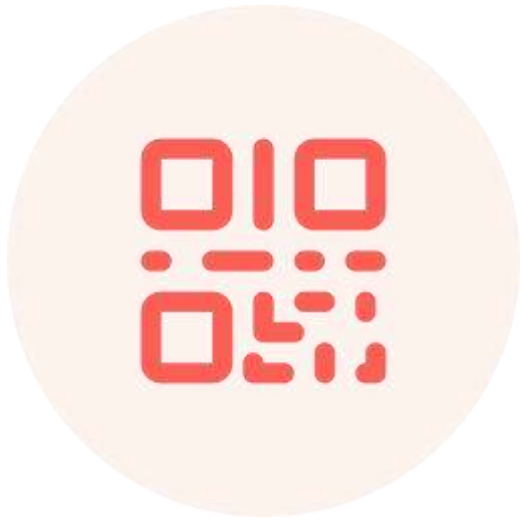# Flipping the EMI Classroom
(with Videos and Classroom Experiments)

(用影片與課堂實驗)來顛覆全英教室

Joseph Tao-yi Wang (王道一)

11/30/2023

‣ **2007**: Teach Principles of Microeconomics at NTU

  ‣ Design one corresponding classroom experiment per week

    ‣ (2007年回台大教書，配合大一「經濟學一/經濟學原理與實習上」每週進度設計課堂實驗)

‣ **2008**: Teach graduate Microeconomic Theory in English

  ‣ "I commit not to understand Chinese both in class and when grading" (2008年研一「個體經濟理論一」用英語授課，當作自己「不懂中文」)

‣ **2009**: Teach Principles of Microeconomics in English

  ‣ Large Class: 162/169 (22F/13F); NTU English OCW (2021)

    ‣ (2009年系上請我「經濟學原理與實習上」也用英語授課，2013/2022年選課人數169/162人；2021年為台大開放式課程錄製英語授課的「個體經濟學原理與實習」)

How I Started Flipping at NTU? (前言：我如何開始的?)

▸ ## 2013: Flip graduate Microeconomic Theory with videos

  ▸ (2013年用事前錄影來顛覆英語授課的研一必修「個體經濟理論一」)

▸ ## 2014: Turn Experimental Economics into MOOCs

  ▸ Coursera (2014); NTU OCW (2015 in English) (2014年為台大 Coursera錄製線上「實驗經濟學I: 行為賽局論」；2015年為台大開放式課程錄製英語授課的版本)

▸ ## 2020: iPad Screen Record Principles of Microeconomics

  ▸ (2020年在英語授課的「個體經濟學原理與實習」因應疫情使用iPad螢幕錄影記錄課程)

▸ ## 2021: Hybrid Principles of Microeconomics in English

  ▸ Online and In-person interaction with Sli.do and MobLab

  ▸ (2021年「個體經濟學原理與實習」用Sli.do和MobLab進行實體與線上混合英語授課因應疫情起伏)

Why Teach in English?

(為什麼要英語授課?)

-EMI Experience at NTU

(呆呆英語授課經驗)

EMI Helps Prepare Students to Study/Work Abroad

▸ Study/Work Abroad After Using English in Class

   ▸ 學生上課用英語，無縫接軌出國留學工作

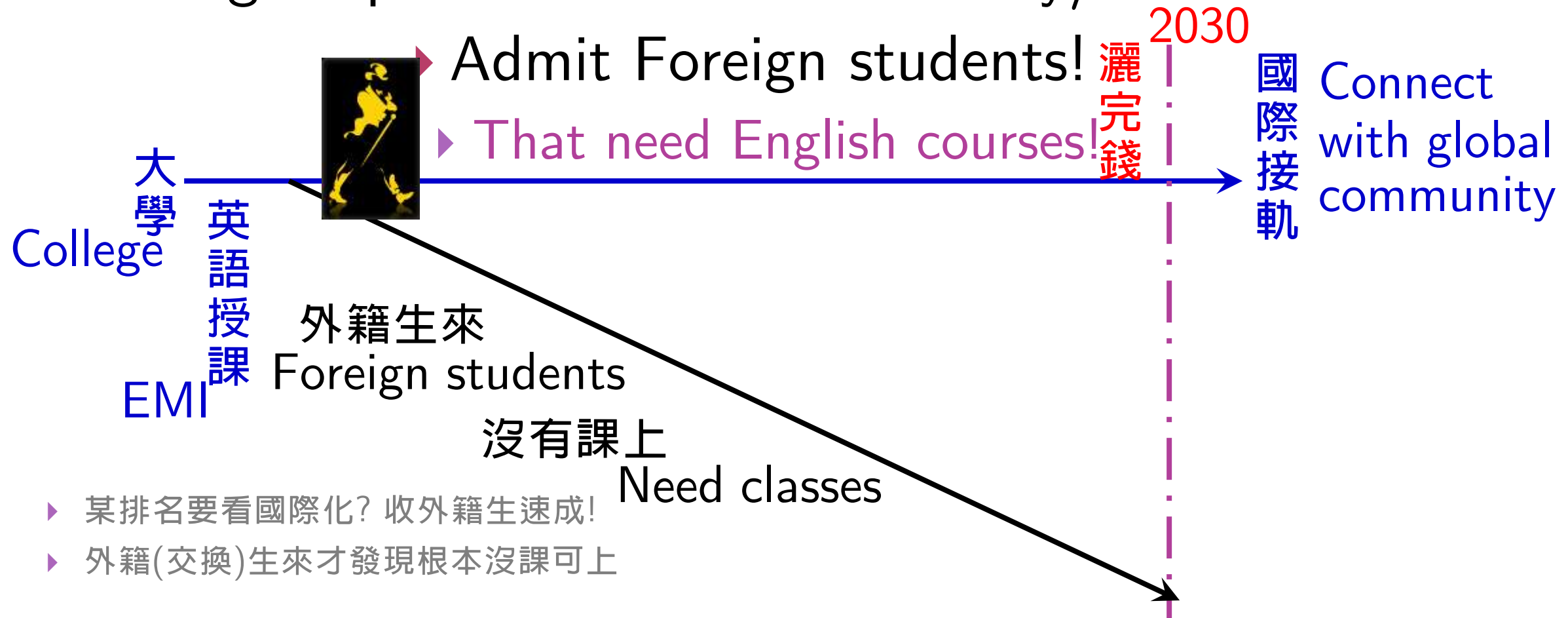▸ Universities Provide EMI to Attract Better Students

   ▸ 大學提供英語學程，吸引更多好學生

大學
College
英語授課
EMI

國際接軌 Connect with global community

▸ # Ranking Requires International Faculty/Student Ratio?

