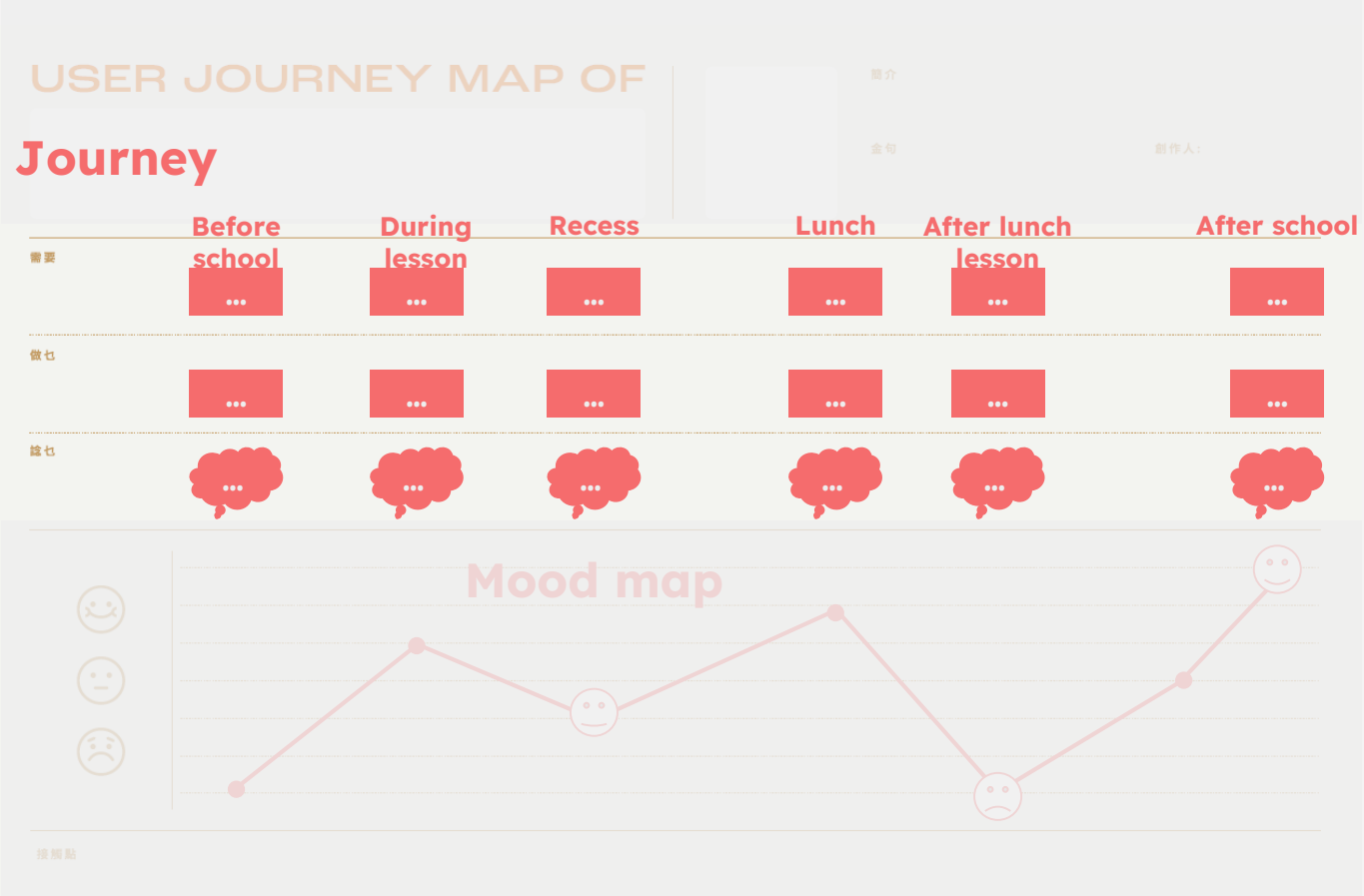

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Scenario Building

Website

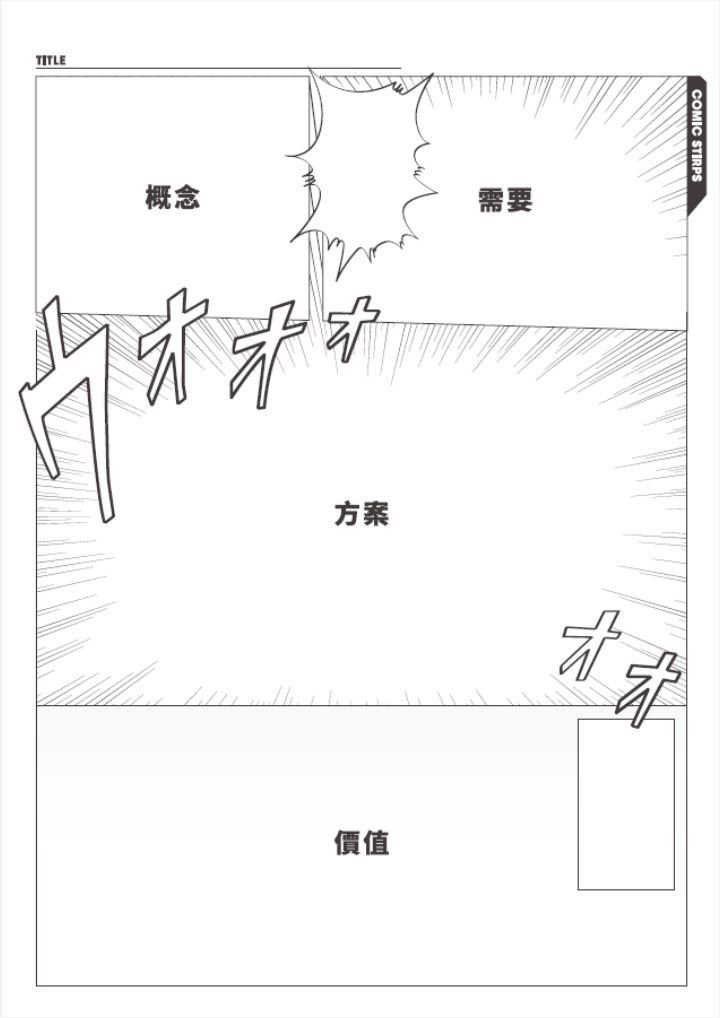
Scenario building

Drawing scenarios

- Imagine and apply their ideas in real life
- Adopt the perspective of user

Comparing scenarios

- Choose **more than one** idea to visualise
- Facilitators lead them to **compare the differences** between two scenarios



Website

Inspiration card

Website

Storytelling

- Ask the students to choose different images to **complete a story**
- Facilitator can **ask more questions** (e.g. real-life questions, imaginary, details...)to complete the story

Related tools

5W: Who, What, When, Where, Why

AEIOU: Activities, Environments, Interactions, Objects and Users

POEMS: People, Objects, Environments, Messages and Services

Empathy Map: How the user sense and think.

Storytelling

- Ask the students to choose different images to **complete a story**
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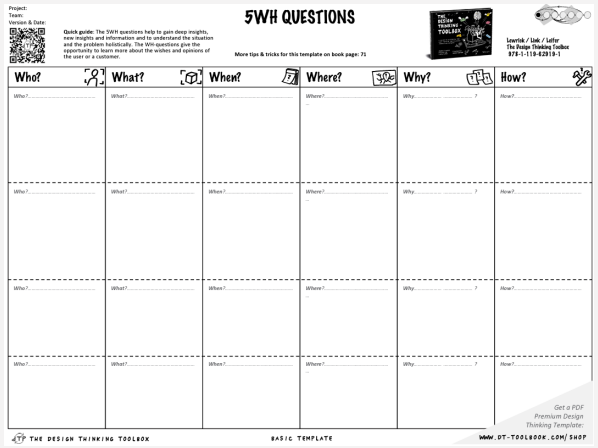

