



STEAM未來教室的設計思考與服務設計

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2019/10

我是老師、Maker、Traveler、農夫...?

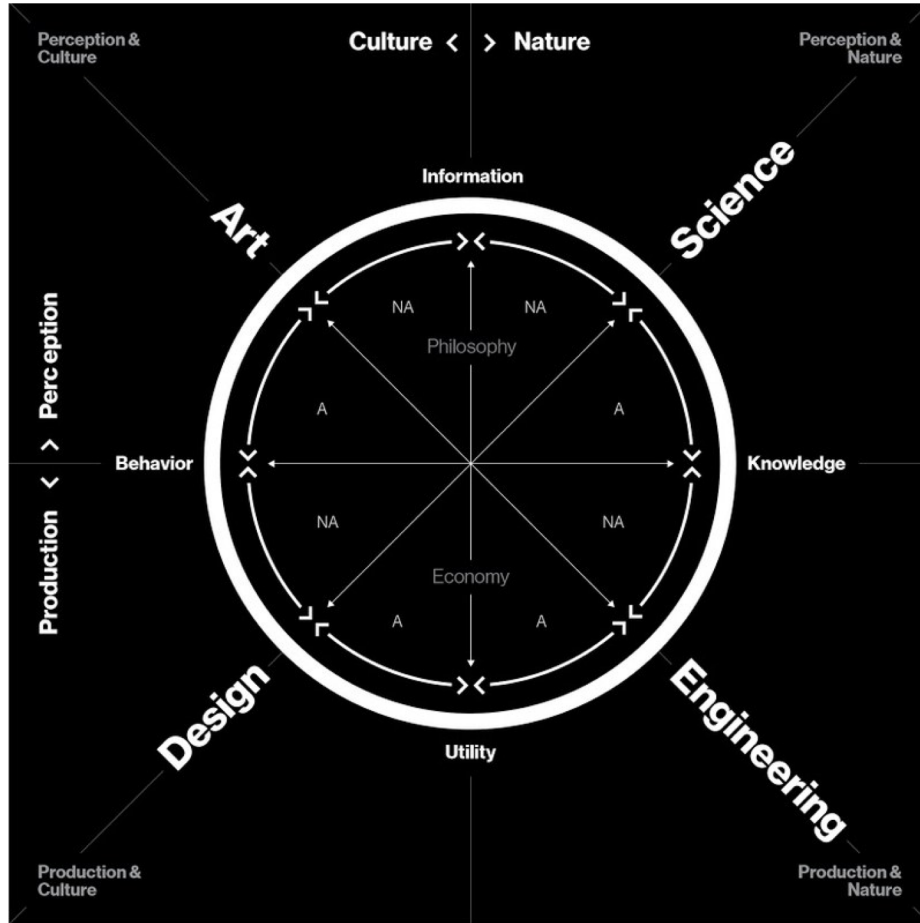
FutureClassroom QA – [sli.do: #S790](#)

FutureClassroom Recap – [sli.do: #k172](#)

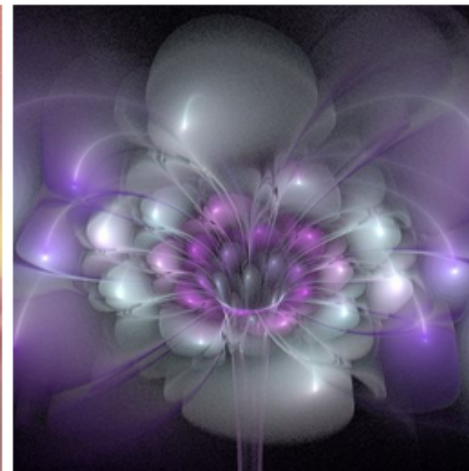
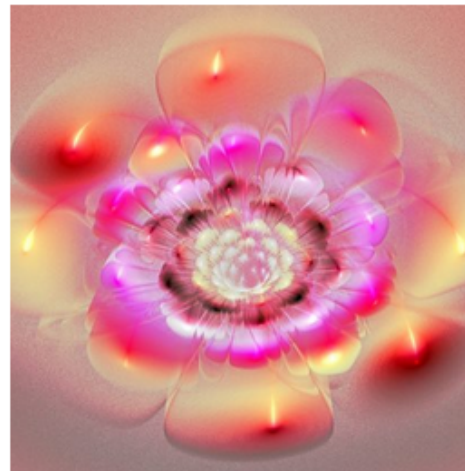
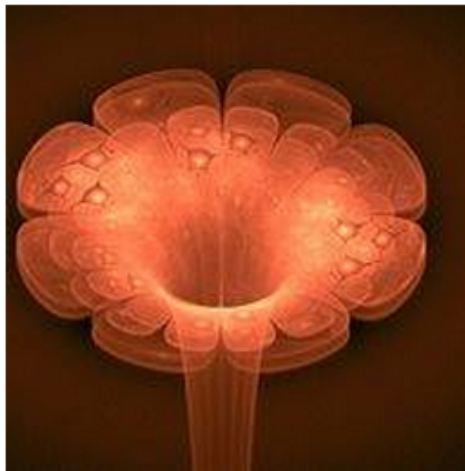
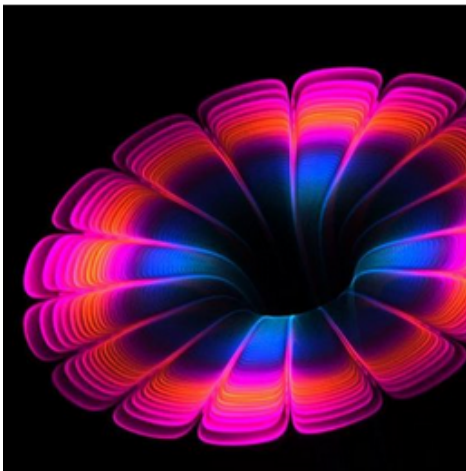
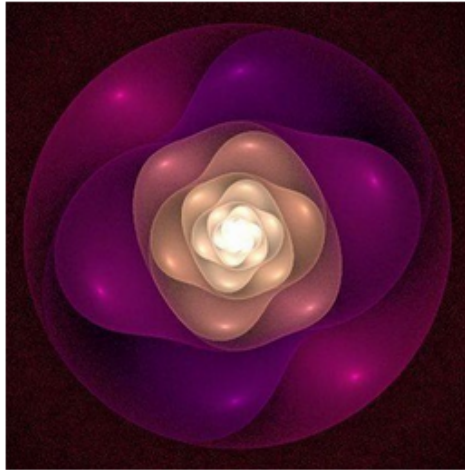


臺北科大智慧互動技術與服務設計研究室

NTUT_SISD Lab



Source: https://www.wired.com/2016/03/mit-media-labs-journal-design-science-radical-new-kind-publication/?mbid=social_twitter



改造老房子：臺東市中心老樹之家

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台東野孩子：向大自然及部落學習

機一、家人開始進行觀察與記錄。為了站在他們的視角觀看，就要蹲下來，跟孩子一樣的高度，才能產生對話空間。一開始時，一家人拿著各自的相機，在往家附近公園取景，從他們討論鏡頭、取得信任與理解，可發現彼此親和與互助。

提到台東，總有人：「好山、好水、好風景」；但對「野孩子」家來說，「好山、好水」是親子之間的關係。家中沒有電視，一餐晚餐可以從六點吃到八點多，討論當下時事與學習的趣

食養心法：

- 孩子吃飽喝足，是學習的基礎。
- 親子共同上廚，是學習的契機。
- 食養中融入文化，創造更多學習力。

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「看原住民跳舞、喝過香醇糯米酒，是這的一部分，都市同學是從課本上學到，我們是親身體驗。」王聖傑說，他住在原住民部落中，看到原住民的英勇，體會到，考試次數不能評斷。

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掌握史上最大配息行情 贏家這樣填息 P.110 / 28歲海軍軍醫「神機」10年血淚告白 P.114

在今天看見明天

今周刊

創刊號 25 一週年

最新調查 > 外籍大學生看台灣同學 過半有媽寶症

世代新危機 超載的教養

家長到大學宿舍搶地板，擔心孩子不會洗衣服……
「媽寶」現象正在侵蝕台灣年輕人的競爭力
忍住插手的欲望，是開始將孩子養成大人的第一步
交大校長很理想：教育像作畫，要適度「留白」

獨家專訪 > 移居教養非洲小孩的母女對談分享
另類教養 > 台大博士父母移民台東，讓子女學部落智慧 P.114

1122



Winston Churchill ~

*"We shape our buildings;
thereafter they shape us."*

龍田書屋食農教育：從土地中找到孩子們一輩子的平衡感

龍田書屋 · 2018年12月25日 星期二 ·

『孩子們為什麼要長的這麼的小？要長的這麼的慢？
孩子們為什麼不像其他物種，短時間之內就能長得跟母體一樣的大小？
因為，
上天要孩子們接近土地、慢慢的長大，
以便讓他們能從土地中，找到一輩子的平衡感。』

這是十數年前旅遊中，在某個禪寺中驚鴻一瞥的格言。
也是後續引發的開放龍田書屋成為孩子們食農教育，
找回布農族傳統依循自然、共耕、共食、及共學模式的願力。

在上天所恩賜的的這片土地中，我們都是過客。
但是如何保存一片樂土，
讓孩子們能從與土地的互動體驗中，
找到他們與自然共生、共榮及和諧相處的平衡感，我們當戮力而為。



→ 回歸未來主人翁本生活的價值

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Source: 龍田書屋/台東桃源國小食農教育

“Children are the world's most valuable resource and its best hope for the future.”

~by John F. Kennedy

Human-Centered Design
Value-Chain Implementation

<https://kahoot.com/>

PIN: **0891267**

<https://kahoot.it/challenge/0891267>



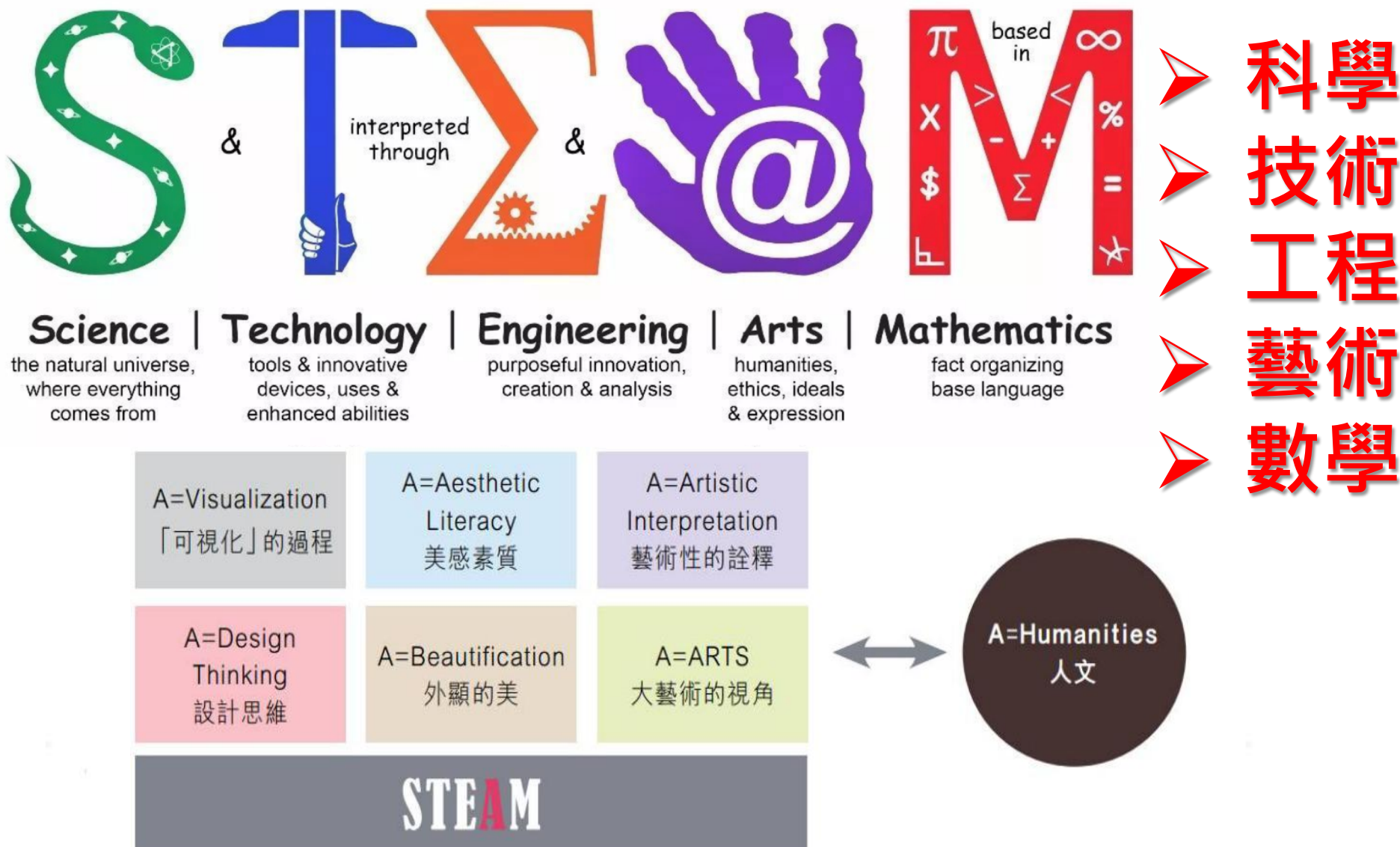
<https://www.sli.do/>

FutureClassroom QA – sli.do: #S790

FutureClassroom Recap – sli.do: #k172

新世代STEAM的學習模式

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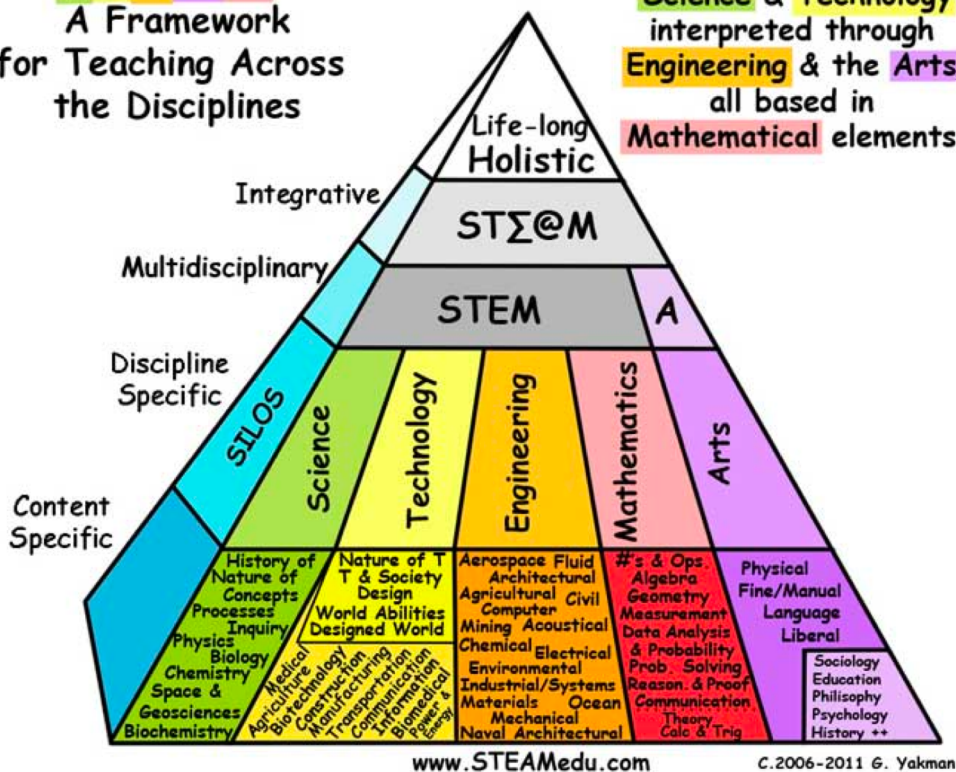
<http://news.juesheng.com/a/34831.html>