▸ Admit Foreign students!

▸ That need English courses!

2030

灑完錢

國際接軌 Connect with global community

大學 College

英語授課 EMI

外籍生來 Foreign students

沒有課上 Need classes

▸ 某排名要看國際化? 收外籍生速成!

▸ 外籍(交換)生來才發現根本沒課可上

- Encourage ~~(Force?!)~~ Faculty to teach in English
  - 只好鼓勵(誤)強制(正)老師英語授課
- But People Respond to Incentives, So...
  - 上有政策，下有對策的結果是...

大學
College

英語授課
EMI

外籍生來
Foreign students

沒有課上
Need classes

欺負新兵
Exploit Newbies

灑完錢評鑑

2030

國際接軌
Connect with global community

應付 Lip
了事 Service

- ▸ **Could Hire Foreign Faculty (Who Don't Speak Chinese)**
  - ▸ 其實可以聘不懂中文的外籍教師
- ▸ **EMI for Real...** (要玩就來玩真的...)

2030

灑完錢

聘真正的外師

Foreign Faculty

國際接軌 Connect with global community

大學 College 英語授課 EMI

外籍生來 Foreign students

來玩真的!! For real!!

沒有課上 Need classes

欺負新兵 Exploit Newbies

應付 Lip 了事 Service

Investing in the Students = Invest in the Future!

▸ **Alumni Reciprocate!**
  ▸ 校友要有感才會回饋/投資自己

▸ **Invest in Yourselves!**

大學
College

英語授課
EMI

Equip the Students

裝備學生

2030

聘真正

灑完

來玩真的!!
For real!!

外籍生來
Foreign students

沒有課上
Need classes

欺負新兵
Exploit Newbies

國際接軌
Connect with global community

應付 Lip
了事 Service

But Face Challenges:

▸ 但你即將面對挑戰：

▸ Go Against the Crowd

▸ 隨波逐流(別人都這樣...)

▸ Need Clear Goals

▸ 沒有目標(不知為何而戰...)

▸ Need Discipline

▸ 缺乏紀律(我就是做不到!)

Teaching in English @ NTU: Pros & Challenges

▸ Students Self-Select to Your Class (學生自我選擇)

　▸ Lazy Taiwanese students won't come (想混的學生不會選全英授課)

　▸ Foreign students are forced to come (外籍生會想來選但不一定會留下來)

▸ Teaching is Path Dependent (英語授課有路徑依賴)

　▸ Easier for new faculty or a new course (對新老師或開新課比較容易)

▸ How to Foster Discussion/Interaction? (但如何鼓勵學生發問/互動?)

　▸ Taiwanese students are shy in English (台灣學生不太發言/用英文更不敢)

　▸ Rural kids handicapped listening English (鄉下孩子有英聽障礙/上課霧煞煞)

How to Foster Discussion & Interaction?

▶ Ask People to Vote (請大家投票，然後點選擇某個選項的同學起來解釋理由)

▶ Then ask people who voted for X to explain why

▶ Which Would You Choose? (如果只能二選一，你寧願選擇哪一個?)

1. Spend 4 Years Studying at the world's best university, but must keep attendance a secret. (念全世界最好的大學，但是拿不到畢業證書)

2. Get an Official Degree from the world's best university, but cannot actually study there. (拿全世界最好大學的畢業證書，但不能去念)

▶ Clickers are Similar (用表決器也有類似效果，但用英語思考對台灣學生還是很大的挑戰)

▶ Still challenging for Taiwanese students (in English)

Wisdom of The Past:

(老祖宗的智慧)

Tell me and I'll forget;
show me and I may remember;
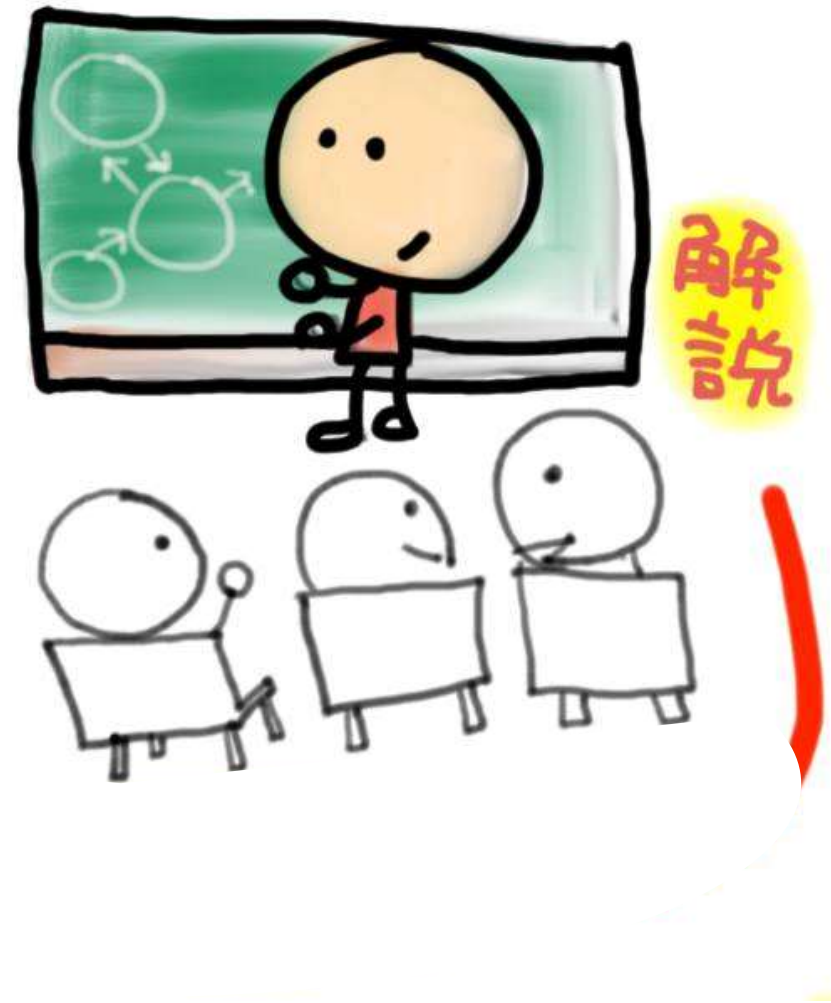involve me and I'll understand.
Chinese Proverb