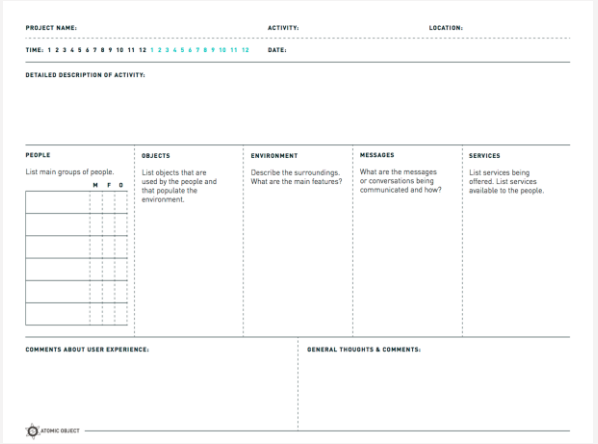

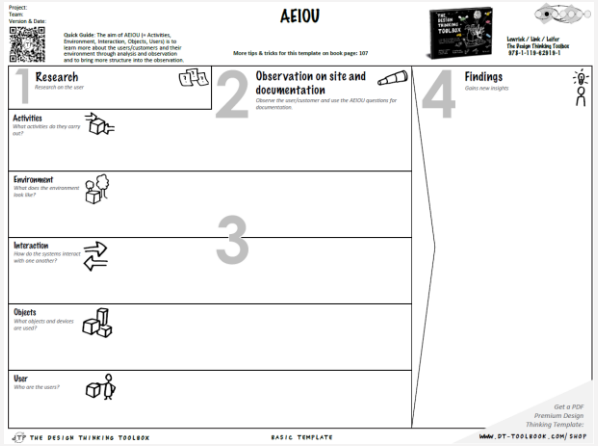

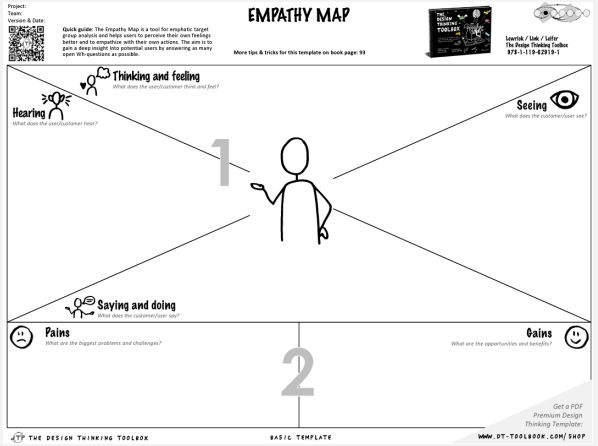

Related tools

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Empathy Map: How the user sense and think.

Website

Project:
Team:
Version & Date:

5WH QUESTIONS

Quick guide: The 5WH questions help to gain deep insights, new insights and information and to understand the situation and the problem holistically. The WH-questions give the opportunity to learn more about the wishes and opinions of the user or a customer.

More tips & tricks for this template on book page: 71

Lewrick / Link / Leifer
The Design Thinking Toolbox
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Who?	What?	When?	Where?	Why?	How?
Who?.....	What?.....	When?.....	Where?..... ...	Why..... ..... ?	How?.....
Who?.....	What?.....	When?.....	Where?..... ...	Why..... ..... ?	How?.....
Who?.....	What?.....	When?.....	Where?..... ...	Why..... ..... ?	How?.....
Who?.....	What?.....	When?.....	Where?..... ...	Why..... ..... ?	How?.....

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Project:
Team:
Version & Date:

EMPATHY MAP

Quick guide: The Empathy Map is a tool for emphatic target group analysis and helps users to perceive their own feelings better and to empathize with their own actions. The aim is to gain a deep insight into potential users by answering as many open Wh-questions as possible.