<https://kknews.cc/design/r8ojm34.html>

從STEM到STEAM的學習演化及4C能力

從STEM到STEAM的演化活動以Georgette Yakman和John Maeda為代表人物。Yakman將STEAM的精髓總結為：「以數學為基礎，科學和技術通過工程和設計被表述出來。」

STΣ@M:
A Framework
for Teaching Across
the Disciplines



<https://www.teacherspayteachers.com/Product/4-Cs-Poster-21st-Century-Skills-2704189>

<http://www.miscositas.com/steam.html>

什麼是設計？



設計是每個人的事



設計是設計師的事



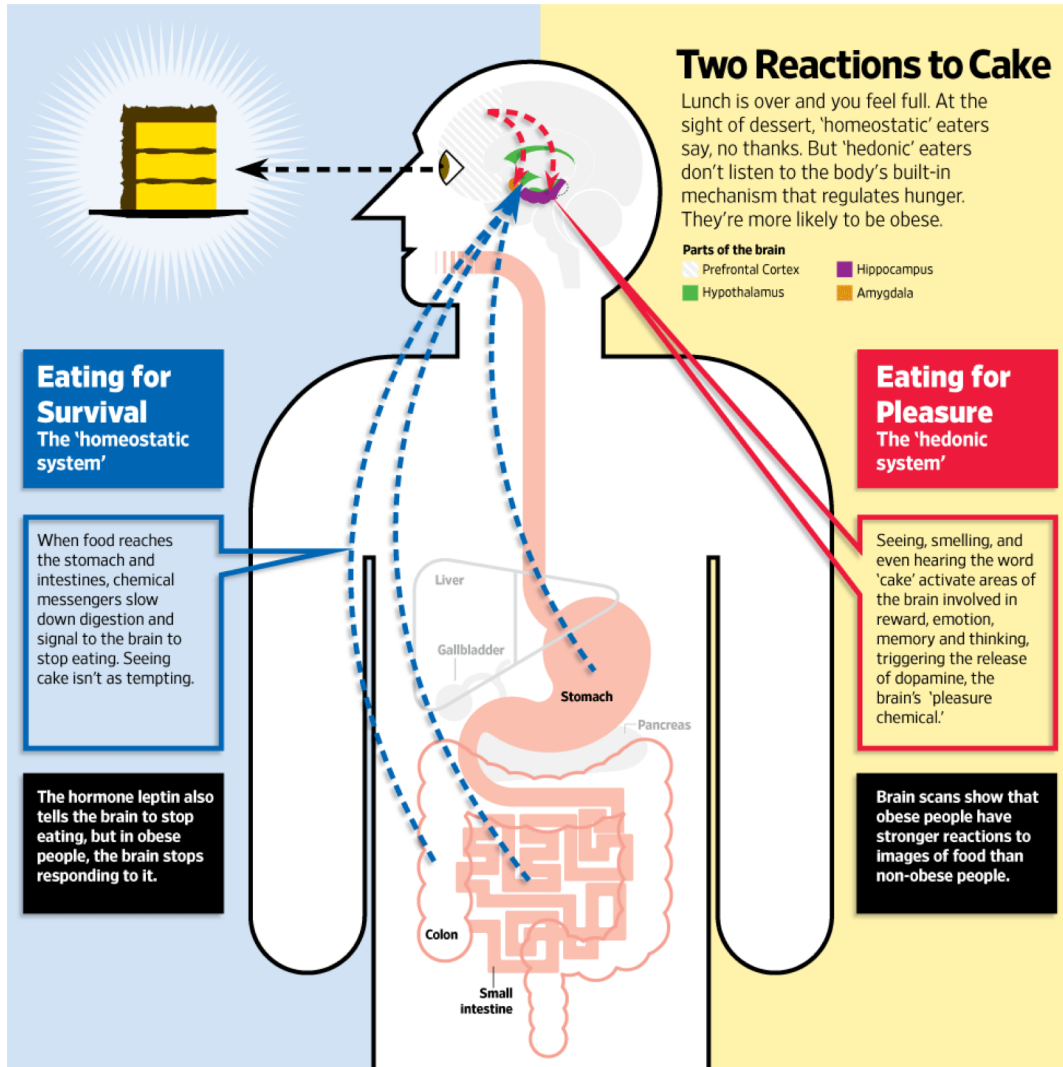
左腦 + 右腦的思考模式 (自我認知活動)



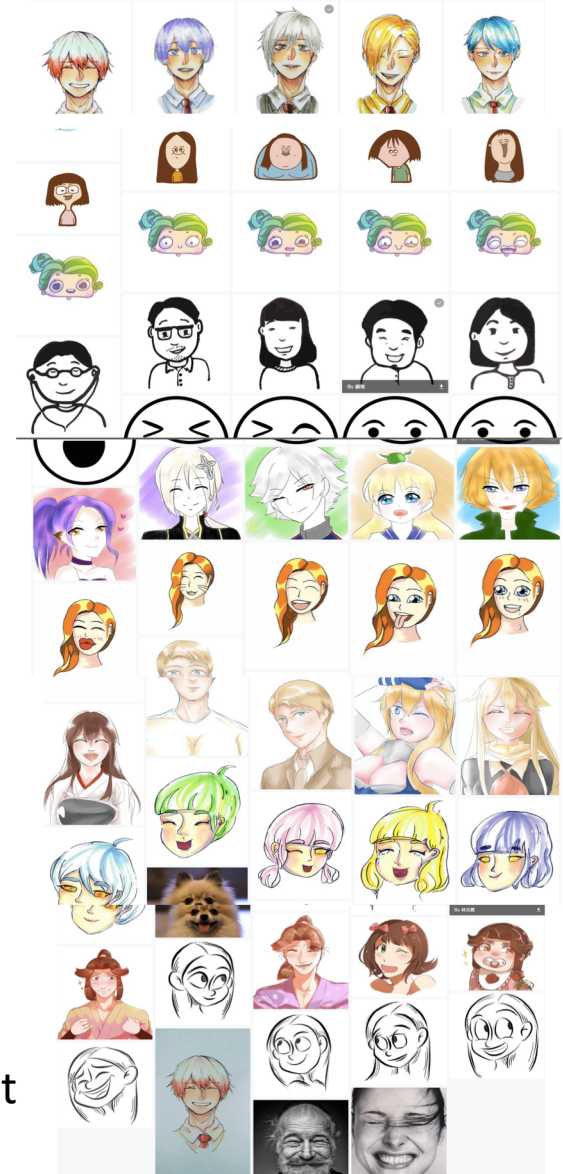
Source: <http://imgur.com/gallery/jbQ0cvZ>

快樂感的設計 Hedonic Design

SD Lab

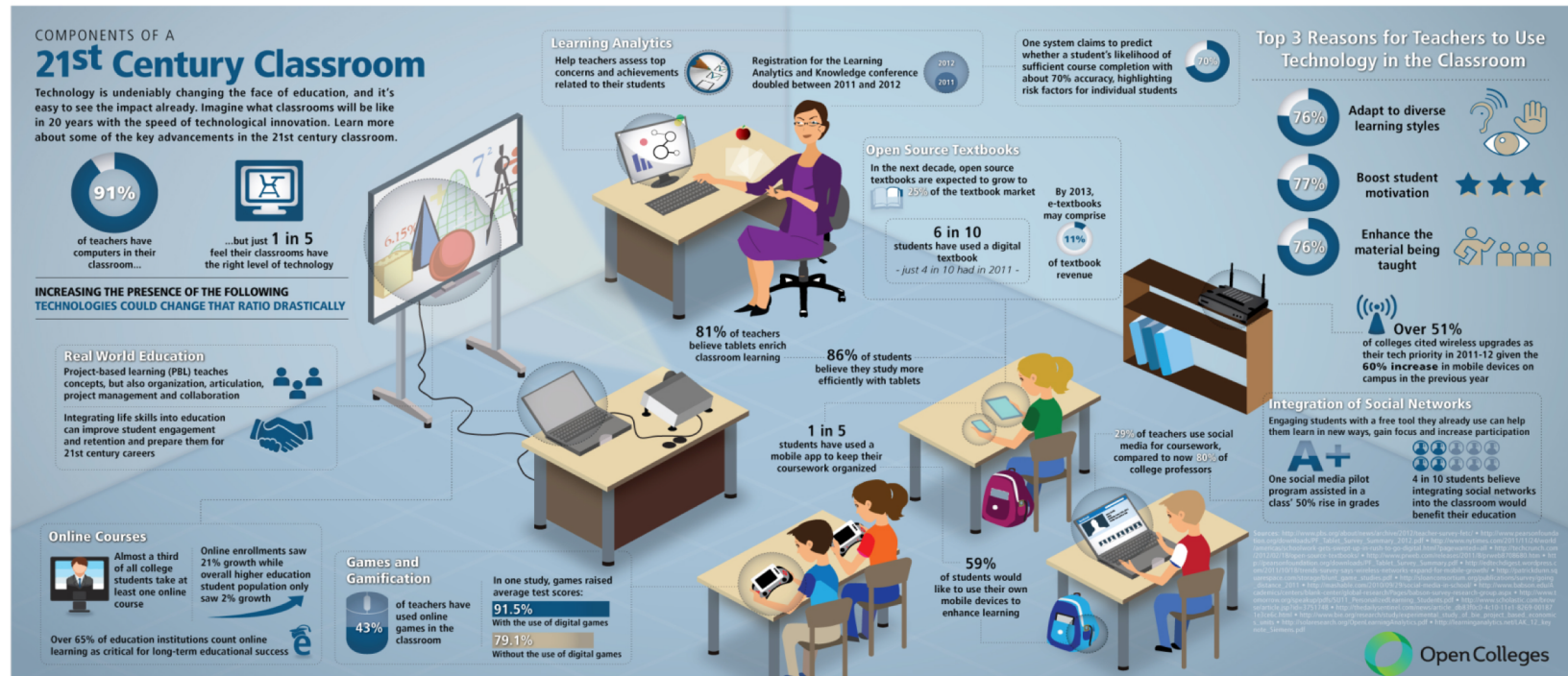
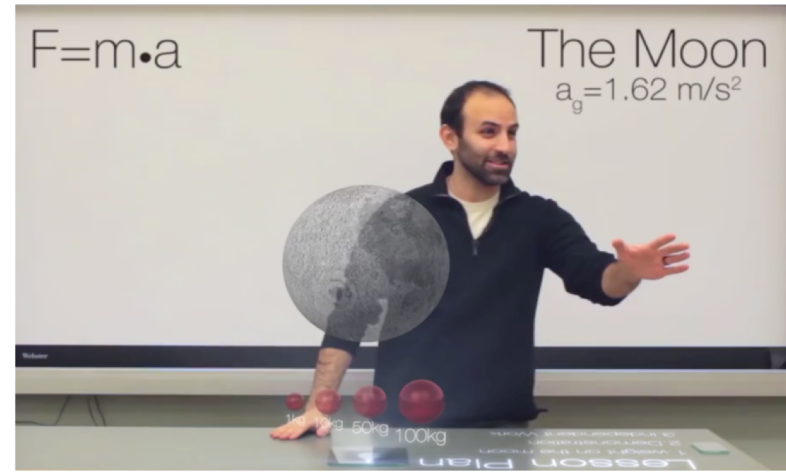


Source: <http://shop-training.com/eating-to-live-or-living-to-eat>



未來教室的情境設計

(請寫下對未來教室的兩個關鍵概念)



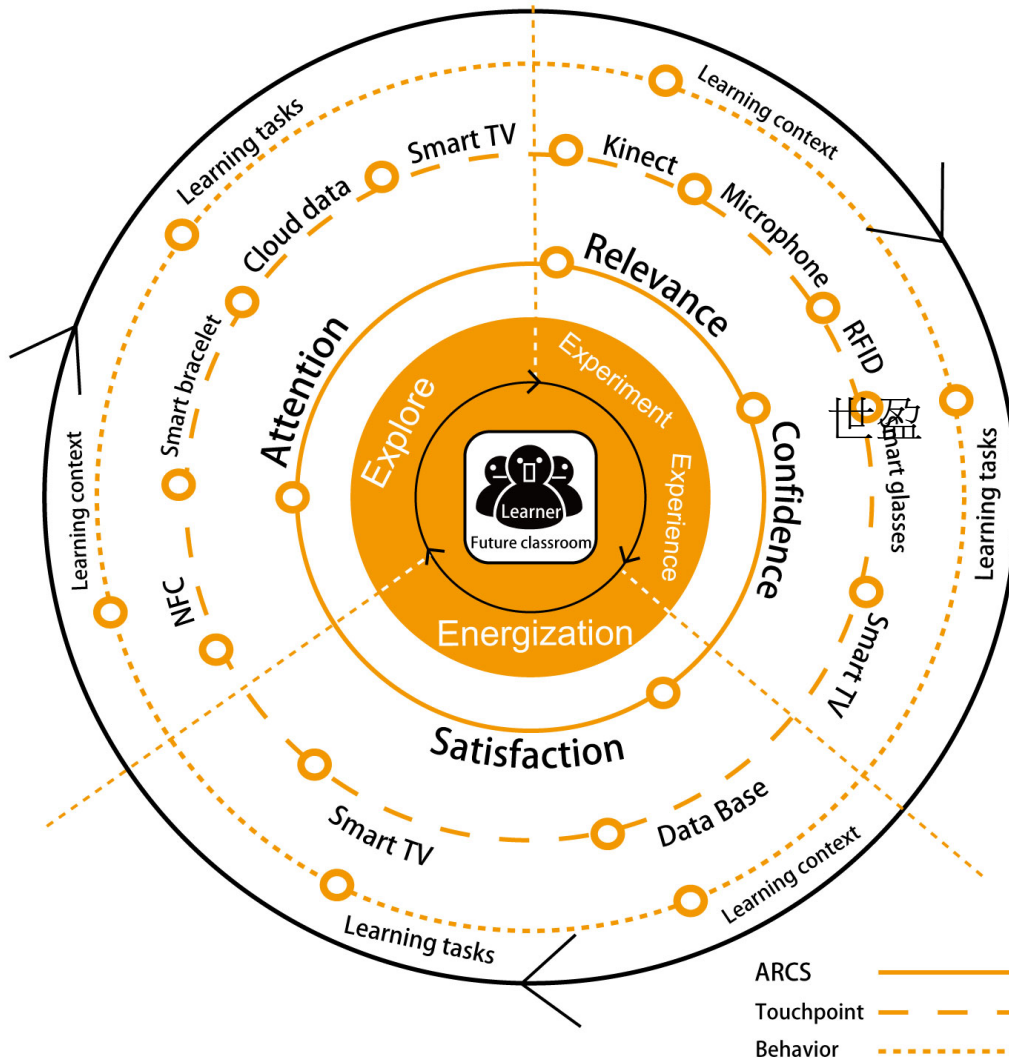
未來教室的學習模式

Working Mechanism: ARCS Model (J. Keller 1988)