見之不若
　　知之，
知之不若
　　行之，
學至於行之
　　而止矣。
行之，明也。

(荀子・儒效)

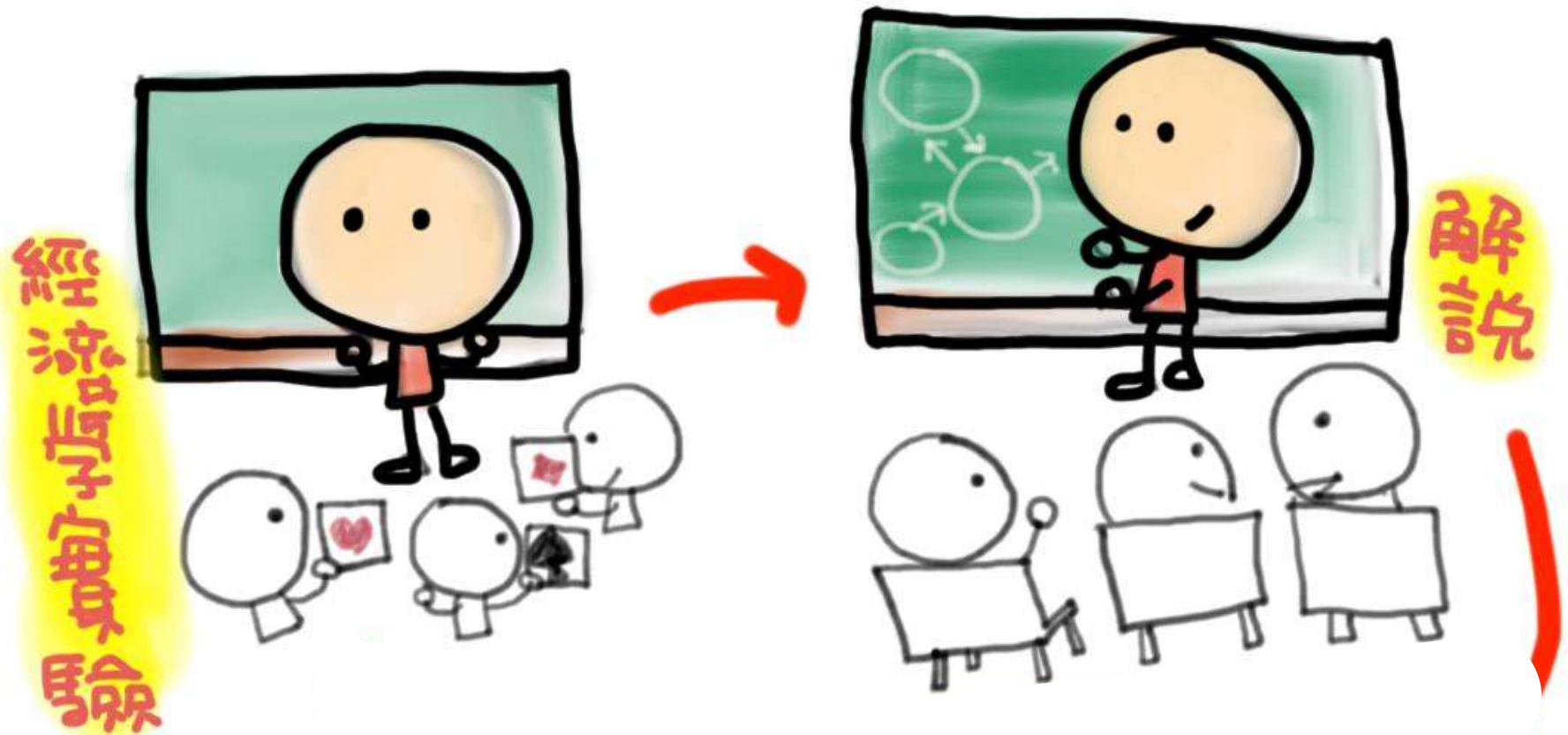# In a Flipped Classroom, You Can...(在顛覆的全英教室裡, 你可以...)

1. Force Students to Preview with Videos

    ‣ (利用錄影來逼學生預習和事後複習、克服語言障礙)

2. Encourage Questions in Class (鼓勵學生上課問問題 因事前有做功課)

3. Use Sli.do to ask questions/see where they get stuck

    ‣ Do Homework (=Quiz) in Groups so they teach each other

        ‣ 善用科技問問題(如sli.do)實地觀察學生學習瓶頸, 甚至分組做習題(其實是隨堂小考, 一定要算分!)