More tips & tricks for this template on book page: 93

Lewrick / Link / Leifer
The Design Thinking Toolbox
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Thinking and feeling
What does the user/customer think and feel?

Hearing
What does the user/customer hear?

Seeing
What does the customer/user see?

1

Saying and doing
What does the customer/user say?

Pains
What are the biggest problems and challenges?

Gains
What are the opportunities and benefits?

2

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Continue our journey...

Task 3 : Idea speed dating

Speed Dating

- **Swap** with other every 2 mins

Analysing ideas

- Divide the papers into several pieces so every group has one section
- In groups, the students start to **select and analyse** some of the ideas.

What

fun & unique ideas

you have got?

30MINS

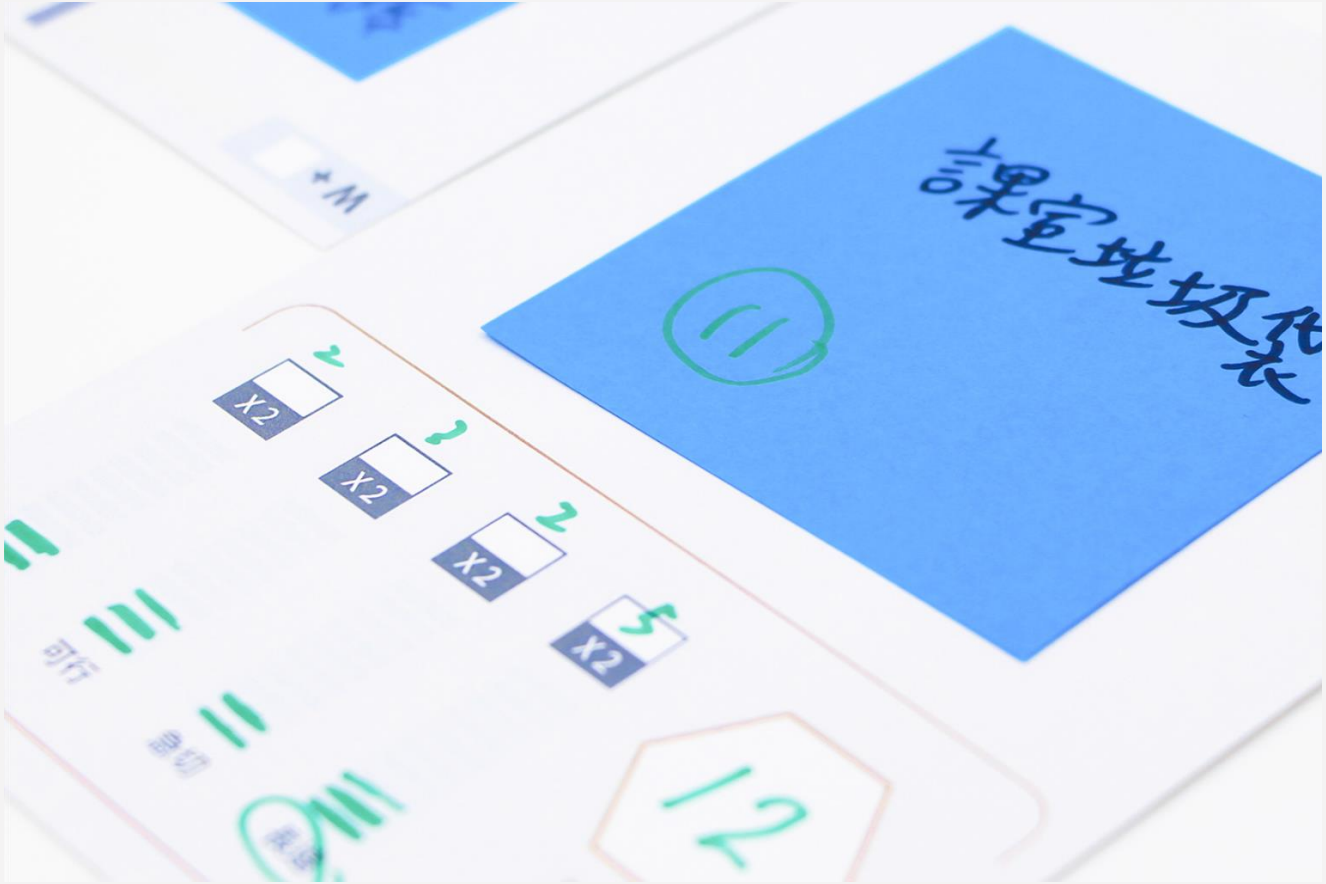
Task 4 : Idea battle card

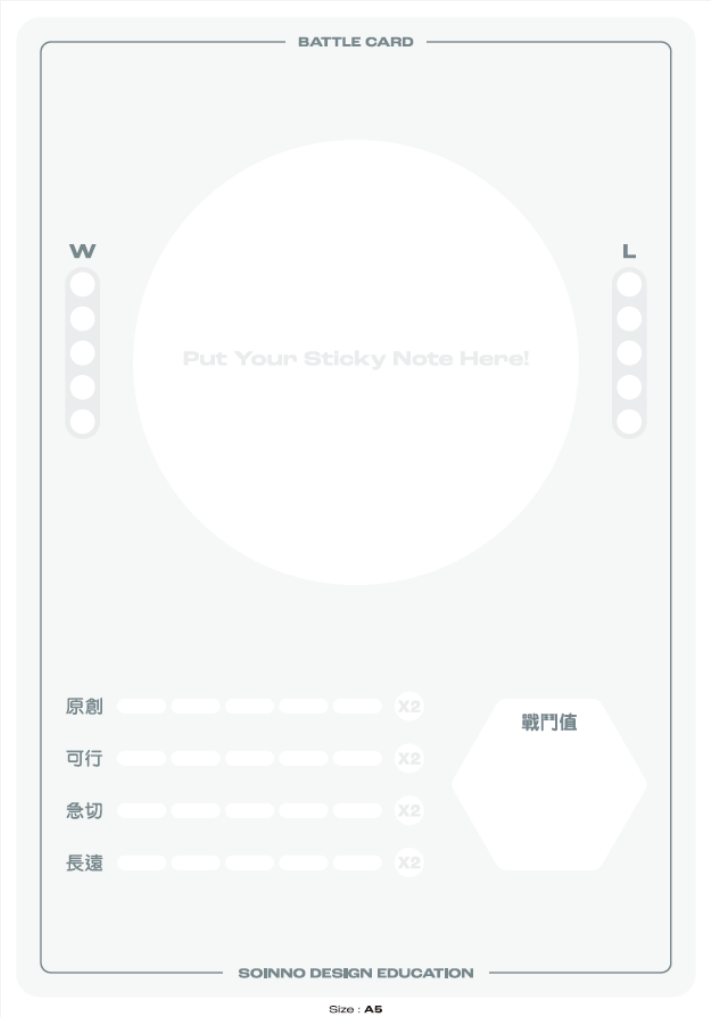
Idea Battle Card

- **Pick 5** ideas from idea speed dating

Analysing **ideas**

- Fill in the battle cards for each idea
- Evaluate each idea
  - Which card is the most effective and efficient solution?
  - Which card is the quickest to solve the problem?
  - More evaluating questions ……





Size : **A5**

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15MINS

Product design principle

1. **User-Centered Design (UCD)**: Conduct thorough user research to understand the target audience's needs, preferences, and ergonomic requirements. Design furniture that caters to their specific use cases and comfort levels.

2. **Simplicity**: Keep the furniture design clean, uncluttered, and focused on the core functionality. Avoid overly complex or ornate designs that can distract from the usability.

3. **Consistency**: Maintain a consistent design language across a furniture collection or line, using similar materials, finishes, and visual cues to create a cohesive brand identity.