未來教室的人本設計思考

Working Mechanism: 4E Processes + ARCS Model



Exploration

Define the problems with Individual scope

Experiment

Practice and play with the problems

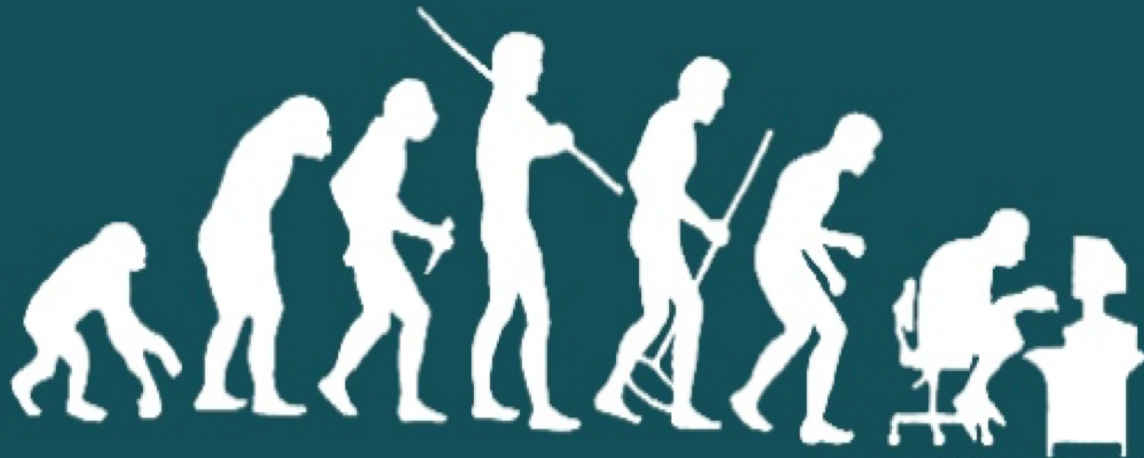
Experience

Finding individual solution to the problems

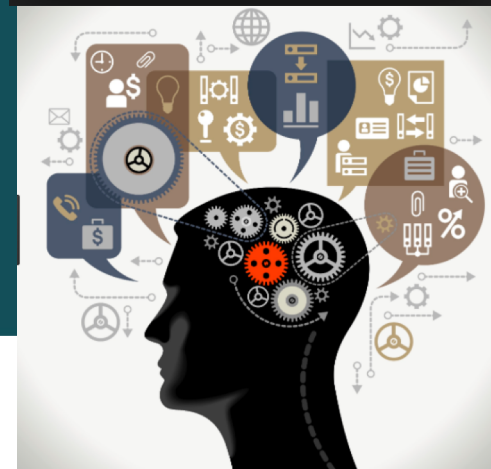
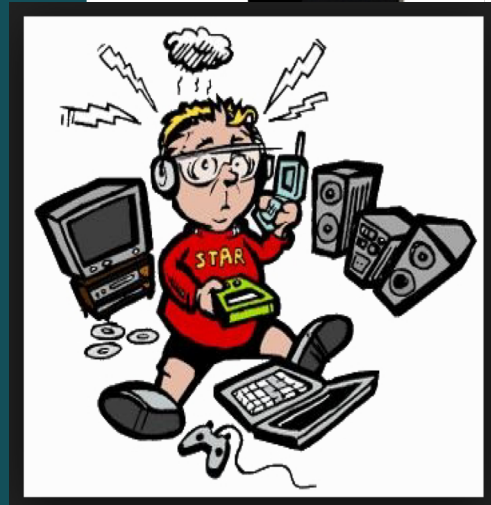
Empowerment

Evaluate Individual achievements

科技力的發展與應用(數位原生代)



Technology



Source:

<https://www.slideshare.net/cozyco/more-with-less-the-power-of-free-technology-cozy-at-naa-2016-lucas-hall>
<http://opinion-forum.com/index/2012/08/who-is-more-powerful-technology-or-parents/>
<http://sommeryeager.com/about-us/technology/>

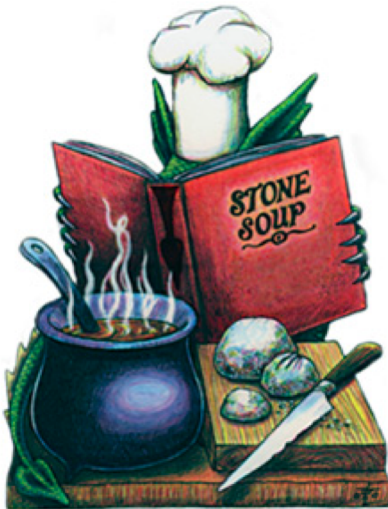
石頭煮湯的故事(共作模式的運作)

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共作



共享



<https://www.beatimeshortstories.com/stone-soup-story>



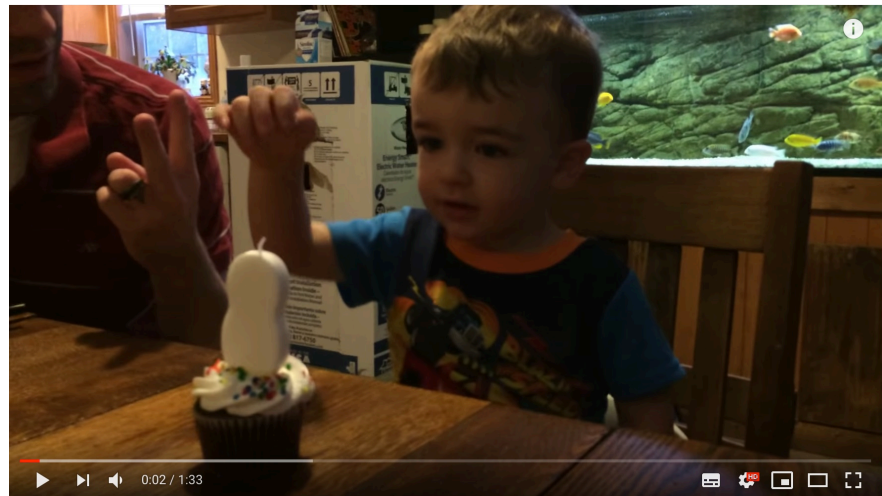
<https://www.indianweb2.com/2017/06/27/mangaluru-govt-owned-coworking/>

人本設計：自我問題解決能力 + 善用工具

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<https://www.youtube.com/watch?v=1IVEXOz7pBU>



<https://www.youtube.com/watch?v=OULuqNgEWmU>

知識管理方程式

a. Data = ?

b. Information = Data + ?

c. Knowledge = Information + ?

d. Wisdom = Knowledge + ?

1. Context Analysis
2. Raw Materials
3. Experiences
4. Actions

(a,2), (b,1), (c,4), (d,3)

未來學習的模式：創意與創新思考的主軸

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用遊戲來探索問題：鏈結自我與創意行動

Exploration with PLAYING —

which connects being (identity and selfhood) with doing (creative action)

用實作來面對問題：鏈結創意行動與可用的資源

Experiment with MAKING —

which connects doing (creative action) with having (available materials)

用分享來累積經驗：鏈結可用的資源與知識經驗

Experience with SHARING —

which connects having (things to share) with knowing (knowledge and experience)

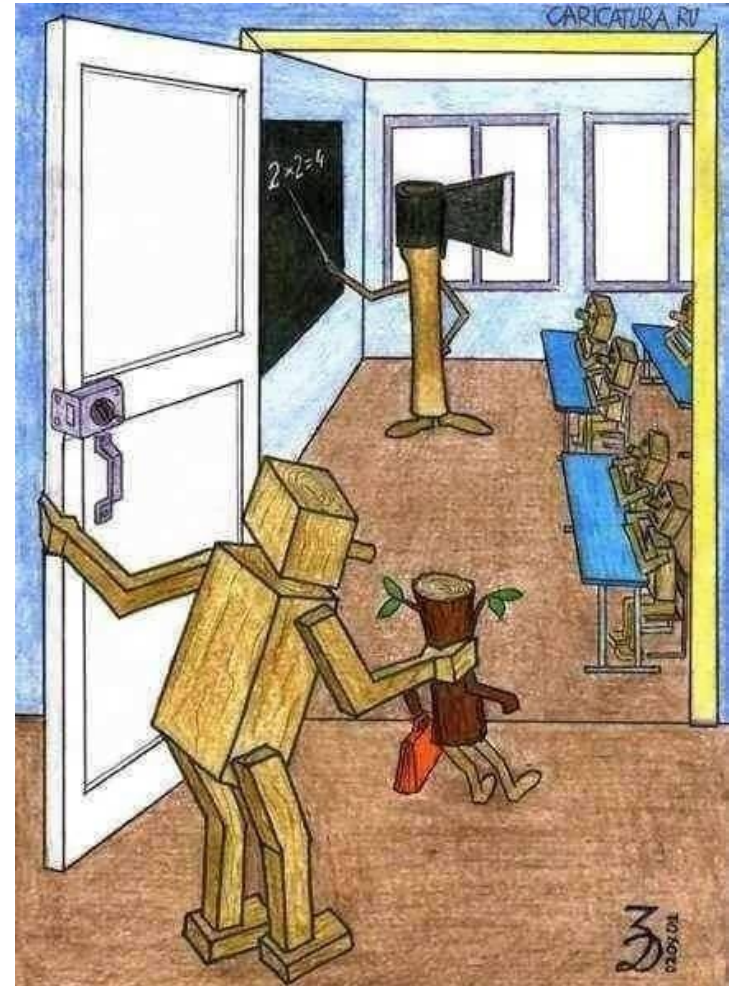
用思考來增強解決問題的能力：建立知識與經驗的鏈結

Empowerment with THINKING —

which connects knowing (knowledge and experience) with being (identity and selfhood)

學校扼殺了創意嗎？

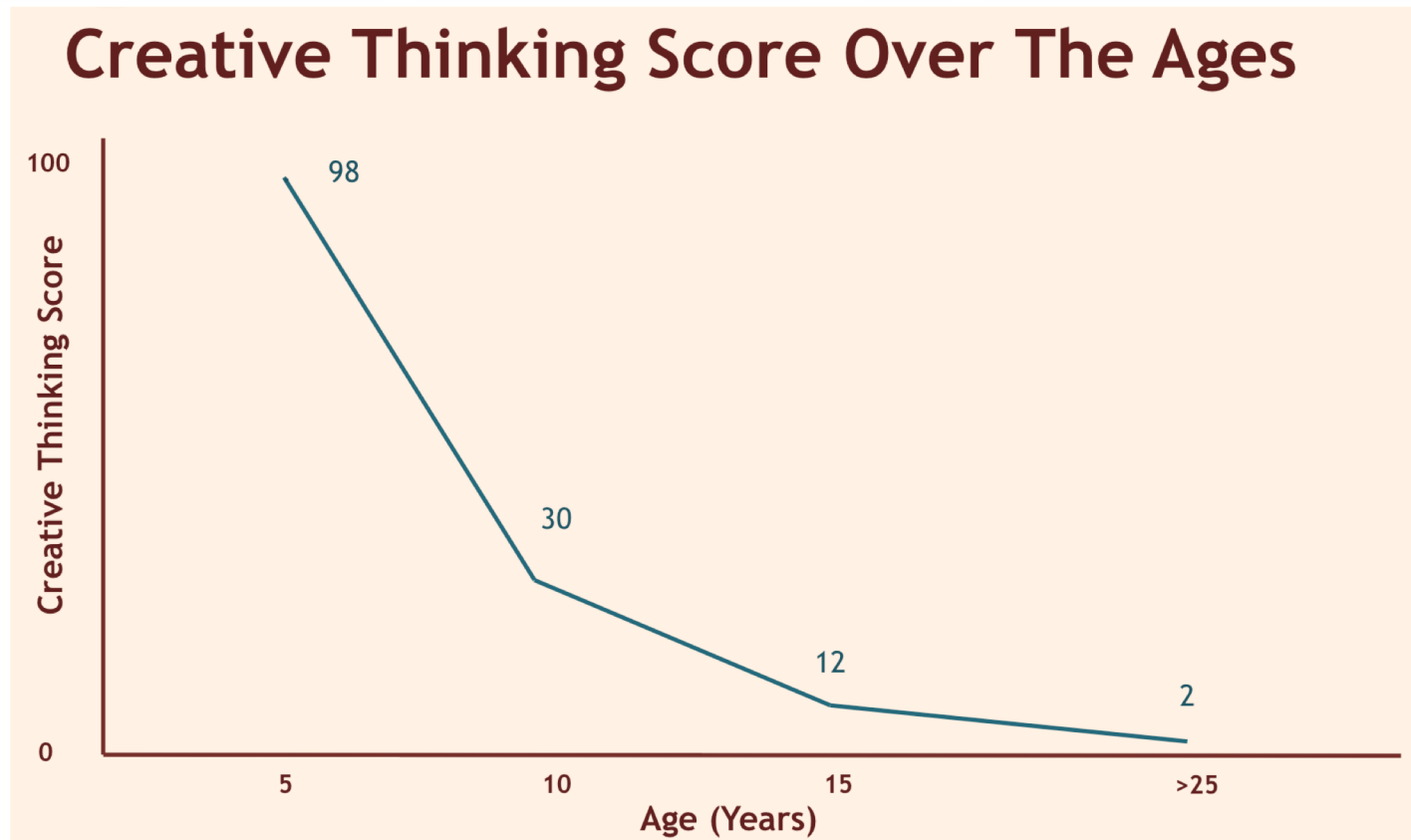
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<https://www.youtube.com/watch?v=6EgcAQrz7gA>