4. Run Experiments to Foster Discussion (設計課堂實驗來促進課堂討論與互動)

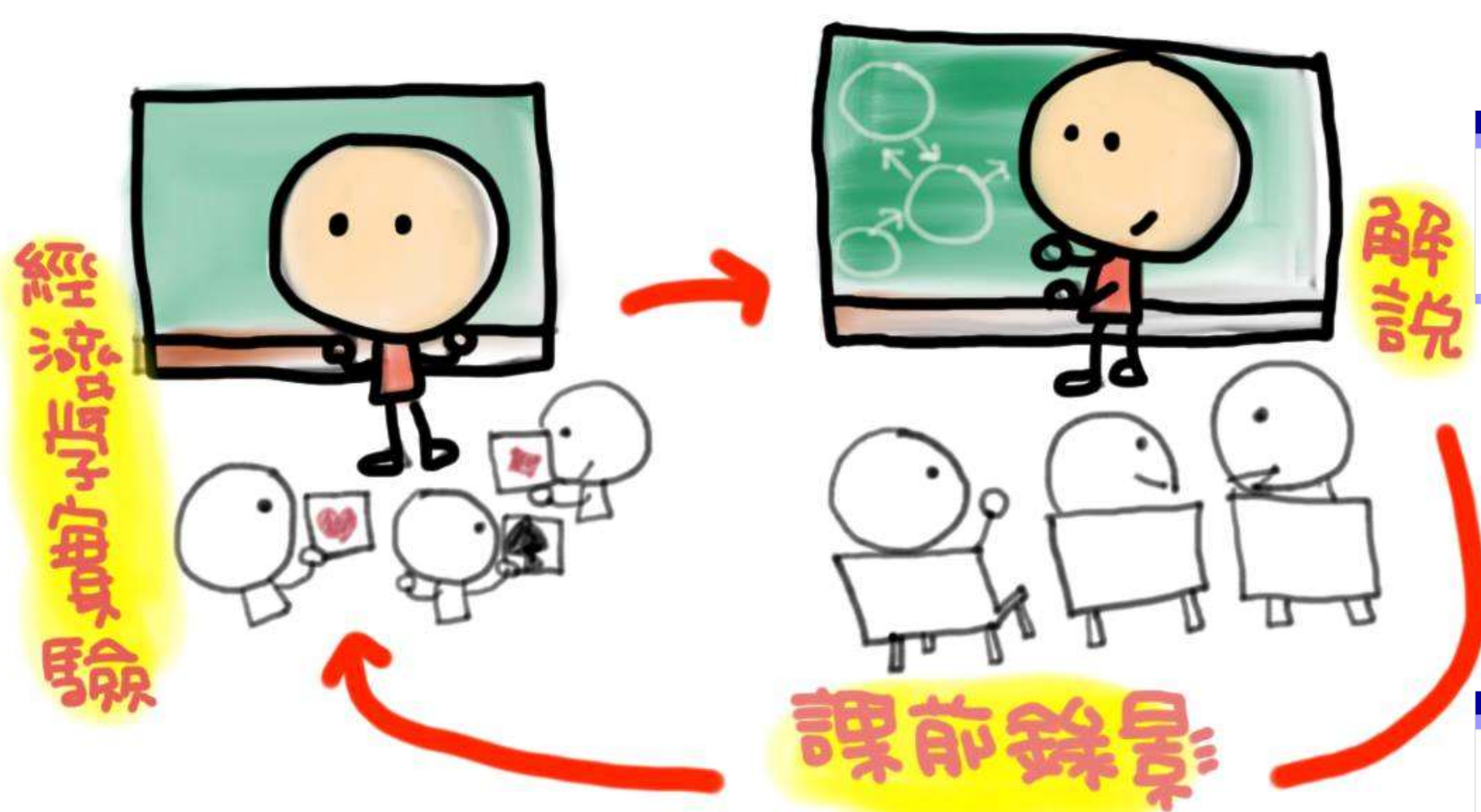‣ "Involve Me, and I'll Understand. (行之，明也)" (荀子儒效)

Not Enough Lecture Time?

▶ I get this question every time: (每次介紹經濟學實驗教學一定被問)

▶ How could I have time for experiments when I can't even finish my lectures? (講課的時間都不夠了哪有時間做實驗)

▶ I used to stress that Involve me, and I'll understand.

　　▶ 荀子說:「行之，明也」 (比老師說破了嘴還要有用)

▶ Now You Can Flip the Classroom with Videos,

▶ So There is No Excuse! (發現可以用錄影顛覆教室之後，就不用怕講不完囉!)

▶ And it's even more beneficial if it's in English! (而且不用怕英文聽力不好，因為可以一聽再聽!)

But... (九把刀: 人生就是有這個But...)

- **Instructors Face Their Own Challenges** (每個老師面對的挑戰不同)
  - **"You don't know how awful XYU students are."** (你不了解X大學生...)

- **"NTU students can do this, but not ours!"** (Really?!)
  - 橘逾淮為枳: 台大學生可以，不代表我們學生也可以(真的嗎?!)

But... (九把刀: 人生就是有這個But...)

▶ **Every Divorce is different, but Marriage Counseling is possible since there are:** (家家有本難念的經，為什麼還有人可以幫別人做婚姻協談、諮商輔導？因為婚姻有:)

1. **General Principles** (共通原則)
2. **Case Studies** (可觀摩案例)
3. **Inspiration** (能觸類旁通)
   ▶ Can Learn from Analogy

▶ What About Teaching?
   ▶ 那教學呢？

Necessary Conditions to Change:

▸ (「改變」有三個必要條件...)

▸ To Push for Reform, You Need:

  ▸ 要推動改革，你需要:

1. Understand Logic of Current System (How it Works)

  ▸ 瞭解現況的邏輯: 知道為甚麼現在是這樣的光景

2. Wisdom from God (on How to Fine Tune the System)

  ▸ 有從上帝而來的智慧: 知道如何微調現有制度讓大家更好

3. Convince Key Person (to Make the Change)

  ▸ 說服有能力改變的人來改變: 這是比較容易的，因為前兩者根本是互斥的!