4. **Feedback and Responsiveness**: Incorporate features that provide tactile or auditory feedback to the user, such as smooth-gliding drawers, sturdy construction, or soft-close mechanisms.

5. **Hierarchy and Visual Emphasis**: Prioritize the key functional elements of the furniture and use visual cues, such as size, color, and placement, to draw the user's attention to them.

以使用者為中心的設計 (UCD)：進行徹底的使用者研究，以了解目標受眾的需求、偏好和人體工學要求。設計適合其特定用例和舒適度的家具。

簡潔：保持家具設計乾淨、整潔，並專注於核心功能。避免過於複雜或華麗的設計，以免影響可用性。

一致性：在整個家具系列或產品線中保持一致的設計語言，使用相似的材料、飾面和視覺線索來創建有凝聚力的品牌形象。

回饋與反應能力：結合提供使用者觸覺或聽覺回饋的功能，例如平滑滑動的抽屜、堅固的結構或軟關閉機制。

層次結構和視覺重點：優先考慮家具的關鍵功能元素，並使用視覺線索（例如尺寸、顏色和位置）來吸引使用者的注意。

6 **Flexibility and Adaptability**: Design furniture that can be easily reconfigured, adjusted, or repurposed to accommodate different user needs and preferences, such as adjustable desks or modular seating.

7 **Error Prevention and Handling**: Anticipate potential user errors or safety concerns and design the furniture accordingly, using features like rounded edges, stable construction, and intuitive assembly instructions.

8 **Accessibility**: Consider the needs of users with various physical abilities and ensure the furniture is accessible, with features like adjustable heights, ample legroom, and easy-to-reach controls.

9 **Learnability and Discoverability**: Intuitively design the furniture to be self-explanatory, with clear cues and instructions on how to use its various functions and features.

10 **Aesthetics and Emotional Appeal**: Combine functional design with visually appealing aesthetics, using materials, colors, and forms that evoke the desired emotional response from the user, such as a sense of comfort, sophistication, or creativity.

靈活性和適應性：設計可以輕鬆重新配置、調整或重新調整用途的家具，以滿足不同使用者的需求和偏好，例如可調式辦公桌或模組化座椅。

預防錯誤與處理：預測潛在的使用者錯誤或安全問題，並利用圓邊、穩定的結構和直覺的組裝說明等功能相應地設計家具。

無障礙：考慮不同身體能力的使用者的需求，並確保家具易於使用，具有可調節高度、充足的腿部空間和易於觸及的控制裝置等功能。

可學習性和可發現性：直觀地設計不言自明的家具，並提供有關如何使用其各種功能和特性的清晰提示和說明。

美學和情感訴求：將功能設計與視覺吸引力美學相結合，使用能夠喚起使用者所需情感反應的材料、顏色和形式，例如舒適感、精緻感或創造力。

Try to think different

sense and experience

from using the chair

1	顏色	Colours
2	材質	Material
3	質感	Texture
4	氣氛	Vibe
5	價值	Value
6	形狀	Form
7	空間	Space
8	氣味	Smell
9	聲音	Sound
10	情景	Scenario
11	功能	Function

Chair 椅

這是什麼？
WHAT?

誰會用？
WHO?

在哪裡用？
WHERE?

什麼時候用？
WHEN?

為什麼？
WHY?

如何用？
HOW?

Task 5 : Making

45MINS

Open source

Design Thinking Toolkit & Guide

POLYU DISCI SOINNO tools

https://soinnohub.polyujcsoinno.hk/zh-hant/tools/

IDK Design Thinking Toolkit

https://www.idk-hkdc.org/toolkit

The Design Thinking Toolbox

https://en.dt-toolbook.com/tools

Atomic Design

https://spin.atomicobject.com/tag/design-thinking/

IBM Design Thinking Course

https://www.ibm.com/design/thinking/page/toolkit

Debrief

~Thank you~