肯尼•羅賓森 (Sir Ken Robinson) 問，學校扼殺了創意嗎？

創意設計的衰減曲線

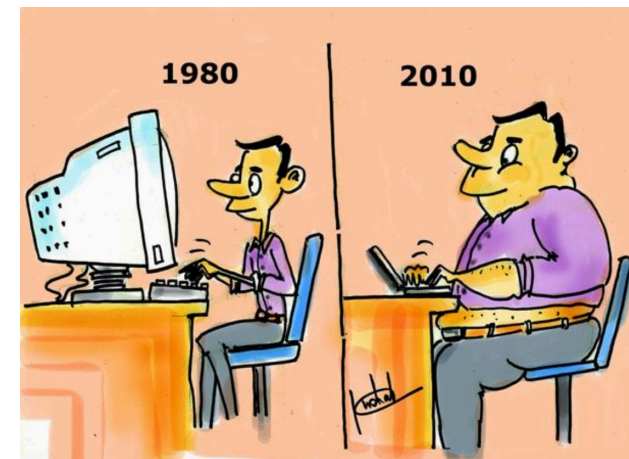
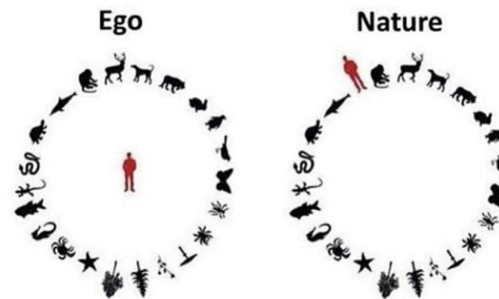
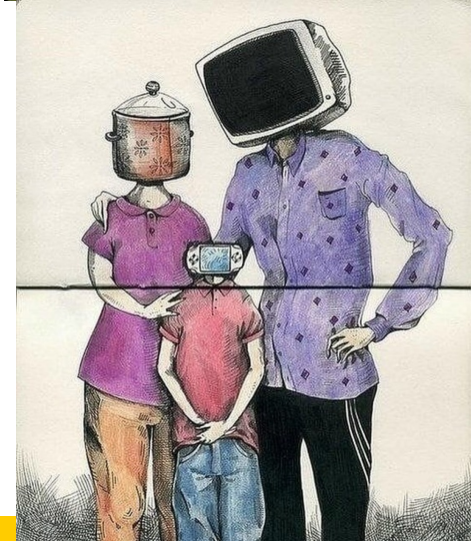
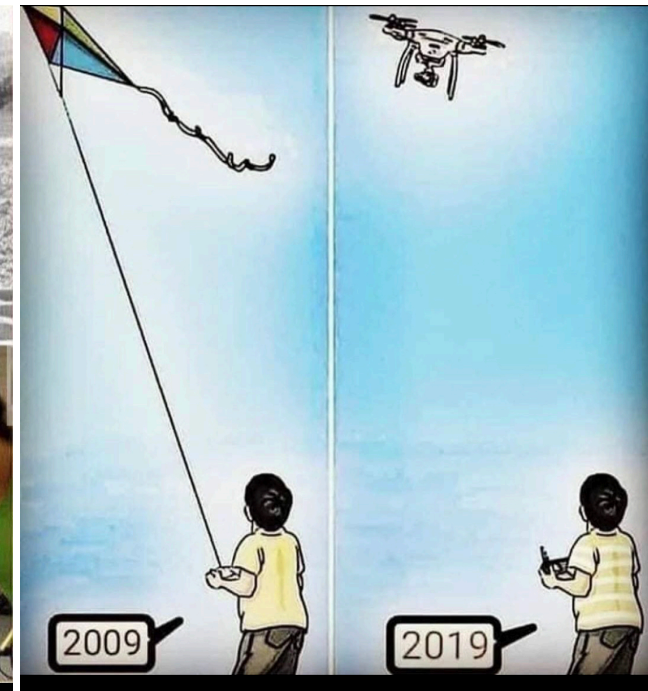
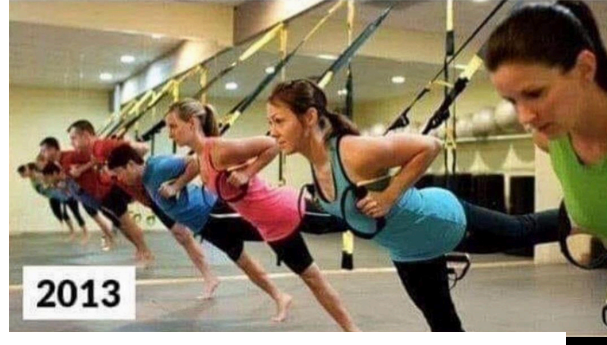
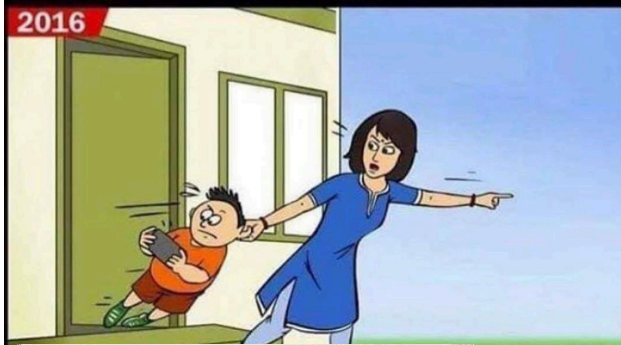


Kids are taught to learn by understanding “*the one right answer*” they need to find, and what they need to do to find it. (On tests of how kids do at brainstorming ideas, 98% of three-year-olds register as “creative geniuses.” By the time they are 25? Only 2%).

<http://www.fastcoexist.com/3018877/can-playing-with-legos-make-you-more-creative>

Check this out <http://seriousplay.com/19483/HOW%20TO%20GET%20IT>

今非昔比？



翻轉思考（來自波蘭的小故事）



主動？被動？不如互動

Daniel Czapiewski, Polish businessman and philanthropist, built this house as an artistic statement about the Communist era and current state of the world. <http://www.curbly.com/users/jill-w/posts/9781-turn-that-house-upside-down>

解決問題之道：突破傳統的思維



創意的價值



再談創意的應用



角度的問題: 另一種層面的思考



漂流木的創意設計

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Driftwood/Wood Ideas

184 Pins • 1.2

by Evelyn Ames

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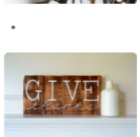
5 Rustic Wood Burned Pine Tree Branch Gift...



Make a Secret Log Box
www.BrooklynLime-



How to preserve the bark on a tree stump



Nice Reclaimed Wood Give Thanks sign for...



Barn wood picture frame



Reclaimed Barn Wood and Vintage Salvaged Door...



DIY: Driftwood Boats



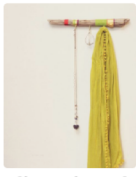
wood stools



40 DIY Log Ideas Take Rustic Decor To Your Home



DIY Paper Lion Mask



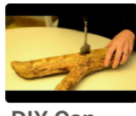
diy painted driftwood hanger



12 tree candle



Silverware Man Fishing, Silver Spoon Fish, Rustic...



DIY Candleholder Centerpieces by Aimee Lane



Barnboard Santa boots are adorned with red...



Driftwood Spoons



driftwood sailboats



Outdoor wooden train made from tree stumps and...



wooden gift tags



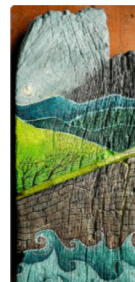
12 DIY IDEAS: Why to throw it, when you can use...



Ladybug and bumblebee tic-tac-toe



Pentacryl: the Wood Stabilizer that Prevents...



Un sg-warnog, dwy frân, tri physgodyn by Valérie Leblond



Beach Decor Driftwood



reclaimed wood gift tags



Gorgeous Rustic Pieces for the Garden



Birch Bark Lamps



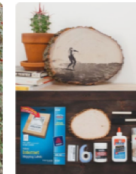
Santa Logs



Top 35 of Most Awesome DIY Driftwood Vintage...



NATURAL DRIFTWOOD Candle Holders Tealights Beach...



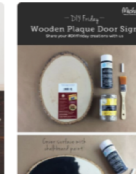
How to Transfer Ink to Wood



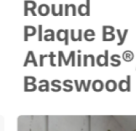
driftwood reindeer by kobunecraft



My Really Cool Feeder (the birds love it too!)



Round Plaque By ArtMinds®, Basswood



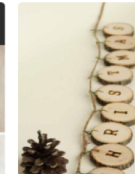
Do It Yourself: Driftwood Boats



driftwood wind chime



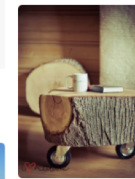
Driftwood



Reclaimed wood art



Recycle Reuse Renew Mother Earth Projects: How to...

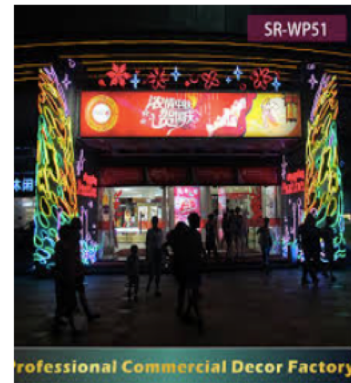


DIY stump coffee table

<https://www.pinterest.com/evart/driftwood-wood-ideas/?lp=true>

設計力與科技力的整合

Digital Signage Everywhere

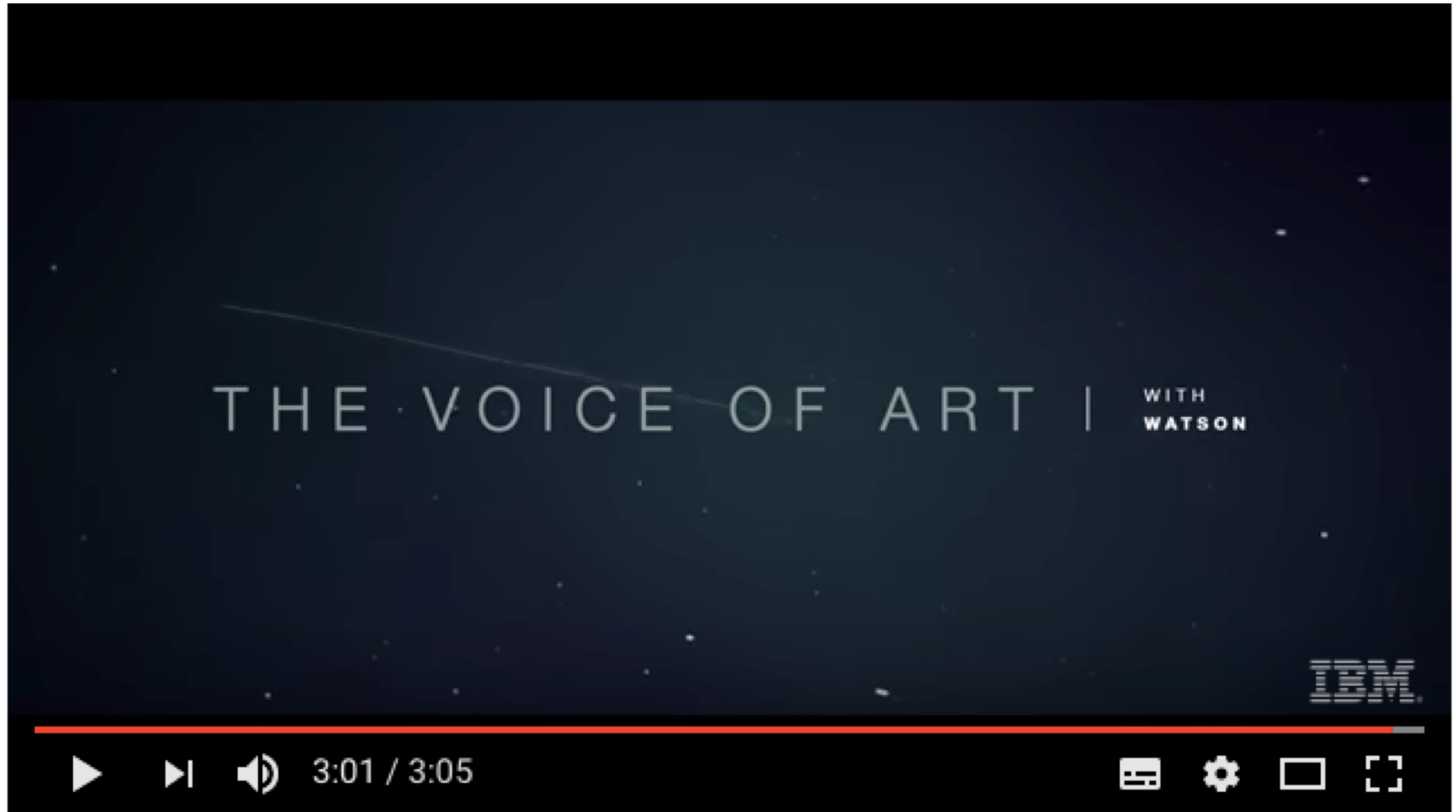


Digital Signage + A.I. + Heterogeneous Platforms



未來教室的科技應用（人工智慧 + 機器學習）

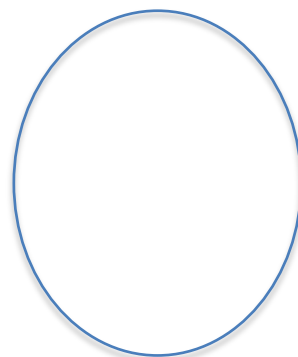
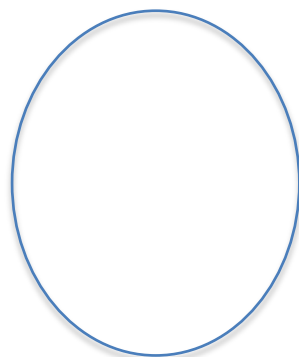
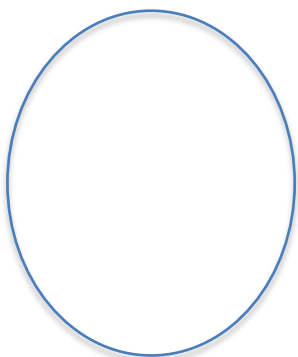
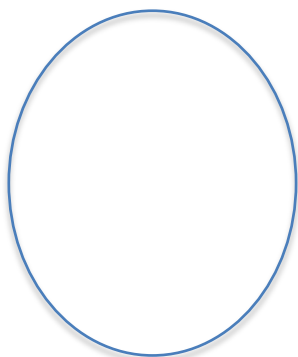
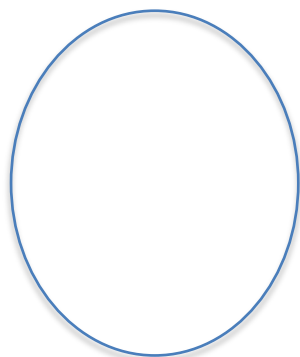
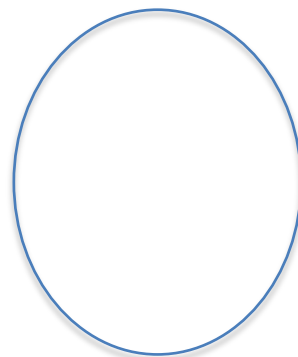
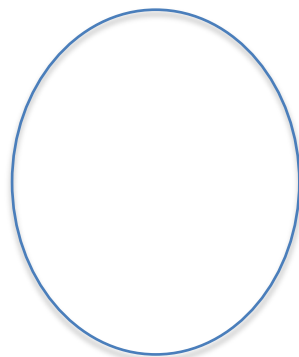
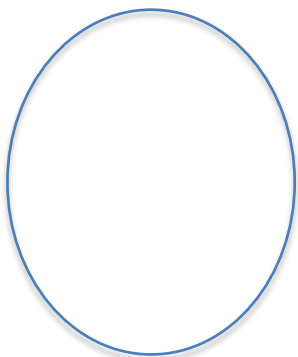
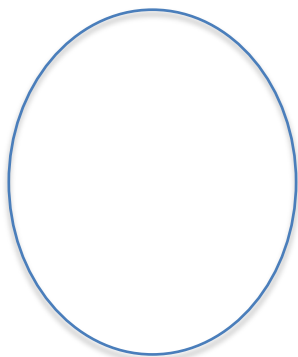
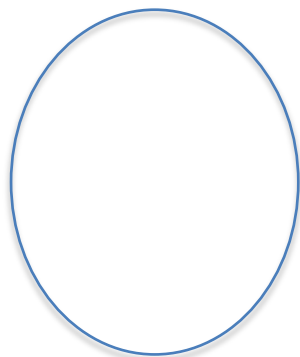
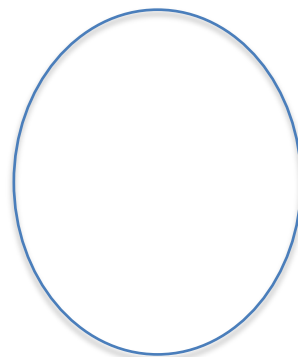
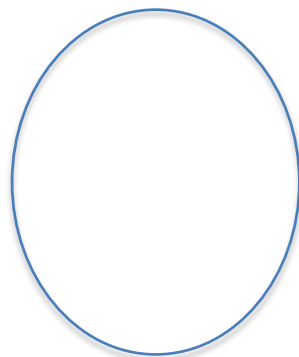
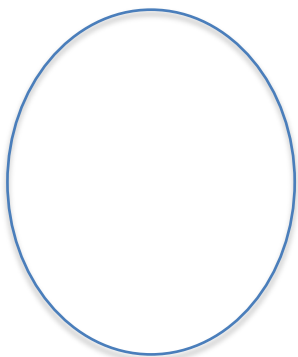
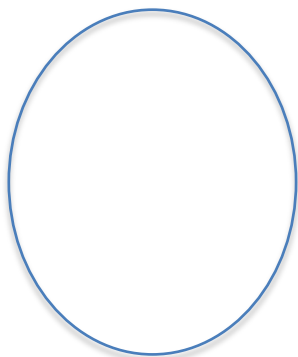
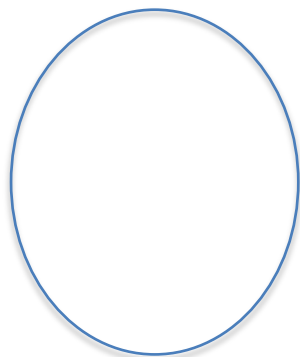
NTUT_SISD Lab