To Flip the Classroom, You Need: (因此，要顛覆教室，你必須)

1. Understand Prior Expectations (瞭解學生對這門課原本的預期)

   ▸ Understand Logic of Current System (瞭解現況的邏輯)

2. Design Unexpected Classes (針對此預期設計超乎預期的課堂內容)

   ▸ Wisdom from God (to Fine Tune) (有從上帝而來的智慧，知道如何微調現況)

3. Flip 3 Classes as a Frist Step (踏出第一步，嘗試顛覆三堂課)

   ▸ Convince Key Person to Change

   ▸ (說服有能力改變的人來改變)

▸ Flip Half Semester in 3 years!

   ▸ (每年顛覆兩三堂，教三年就半學期了!)

Flipping with Videos and Experiments

Q & A

投影片下載

Flipping the EMI Classroom: Screening and Signaling

顛覆全英教室示範: 篩選與認證機制

Joseph Tao-yi Wang (王道一)
NTU-ECON (台大經濟系)

Necessary Conditions to Change:

▸ (「改變」有三個必要條件...)

▶ To Push for Reform, You Need:

▸ 要推動改革，你需要:

1. Understand Logic of Current System (How it Works)

▸ 瞭解現況的邏輯: 知道為甚麼現在是這樣的光景

2. Wisdom from God (on How to Fine Tune the System)

▸ 有從上帝而來的智慧: 知道如何微調現有制度讓大家更好

3. Convince Key Person (to Make the Change)

▸ 說服有能力改變的人來改變: 這是比較容易的，因為前兩者根本是互斥的!

To Flip the Classroom, You Need: (因此，要顛覆教室，你必須)

1. Understand Prior Expectations (瞭解學生對這門課原本的預期)

   ▸ Understand Logic of Current System (瞭解現況的邏輯)

2. Design Unexpected Classes (針對此預期設計超乎預期的課堂內容)

   ▸ Wisdom from God (to Fine Tune) (有從上帝而來的智慧，知道如何微調現況)

3. Flip 3 Classes as a Frist Step (踏出第一步，嘗試顛覆三堂課)

   ▸ Convince Key Person to Change

   ▸ (說服有能力改變的人來改變)

▸ Flip Half Semester in 3 years!

   ▸ (每年顛覆兩三堂，教三年就半學期了!)

Student Expect Principles of Economics to

▶ Have Big Classes (大班授課)

▶ Cram/Memorize (講光抄、背多分)

▶ Unrealistic (模型假設脫離現實)

　▶ Blackboard Economics?!

▶ So They Forget: (黑板經濟學?!)

　▶ Frequently (經濟: 經常忘記)

　▶ Quickly (會計: 快快忘記)

　▶ Completely (統計: 通通忘記)

Classroom Experiment 12:

Screening and Signaling

▸ **"稀ㄟ取踢" Inc. Offers 2 Cell Phone Plans:**

    ▸ Plan A: $1 per minute

    ▸ Plan B: $168 monthly for 300min, then $1.5/min

▸ **Based on Last digit of student ID# (or card drawn), you:**

    ▸ ♠13:   Use   0-100min/mo

    ▸ ♡24:   Use 200-300min/mo

    ▸ ◇680: Use 400-500min/mo

    ▸ ♣579: Use 600-700min/mo

▸ **Which plan is cheaper for you?**

電信業者	亞太電信	中華電信	台灣之星	LINE MOBILE
方案	168(12.12限定)	469	288	399
月租費	168	469	288	399
上網優惠	21M吃到飽	21M吃到飽	21M吃到飽	21M吃到飽
網內語音	免費	前五分鐘	免費	免費
網外語音	30分鐘	25分鐘	0分鐘	30分鐘
市話		10分鐘		40分鐘
其他優惠	百萬好禮抽獎	無	無	200點+2%
漫遊優惠	無	無	無	指定國家月租抵漫遊
綁約期限	24個月	24個月	12個月	12個月
網內費率	免費	$3/分鐘	免費	免費
網外費率	$2/分鐘	$6/分鐘	$6/分鐘	$6.6/分鐘
市話費率	$2/分鐘	$6/分鐘	$6/分鐘	$6/分鐘
申辦通路	亞太直營/特約門市	網路門市	全通路	官網

Which Plan is the cheaper for you?
Plan A: $1 per minute
Plan B: $168 monthly for 300min, then $1.5/min

ⓘ Start presenting to display the poll results on this slide.

Screening (篩選機制)

1. **A Set of Rules** (一套遊戲規則)
   - ‣ Different cell phone plans (各種資費方案)
2. **Individuals Optimize** (個人決策謀求最佳化)
   - ‣ Which saves me the most money? (哪個最省錢?)
3. **You React to Others Optimizing** (其他人也在謀求自身最佳，所以你要因應)
   - ‣ Want a free iPhone 13? Get a new line! (為了零元手機多辦一個門號?)
4. **What Should Aggregate Data Look Like?**
   - ‣ The separating equilibrium says ♠13♣579 choose plan A, while ♡24◇680 choose plan B (整體結果長怎樣? 理論的預測為何?)
   - ‣ 分離均衡(Separating Equilibrium)的預測是♠13和♣579選擇方案A，♡24和◇680選擇方案B

| 電信業者	亞太電信	中華電信	台灣之星	LINE MOBILE
方案	168(12.12限定)	469	288	399
月租費	168	469	288	399
上網優惠	21M吃到飽	21M吃到飽	21M吃到飽	21M吃到飽
網內語音	免費	前五分鐘	免費	免費
網外語音	30分鐘	25分鐘	0分鐘	30分鐘
市話		10分鐘		40分鐘
其他優惠	百萬好禮抽獎	無	無	200點+2%
漫遊優惠	無	無	無	指定國家月租抵漫遊
綁約期限	24個月	24個月	12個月	12個月
網內費率	免費	$3/分鐘	免費	免費
網外費率	$2/分鐘	$6/分鐘	$6/分鐘	$6.6/分鐘
市話費率	$2/分鐘	$6/分鐘	$6/分鐘	$6/分鐘
申辦通路	亞太直營/特約門市	網路門市	全通路	官網

5. **Does Empirical Data Match the Theory?** (實證資料是否支持你的預測?)