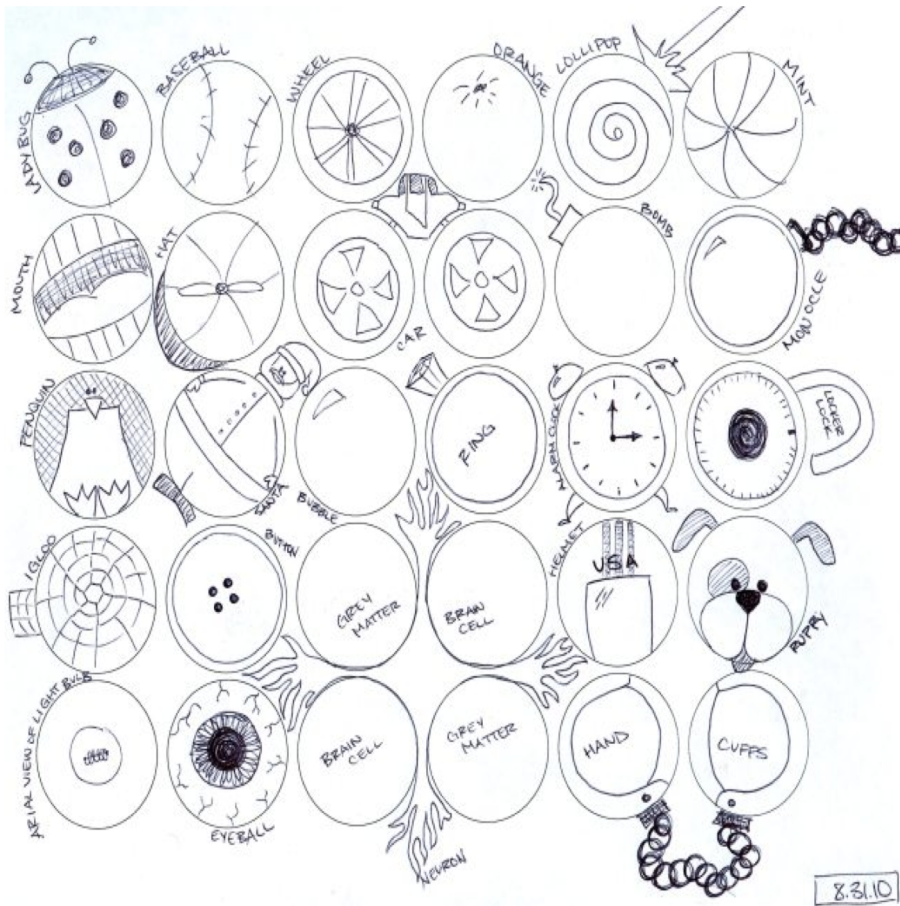
Source <https://www.youtube.com/watch?v=m9jT6nStyCQ>

創意任務一 想像力大考驗

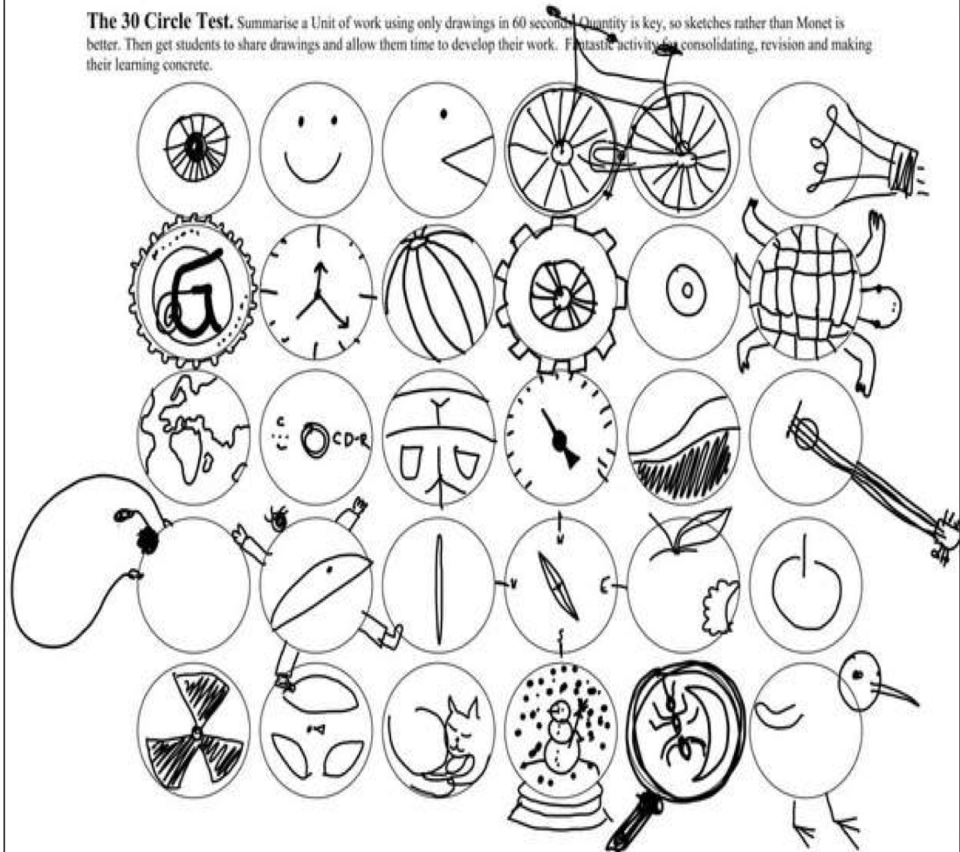
60秒內用任何可用的工具畫出下列圖形



創意任務二 60秒內畫出下列圓形的創意變形

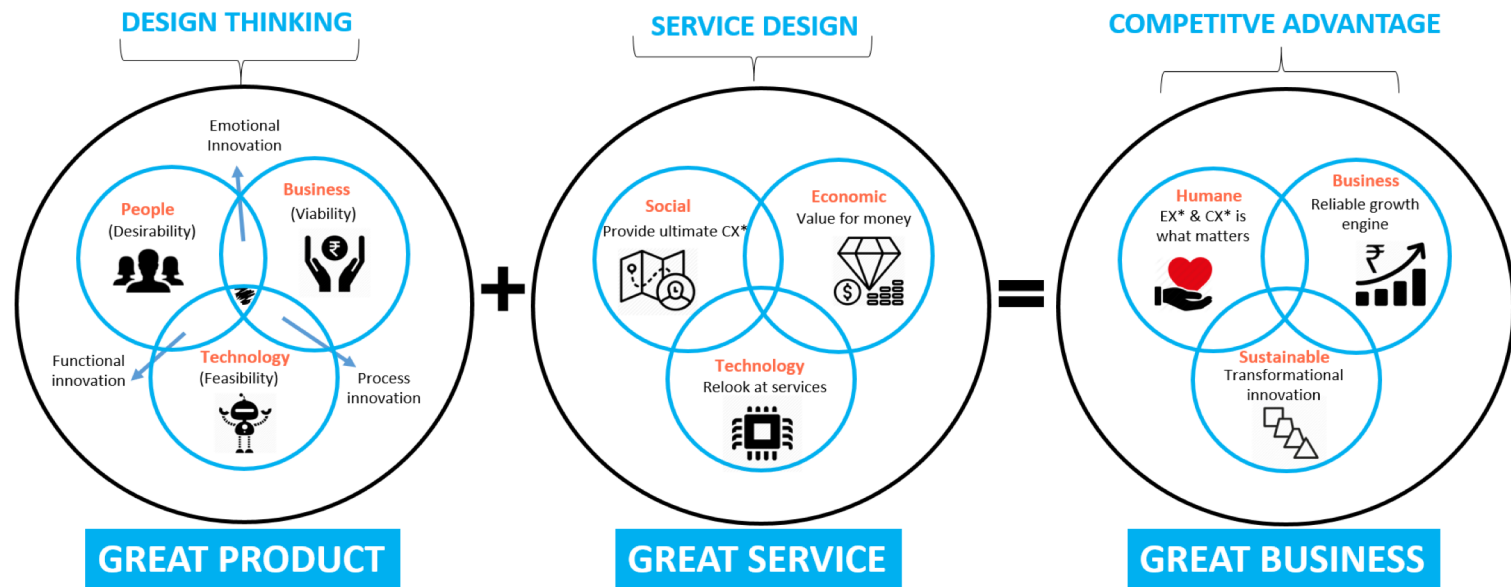


<http://www.i-linc.eu/web/portal/learning-opportunities/details?articleId=193083>



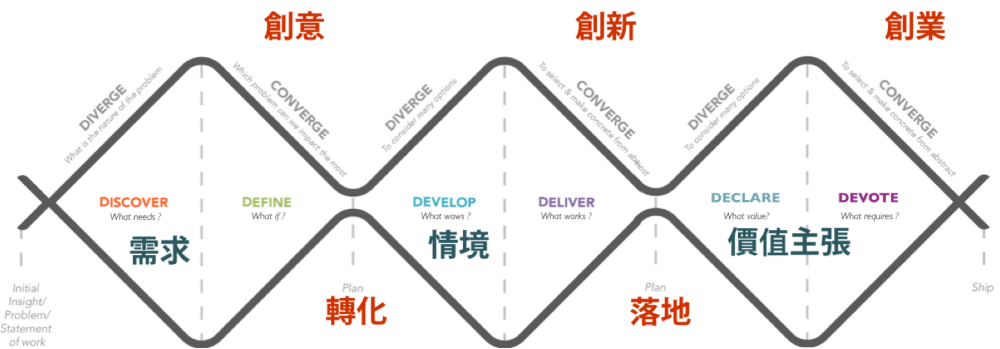
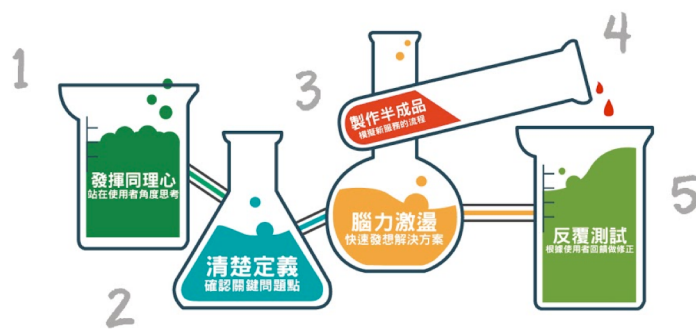
<https://collaborate.teachersguild.org/challenge/>

設計思考 + 服務設計 = 創造競爭優勢

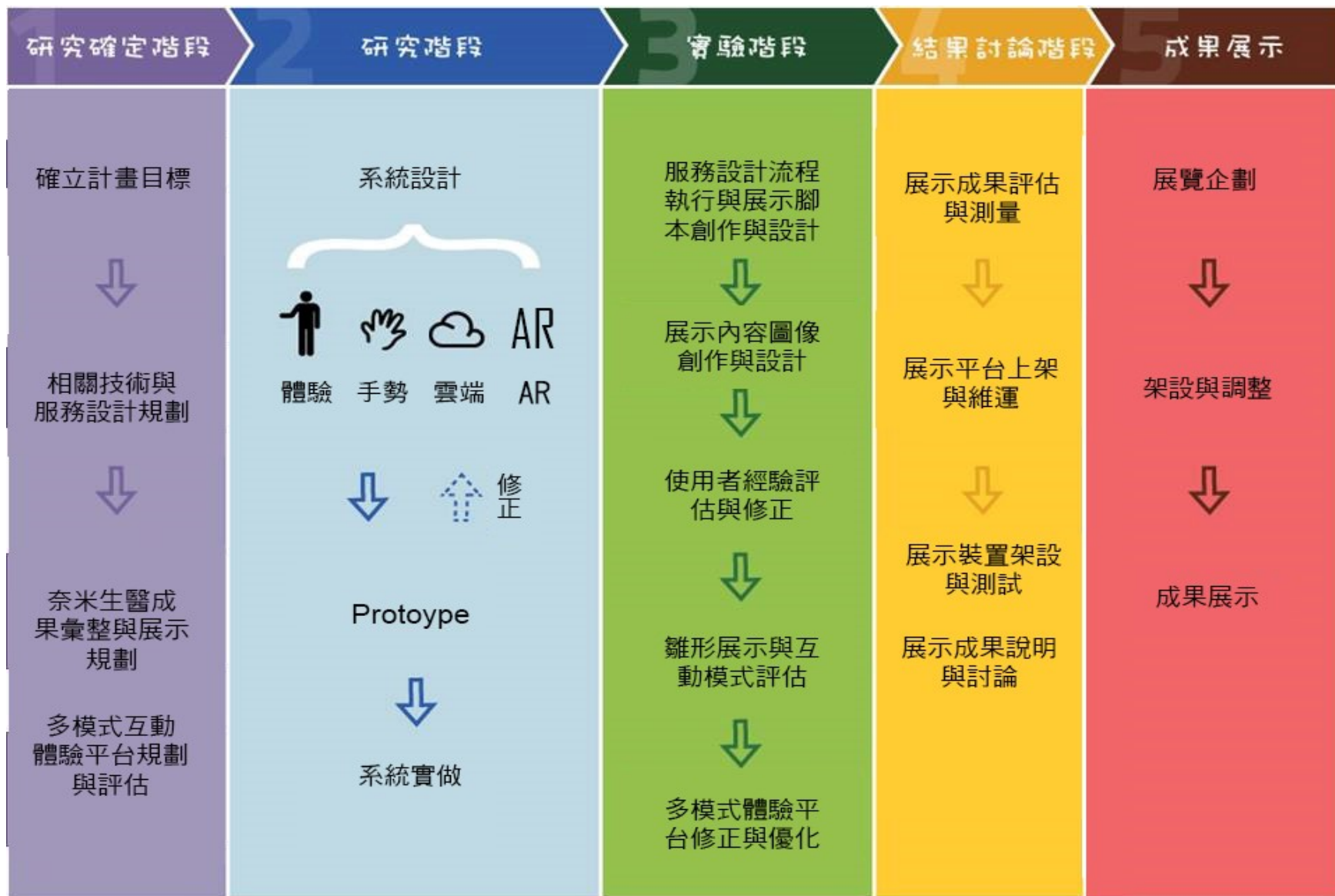


Innovatus Marketers Touchpoint LLP

EX = Employee Experience, CX = Customer Experience

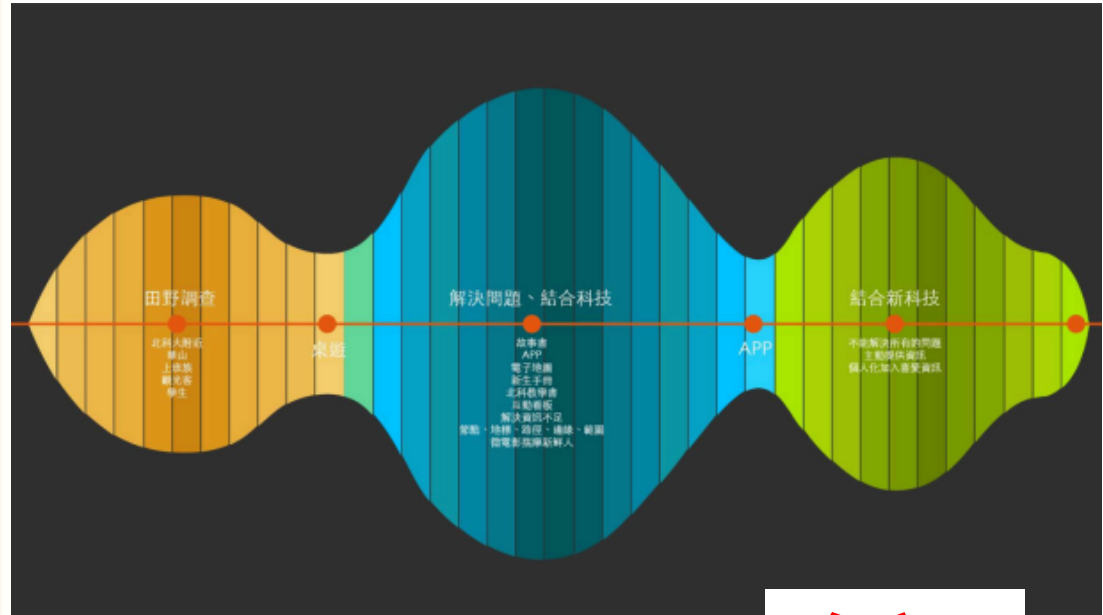


設計思考的執行流程架構



服務設計：POEMS 的分析模式

NTUT_SISD Lab

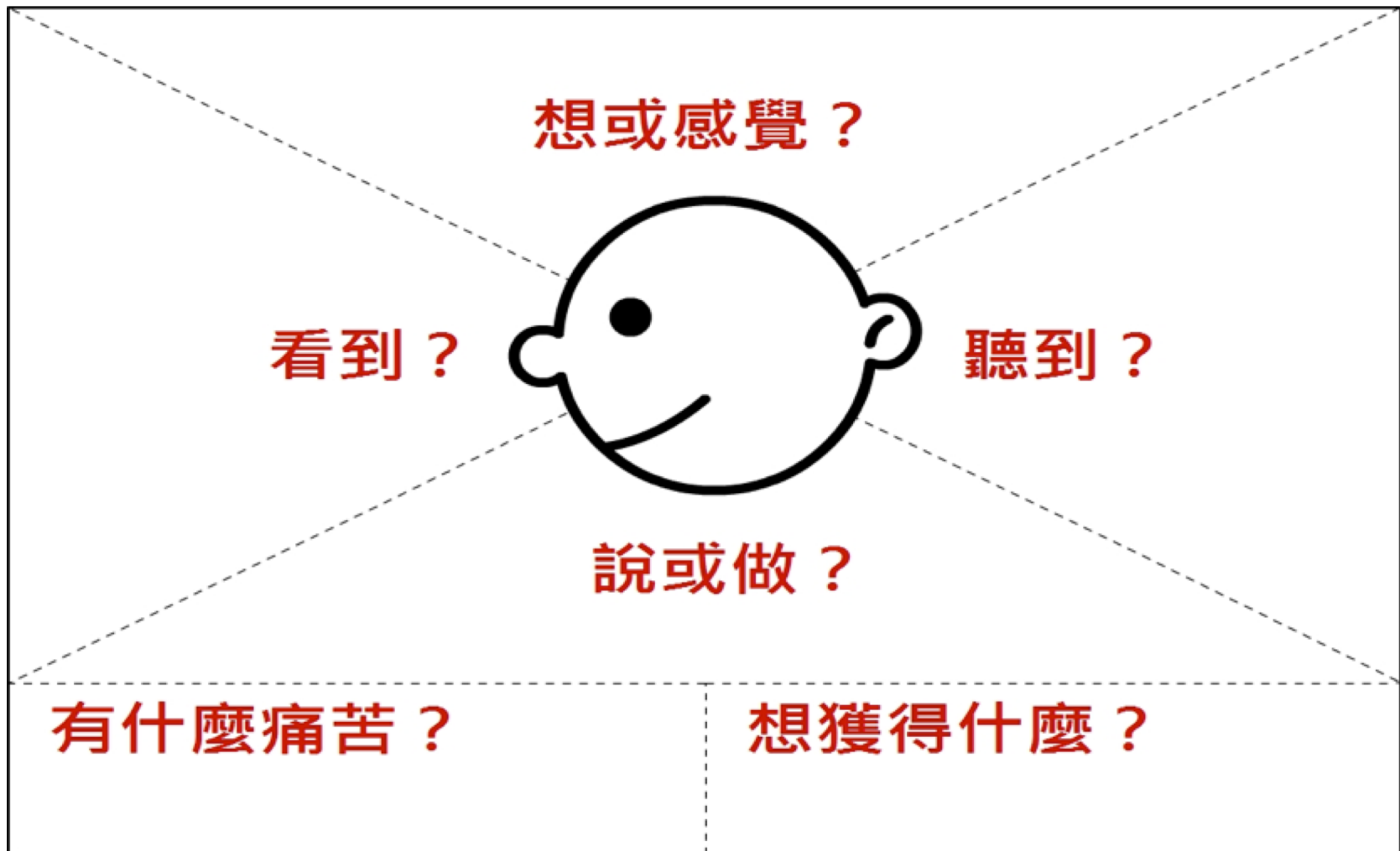


資訊



人 物 地點 服務

同理心地圖知應用分析



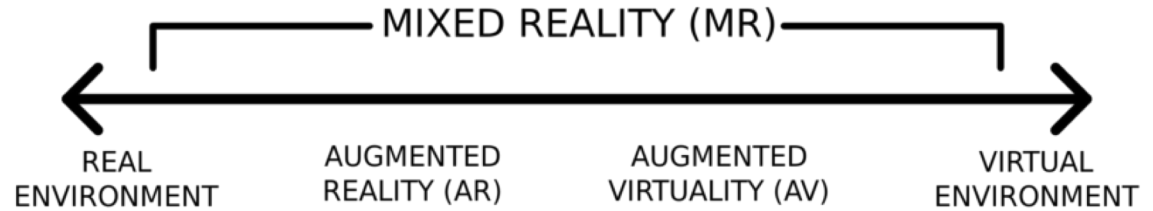
使用者的眼動分析(Eye Tracking)



擴增/虛擬實境未來教室學習

研究案例分析與展示

AR → VR → MR



REAL ENVIRONMENT

MIXED REALITY (MR)

VIRTUAL ENVIRONMENT

Tangible User Interfaces (TUI)

A TUI uses real physical objects to both represent and interact with computer-generated information (Ishii & Ullmer, 2001).

Augmented Reality (AR)

AR 'adds' computer-generated information to the real world (Azuma, et al. 2001).

Augmented Virtuality (AV)

AV 'adds' real information to a computer-generated environment (Regenbrecht, et al. 2004).

Virtual Reality (VR)

VR refers to completely computer-generated environments (Ni, Schmidt, Staudt, Livingston, Bull, & May, 2006; Burdea & Coffet 2003).

Projection Augmented models (PA model) are a type of Spatial AR display, and are closely related to TUIs.

Spatial AR

Spatial AR displays project computer-generated information directly into a user's environment (Bimler & Raskar, 2005).

'See-through' AR (either optical or video)

A user wears a head-mounted display, through which they can see the real world with computer-generated information superimposed on top (Cakmakci, Ha & Roland, 2005; Billinghurst, Gosses & Looze, 2005).

Semi-immersive VR

A semi-immersive VR display fills a limited area of a user's field-of-view.

Immersive VR

Immersive VR, which uses either a head-mounted-display or a projection-based system, completely fills the user's field-of-view.



Using physical objects to create a virtual model (Ichida, Itoh, & Kitamura, 2004). As a user adds a physical 'ActiveCube' to the construction, the equivalent virtual model is automatically updated.



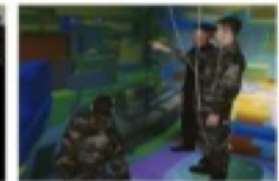
The 'Bubble Cosmos' - 'Emerging Technology' at SIGGRAPH06. The paths of the smoke-filled bubbles are tracked, and an image is projected into them as they rise.



See-through AR: the butterfly is computer-generated, and everything else is real (Fischer, Bartz & Straßer, 2005; Kölsch, Bane, Höllerer, & Turk, 2006).

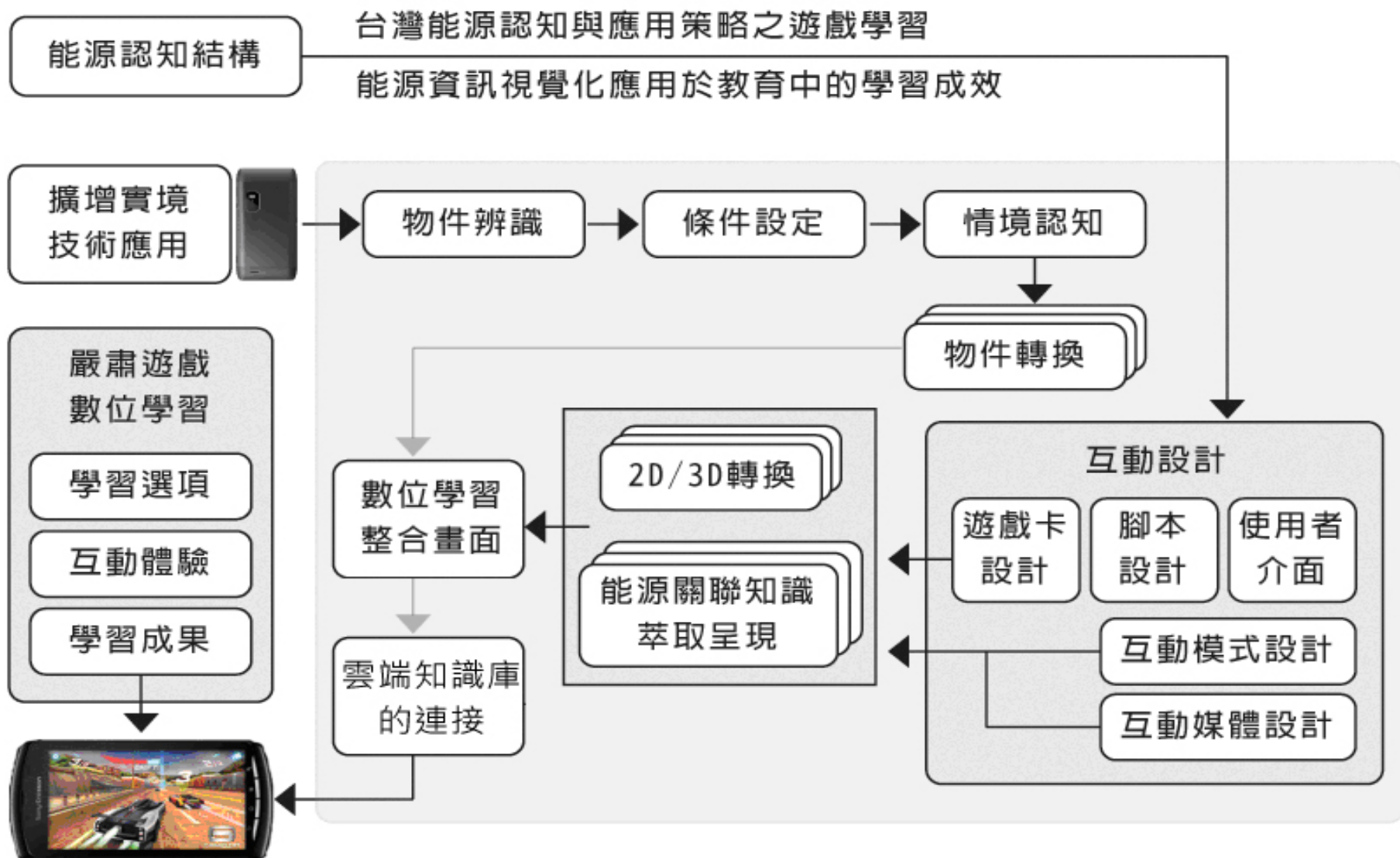


Semi-immersive VR using the Barco Baran workbench (Drettakis, Roussou, Tsingos, Pache & Gallo, 2004).



Projection-based immersive VR. The users are fully immersed in the 'CAVE' (FakeSpace, 2006; Cruz-Neira, Sandin & DeFanti, 1993).