   ▸ **How many ♠13♣579 (♡24◇680) did choose plan A(B)?**

      ▸ (剛剛有多少♠♣奇數(♡◇偶數)真的選方案A(B)?)

6. **Can Individual Differences be Explained?** (資料中的個別差異能否解釋?)

   ▸ **If you are different, what were you thinking?** (如果你是特例，你是怎麼想的?)

7. **How Can the Institution (Rules) Improve?** (制度/遊戲規則可以怎麼改進?)

   ▸ **What would you do as a marketing manager?** (如果你是行銷經理會怎麼做?)

8. **Where Did this Institution Come From?** (這套制度是哪裡來的?)

   ▸ **Copied from other countries? Only one approved?** (抄國外的資費方案? 只有這個通過NCC的核准?)

Applications of Screening (篩選機制的應用)

▸ **Screening Devices designed to Differentiate** (篩選機制設計關鍵是要分眾)

  ▸ Let some choose Plan A, others Plan B (讓某些人去選方案A，另一批人選方案B)

▸ **Ex: Marketing Campaigns Target Specific Groups** (針對性行銷專案)

  ▸ Student/NP plans of cell phone companies (電信三雄的學生專案、NP專案)

  ▸ BOGO, 2nd pair 50% off, 2nd bottle 41% off... (買一送一、第二雙半價...)

▸ **HR Screen CVs Based on Certain Criteria** (人資看履歷根據某些條件篩選)

  ▸ Ivy League, GPA, extra-curriculum activities, GIS

  ▸ Students try their best to satisfy those criteria

  ▸ 比如說：苔誠青椒、成績、社團活動或幹部資歷

  ▸ 學生就會按照那些條件來爭取資歷

Signaling（認證標籤）

1. Expected Salary if you graduate from: (假設你高中畢業後考上...)
   ▸ ♡24♢680: National iDaiwan University: 35k/mo (國立愛呆丸大學畢業起薪35k)
   ▸ ♠13♣579: Salty Chicken University: 22k/mo (私立鹹酥雞大學畢業起薪22k)
2. If you go to graduate school at NiDU: (大四上你可選擇報考愛呆丸大學研究所)
   ▸ Expected salary 40k/mo, but need to repay student loans @ 5k/mo
   ▸ (畢業後月薪40k，但須負擔就學貸款(和補習貸款)月繳5k)
3. Would you (advise your friend or your son to) apply for NiDU graduate school? Why?
   ▸ (請問你會不會報考研究所? 為什麼?)
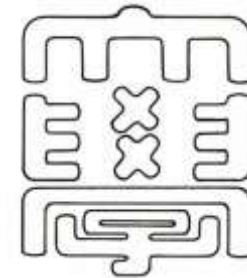
slido

BA@NiDU earns 35k/mo
BA@SaltyChickenU earns 22k/mo
MA@NiDU earns 40k/mo (but need to repay student loans@5k/mo)
Would you apply for NiDU's MA program?

slido

If you are a BA@NiDU (♡24◇680) and you did NOT apply for graduate school, list reasons why you did NOT apply.

ⓘ Start presenting to display the poll results on this slide.

▸ Revisit the question previously raised...

▸ Which Would You Choose? (mutually exclusive) (只能二選一的話...)

1. Spend 4 Years Studying at the world's best university, but must keep attendance a secret. (念全世界最好的大學，但是拿不到畢業)

2. Get an Official Degree from the world's best university, but cannot actually study there. (拿全世界最好大學的畢業證書，但不能去念)

▸ Answer Reveals which do you think is the more important reason <u>Education Increases Salary</u>

Your Human Capital vs. Your Signal

▸ 你的選擇反映你認為教育提高薪資的兩個原因哪個比較重要：累積的人力資本 vs. 擁有的認證光環

Signaling (認證標籤)

1. **A Set of Rules** (一套遊戲規則: 就業市場上(與社會上?)公認的文憑主義)

    ▸ Credentialism on the job market (and society)

2. **Individuals Optimize** (個人決策謀求最佳化)

    ▸ Which choice is better for my job market? (哪個選擇對未來求職最有利?)

3. **You React to Others Optimizing** (其他人也在謀求自身最佳，所以你要因應)

    ▸ Would salary be the same if everyone has a MA? (大家都上研究所碩士起薪不變?)

4. **What Should Aggregate Data Look Like?** (整體結果長怎樣?理論預測為何?)

    ▸ Pooling equilibrium says all should get a MA, though NiDU undergrads (♡24♢680) are indifferent (Other equilibrium?)

    ▸ (有志一同均衡預測所有人都會考研究所，雖然愛呆丸大學的畢業生覺得沒差。) (其他均衡呢?)

5. **Does Empirical Data Match the Theory?** (實證資料是否支持你的預測?)

   ▸ How many ♠13♣579(♡24◇680) actually applied for MA?

     ▸ (剛剛有多少♠♣奇數(♡◇偶數)真的選擇研究所?)

6. **Can Individual Differences be Explained?** (資料中的個別差異能否解釋?)

   ▸ If you are ♡24◇680, what were you thinking? (♡◇偶數的你是怎麼選擇的?)

7. **How Can the Institution (Rules) Improve?** (制度/遊戲規則可以怎麼改進?)

   ▸ What would you do as employers? As Minister of Education? (如果你是老闆會怎麼辦? 如果你是教育部長呢?)

8. **Where Did this Institution Come From?** (這套制度是哪裡來的?)

   ▸ Imperial Examination System? (萬般皆下品? 還是把讀書當作晉身統治階級的科舉制度?)