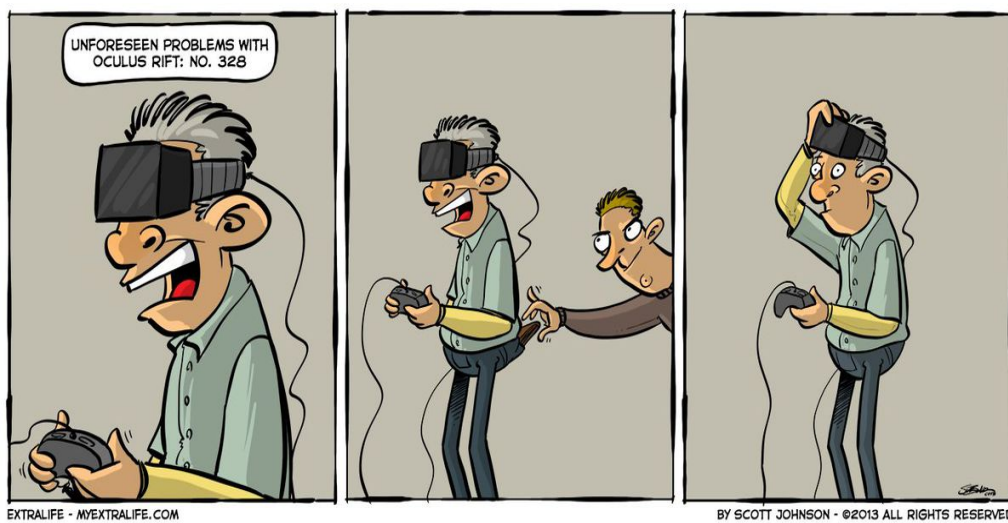
未來教室擴增實境嚴肅遊戲的規劃架構



虛擬實境應用於未來教室



擴增實境/虛擬實境應用問題



Distract from Reality
抽離現實
Theft 竊取行為
Privacy 個人隱私

奈米醫學及生物科技AR App QR Code下載





多模式互動嚴肅遊戲的創作與評估： 以生活中化學元素的數位學習為例

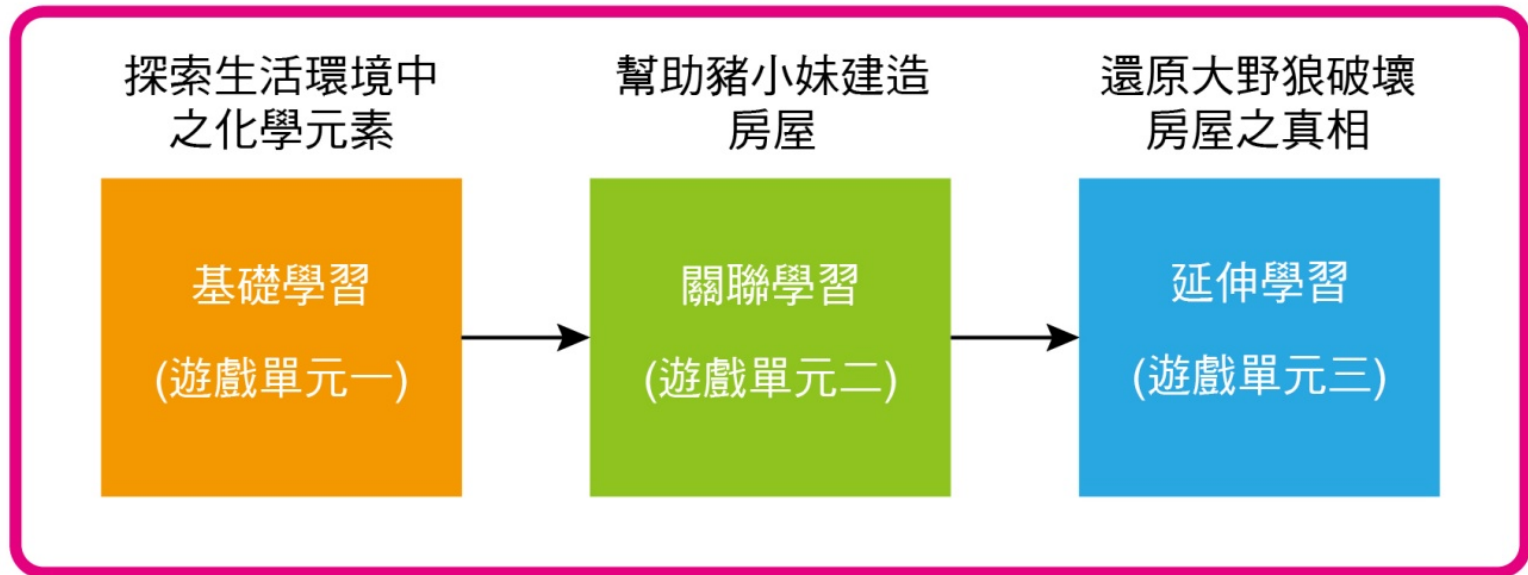
The Multimodal Interactive Serious Game Development and Evaluation:
Case Study on Digital Learning for Chemical Elements in Daily Life

學生：黃馨慧
指導老師：王聖銘

國立臺北科技大學 互動媒體設計研究所

生活中的化學元素遊戲情境設計

遊戲情境故事包裝



- 本研究將這三個單元的學習內容包裝為有連串性的故事情境，以三隻小豬童話故事中，大野狼將房屋吹垮的故事情節，做為遊戲知識學習之情境。

擴增實境應用於未來教室的技術架構

系統架構圖



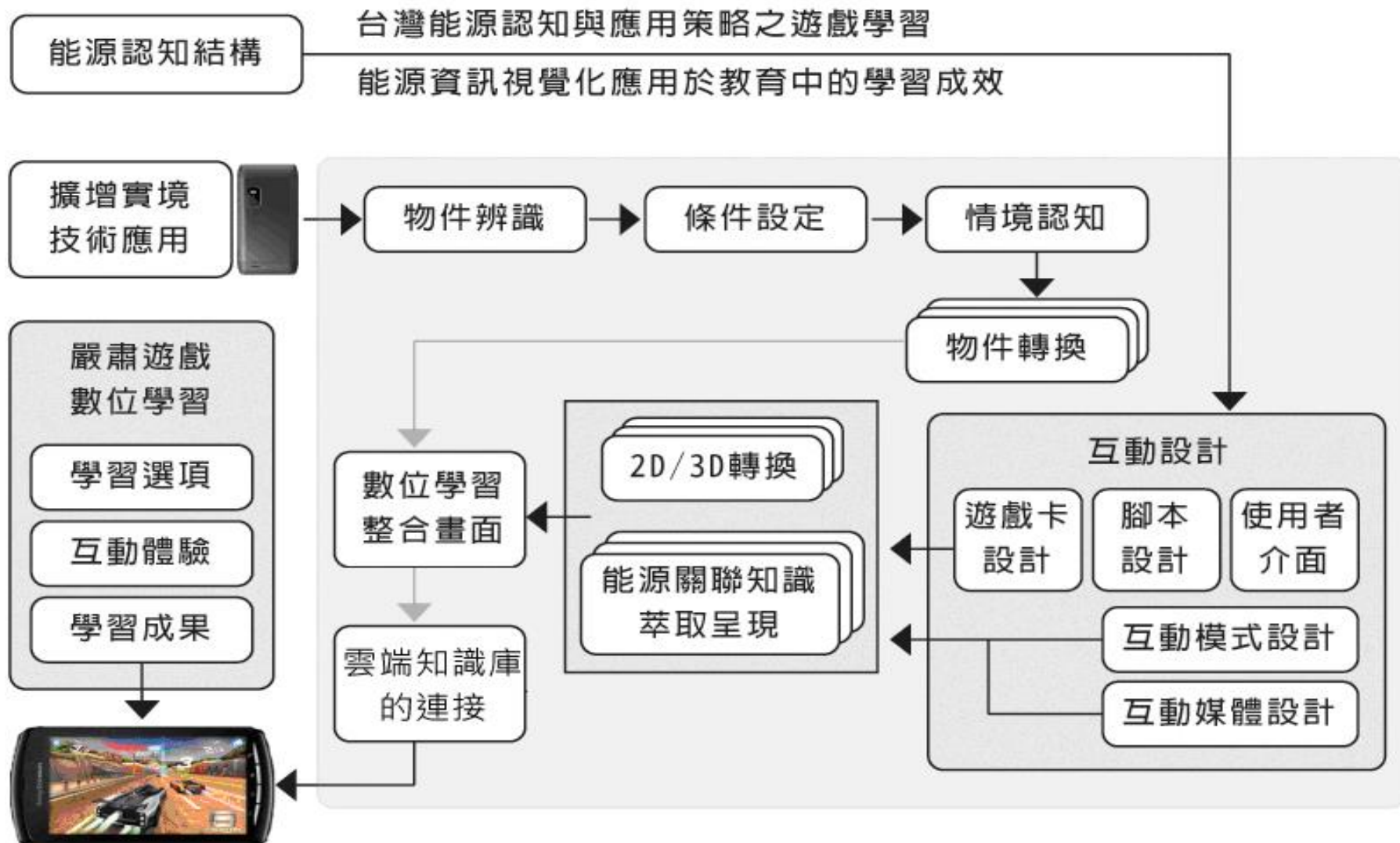
數位遊戲式學習之使用者經驗設計與評估 －以嚴肅遊戲「能源戰爭」為例

User Experience Design and Evaluation of Digital Game-Based Learning:
Case Study on Serious Game “Energy War”

指導教授： 王聖銘 博士
李來春 博士

研究生： 葉永森

能源戰爭手遊應用於未來教室的技術架構







研究室發展成果（學生論文）

已畢業研究生論文

多模式互動嚴肅遊戲-以生活中的化學元素為例【Warm House】：Multimodal Living Chemistry and Green Building Serious game
<http://youtu.be/LYqBL5g3K50>

長軸電視牆多模式互動技術：HTML 5 TV Wall for story Telling
<http://youtu.be/4MRhybqoYI8>

掌潮 Holo x Puppetrix：Finger Gestion Recognition and Hologram for Glove Puppet Cultural Experience
<https://www.youtube.com/watch?v=I2CCPHtvUEI&t=227s>

京皮笑臉 Smiley Facial Makeup in Opera：Face Recognition for Peiking Opera Cultural Experiences.
<http://youtu.be/eByzcsMOKhE>

能源戰爭遊戲：Energy War Game
<http://youtu.be/Xeb0ENCAVkk>

研究室發展成果（科技部計畫）

看見台灣能源(地投影)：Renewable Energy Floor Projection

<http://youtu.be/YB-vLjyRvg0>

能源解密(立投影)：Kinect Control Renewable Energy learning system

<http://youtu.be/-8AxzC2nOug>

深海裡的新能源(甲烷冰遊戲)：Serious game to introduce Methane Hydrates by using leap motion.

<http://youtu.be/YXdZVpwU1Hw>

功夫化學式家族嚴肅遊戲：Kung-Fu Chemistry serious game

<http://youtu.be/dhsIJ1HbWHU>

食物碳足跡與電器森林Demo：Food and Carbon Footprint Serious Game using RFID (Tangible Interaction)

<http://youtu.be/pRkRPdruMuQ>

娜美的診療室

<http://ntut-sisd.wixsite.com/nanotech>

→ 用創意設計解決問題並建立互動

NTUT_SISD Lab



Better City, Better Life !

→ 用創意的解決問題（趣味理論）

NTUT_SISD Lab

Thefuntheory.com

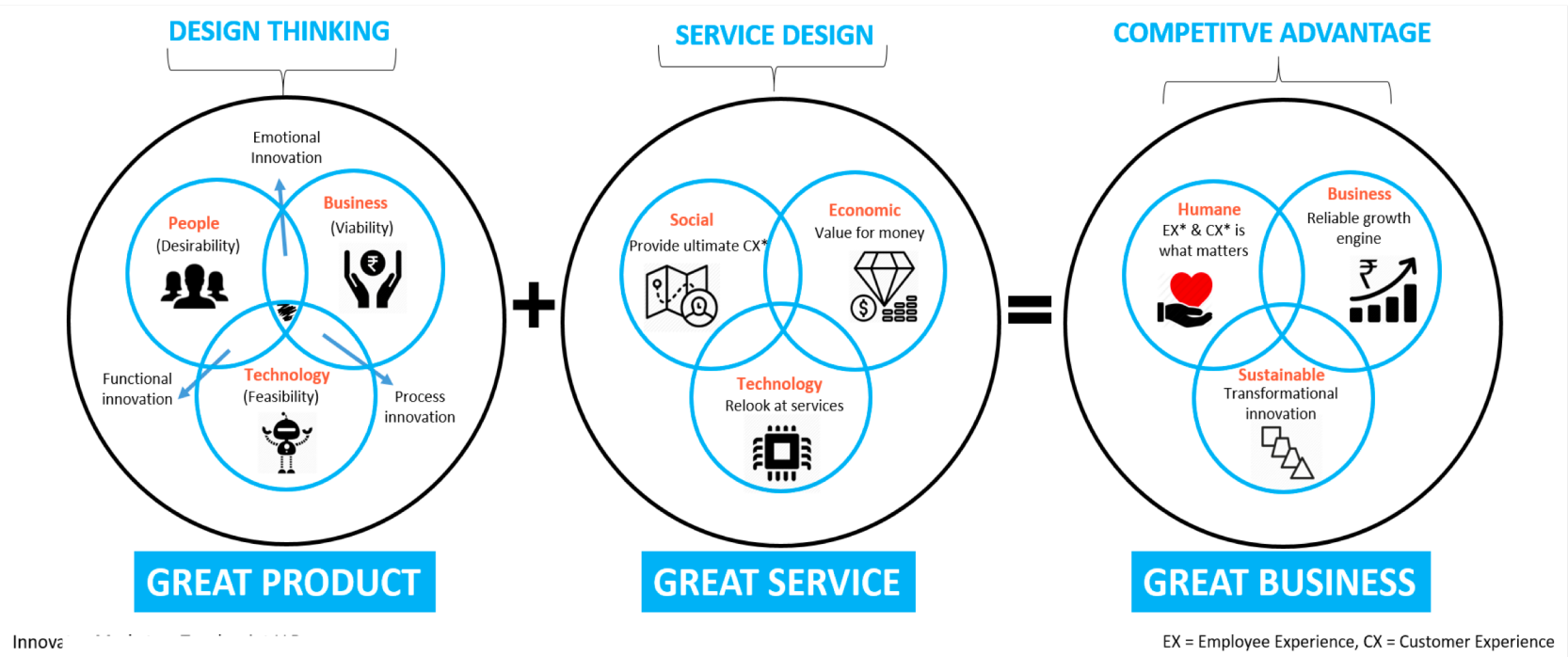


Take Away Questions :