Applications of Signaling (認證標籤的應用)

- Signals Let You Stand Out (認證標籤的設計關鍵是要能夠讓你鶴立雞群)
  - Convince others you (your products) are better (說服對方你比較好，與眾不同)
- Examples: (認證標籤實例)
- Consumers Demand Certificate of Origin (消費者要求產地標章)
  - Credentials, Recommendation Letters, MIT, ISO (學歷光環/主管推薦信/台灣製造)
- Demonstrate Qualification in Job Interviews (求職者透過面試強調自己的特點)
  - Hire me, because... (試圖說服面試官錄取她/他) (你去科系面試，要如何說服對方錄取你?)
- How would you convince interviewers to admit you? Should I go for MBA immediately after college? (商管科系大學畢業該馬上念MBA嗎?)

What Course Are You Taking?

▶ Your GPA serves two purposes:

   ▶ Signal you are a smart and responsible student

   ▶ Reflect the knowledge and abilities accumulated in college

▶ But what does sweet and cheap GE indicate?

   ▶ What if I get a C in a tough course? Isn't that worse than taking easy sweet and cheap ones?

   ▶ Next year, should you take the road to heaven (天堂路線) or the deadly triangle (必死鐵三角)?

      ▶ (cf. NTUCourse on ptt)

Some Personal Recommendations

- ▸ 2nd year, take Intermediate Micro from 古慧雯 or 駱明慶
- ▸ 3rd and 4th year, take:
  - ▸ 市場與台灣經濟發展(吳聰敏): Capstone on Presentation and Writing
  - ▸ 賽局理論與策略思考(馮勃翰): Game Theory & Strategic Thinking
  - ▸ English Composition (2 yr) or other languages
  - ▸ Apply for BESAP, SAPFS (人社學術人才跨國培育計畫)
- ▸ Thinking about Graduate School?
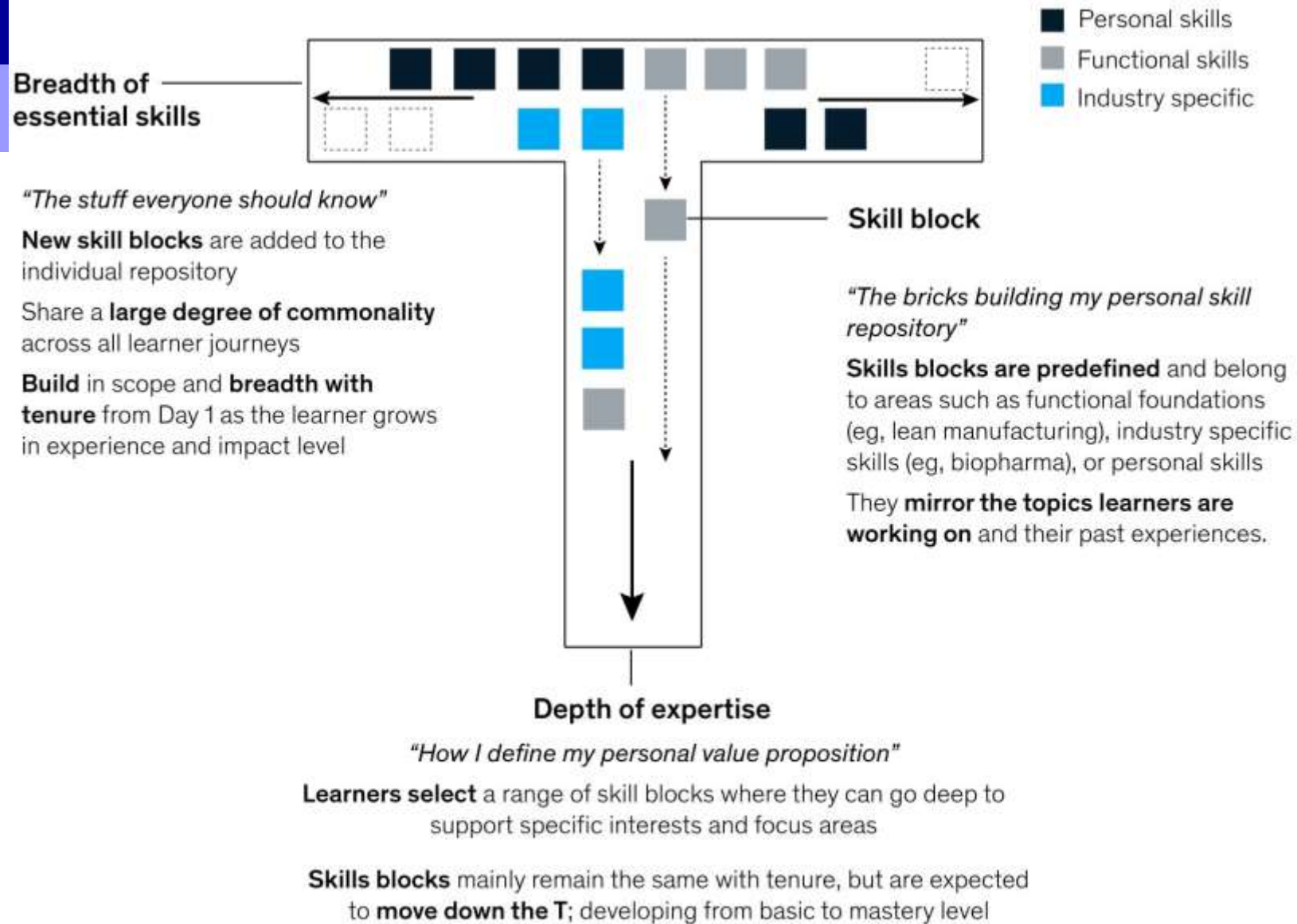 - ▸ Try out 1-2 graduate Micro/Macro/Econometric Theory or Master-level electives (駱明慶,陳虹如,李怡庭,...)