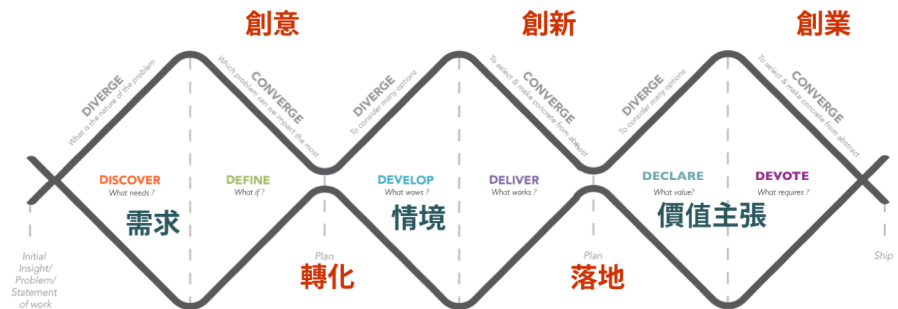
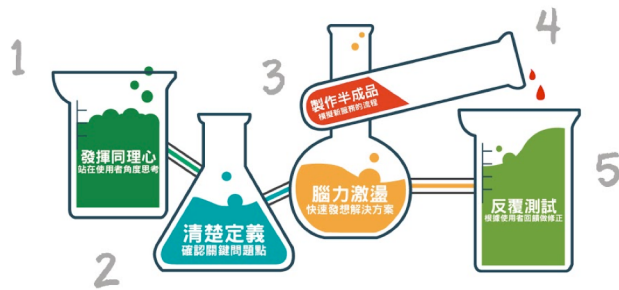
- Ubiquitous Digital Signage with Ubiquitous Experiences 。
無所不在的數位看板與體驗設計
- Design Thinking with Human-Center Design
人本的設計思考
- Contents is the King
數位內容是王道
- Effectiveness, Efficiency, Utility, Affordance
效用、效率、功能、示能性的分析
- Connecting Technology Island
如何解決跨領域科技整合的藩籬
- Scientific Evidences Collection (Eye Tracking Evaluation)
科學性資料的蒐集與分析
- Design by Data (Value of the Data)
透過資料做設計 (凸顯資料的價值)

整合設計思考與服務設計建立創新學習模式

NTUT_SISD Lab

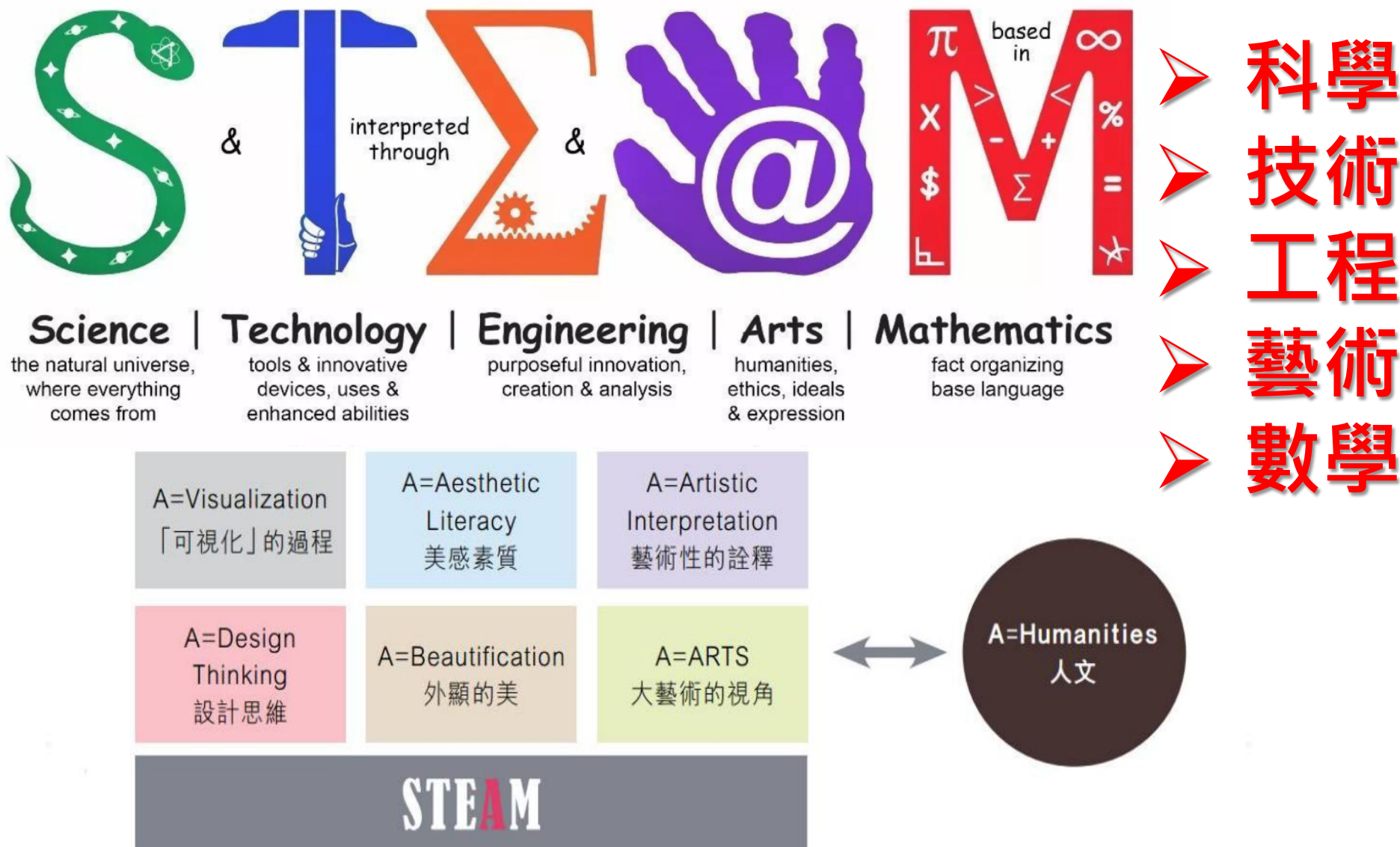


Innova



新世代STEAM的學習模式

NTUT_SISD Lab

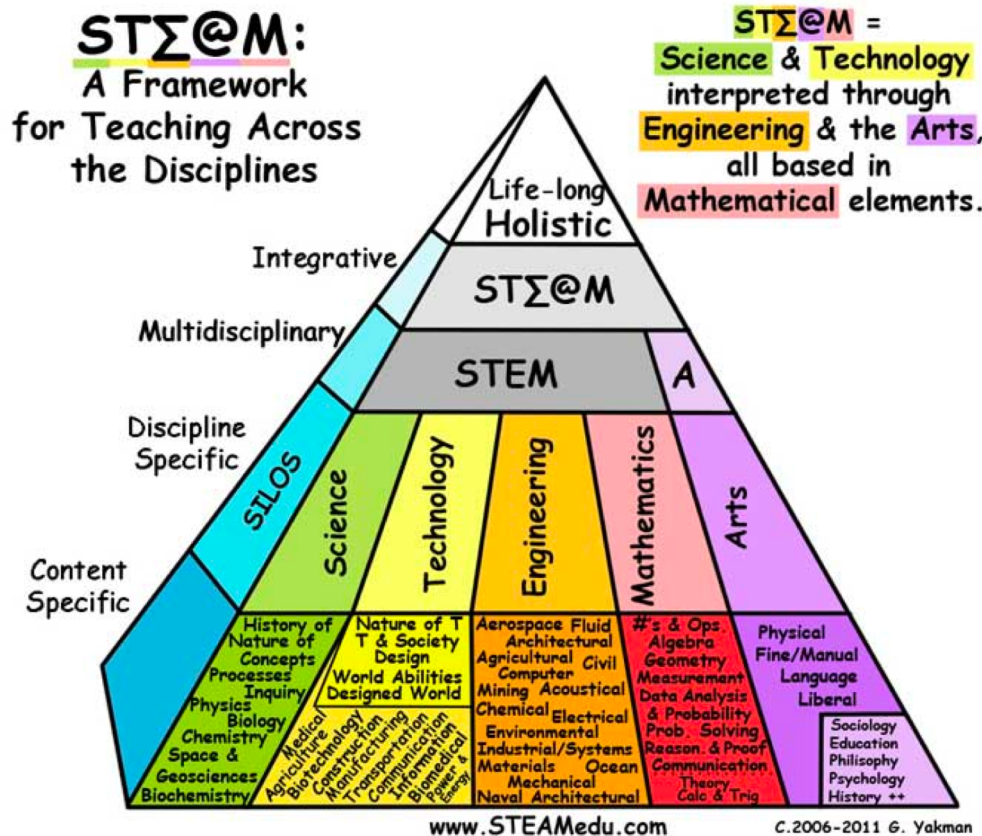


<http://news.juesheng.com/a/34831.html>

<https://kknews.cc/design/r8ojm34.html>

從STEM到STEAM的學習演化及4C能力

從STEM到STEAM的演化活動以Georgette Yakman和John Maeda為代表人物。Yakman將STEAM的精髓總結為：「以數學為基礎，科學和技術通過工程和設計被表述出來。」

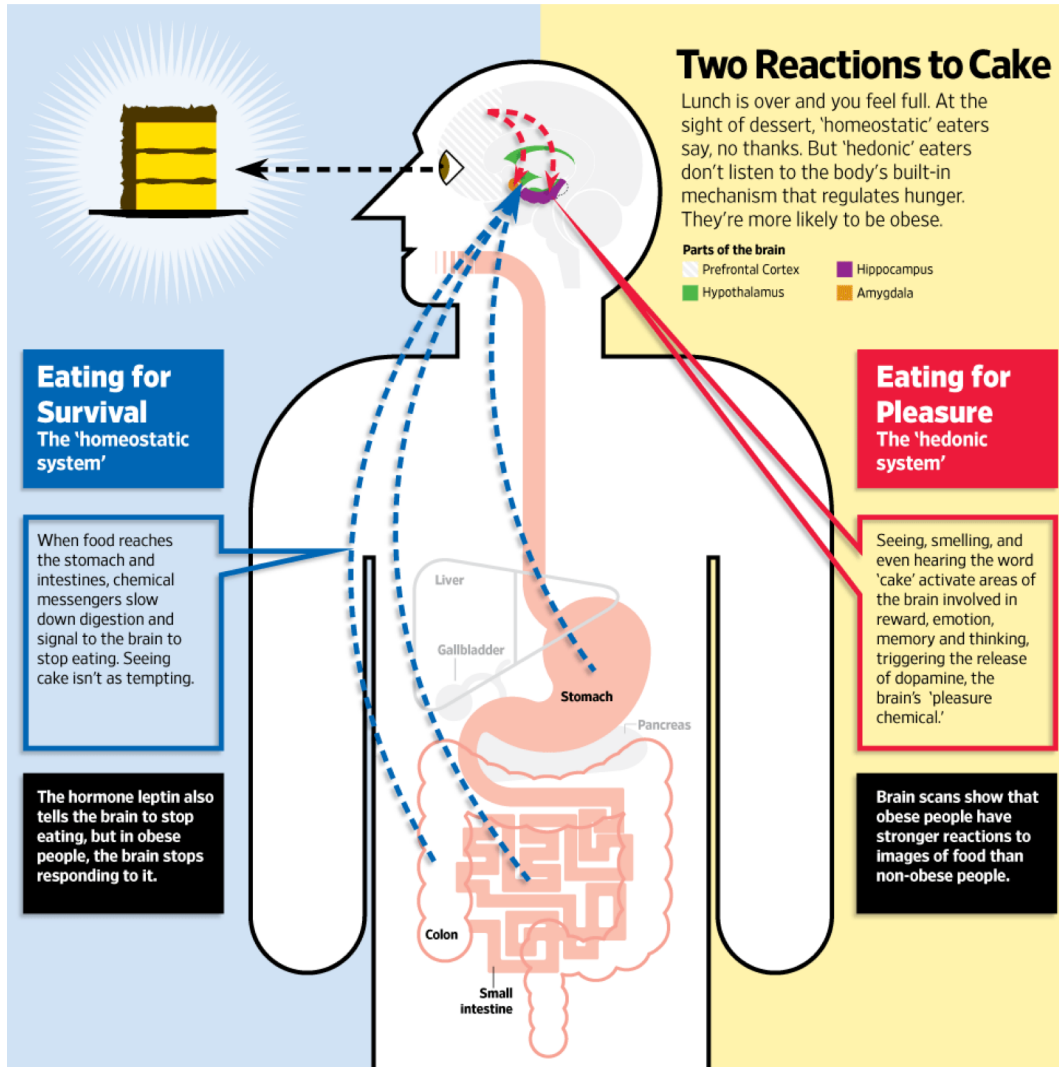


<https://www.teacherspayteachers.com/Product/4-Cs-Poster-21st-Century-Skills-2704189>

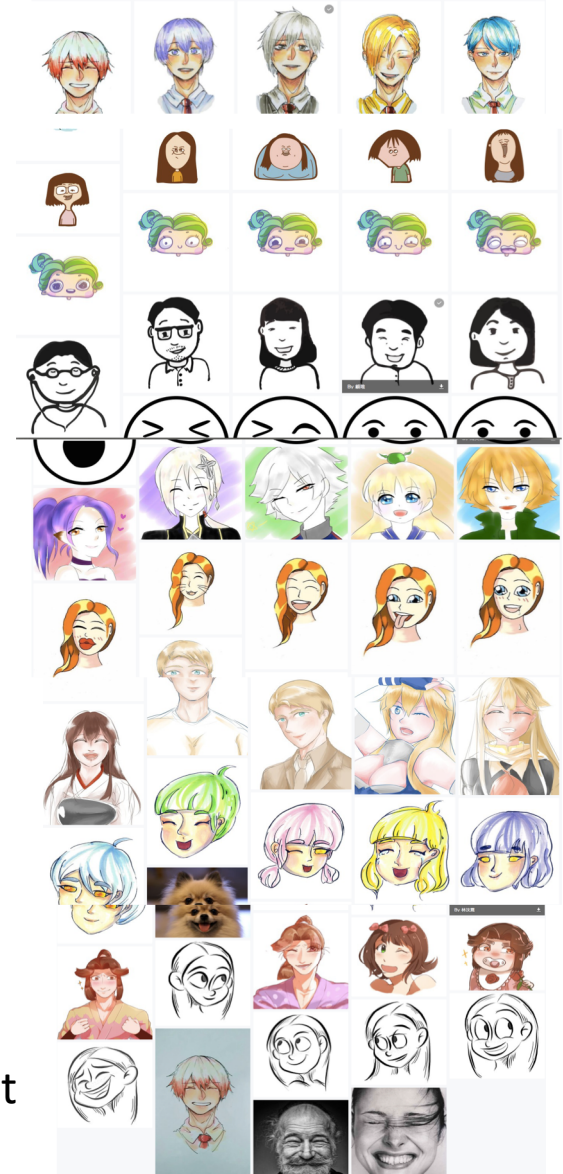
<http://www.miscositas.com/steam.html>

快樂感的設計 Hedonic Design

SD Lab



Source: <http://shop-training.com/eating-to-live-or-living-to-eat>



招式與內力的整合



→ 創意與創新學習的主軸

用遊戲來探索問題：鏈結自我與創意行動

Exploration with PLAYING —

which connects being (identity and selfhood) with doing (creative action)

用實作來面對問題：鏈結創意行動與可用的資源

Experiment with MAKING —

which connects doing (creative action) with having (available materials)

用分享來累積經驗：鏈結可用的資源與知識經驗

Experience with SHARING —

which connects having (things to share) with knowing (knowledge and experience)

用思考來增強解決問題的能力：建立知識與經驗的鏈結

Empowerment with THINKING —

which connects knowing (knowledge and experience) with being (identity and selfhood)

<https://kahoot.com/>

PIN: **0891267**

<https://kahoot.it/challenge/0891267>



FutureClassroom QA – sli.do: #S790
FutureClassroom Recap – sli.do: #k172

謝謝聆聽!

ryan5885@mail.ntut.edu.tw



FutureClassroom QA – sli.do: #S790
FutureClassroom Recap – sli.do: #k172