Some Personal Recommendations

- Find your interest by taking electives broadly

  - Try Summer interns (industry) or RAs (academics)

- Focus on one field to sharpen your skills

  - Forge secret weapons (吃飯的傢伙) with tough core courses

- Develop General Skills as well: (required by other majors)

  - Logical Reasoning (English Composition/Intro to Real Analysis) (英文作文二/分析導論一二)

  - Communication (writing and oral presentation)

  - Programming Skills (C++/Python/Matlab/R, etc...)

Recommendation of

- ▸ Ops 4.0—The Human Factor: A class size of 1
  - ▸ The T-shaped skills profile

Every learner builds a unique, personalized T-profile with relevant skill blocks.

Personal skills
Functional skills
Industry specific

Breadth of essential skills

"The stuff everyone should know"

New skill blocks are added to the individual repository

Share a **large degree of commonality** across all learner journeys

Build in scope and **breadth with tenure** from Day 1 as the learner grows in experience and impact level

Skill block

"The bricks building my personal skill repository"

Skills blocks are predefined and belong to areas such as functional foundations (eg, lean manufacturing), industry specific skills (eg, biopharma), or personal skills

They **mirror the topics learners are working on** and their past experiences.

Depth of expertise

"How I define my personal value proposition"

Learners select a range of skill blocks where they can go deep to support specific interests and focus areas

Skills blocks mainly remain the same with tenure, but are expected to **move down the T**; developing from basic to mastery level

McKinsey & Company

Some Personal Recommendations

▸ Interested in micro-economics?

  ▸ Take Calculus 4: With Applications to Economics

  ▸ Master Intermediate Micro and take Micro Theory I

▸ Like the experiments I run? Signup for TASSEL

  ▸ Take Experimental Economics + start to do research with me

▸ If you want to apply for graduate school in Econ:

  ▸ Take Introduction to Real Analysis (2nd yr), Linear Algebra (1st yr); then Advanced Statistical Inference (grad.)@NTU Math

  ▸ Take 2 years of English Composition (I+II)@NTU FLLD

Q & A
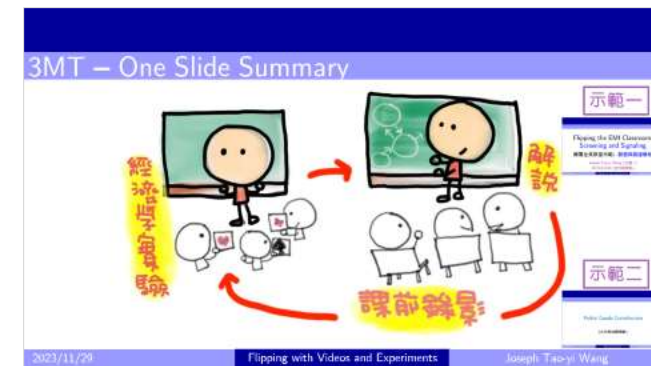
Public Goods Contribution

(公共財自願捐獻)

Public Goods Contribution (公共財自願捐獻)

- Form groups of 4 people according to your card
  - 請按照手上的撲克牌，分成四人一組

  - Each group member should have a card (每一組的組員手上的撲克牌)
- Of the same number (必須都要是同樣數字)
- But NOT the same suit! (但是花色不可以相同!)
  - People online join assigned chatrooms (線上參與者請按事先的分配進入討論室)

Public Goods Contribution (公共財自願捐獻)

▸ Each group has 2 red, 2 black card (每組總共有兩張紅色牌、兩張黑色牌)

　▸ I will collect 2 cards from each group (之後主持人會跟每組收取兩張牌)

▸ You choose which two cards to submit to the pool:

　▸ two black, two red, or one each

　▸ (各組自行選擇要繳交哪兩張牌存入公庫: 交出兩黑、兩紅或一黑一紅均可)

▸ You keep the remaining 2 cards (剩下兩張牌留在私庫)

　▸ Submit cards facing down (secret) (繳交時請牌面朝下確保他人看不到牌組內容)

▸ I will count red cards in the pool (最後統計公庫裡總共有多少張紅色牌)

　▸ Discuss and jointly decide; no dictators! (請共同討論後作決定，不要都是某一個人獨裁)

Public Goods Contribution (公共財自願捐獻)

- Scores depends only on red cards (每回合得分取決於紅色牌/黑色牌不計分)
- 1 red card you keep = 1pt for your group (私庫的每張紅色牌可讓該組得1分)
- 1 red card in pool = 2pt for each group (公庫的每張紅色牌可讓每組都得2分!)
  - If there are 30 groups and each submit one each
  - Pool has 30 red cards (=60pt), so each group earns 61pt!
    - (假設有30組參與遊戲，每組都繳出一紅一黑存入公庫，公庫就有30張紅色牌(=60分)，各組得61分!)
- In later rounds, red cards you keep may change value, but red cards submitted to the pool always yields 2pt for each group
  - (在之後的回合，私庫中的紅色牌價值會有所變動，但公庫中的紅色牌價值不變)

▸ Group Earnings = (1pt ✖ red cards you keep)
+ (2pt ✖ total red cards in the pool)

▸ (小組報酬 = (1分 ✖ 私庫紅色牌張數) + (2分 ✖ 公庫紅色牌總張數))

▸ How much would you earn if all groups submit two red cards? (如果30組都交出兩張紅色牌，會拿幾分?)

▸ How much would you earn if others all submit two red cards, but you submit only one?

▸ (如果別組都交出兩張紅色牌，但你們這組暗槓一張紅色牌，這樣你們會拿幾分?)

▸ Is it worth it to keep one red card? (暗槓划得來嗎?)

Group Earnings = (1pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (1分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。
How much would you earn if all groups submit two red cards? (如果30組都交2張紅色牌，會拿幾分?)

ⓘ Start presenting to display the poll results on this slide.

Group Earnings = (1pt × red cards you keep) ＋ (2pt × total red cards in the pool) 小組報酬 = (1分 × 私庫紅色牌張數) ＋ (2分 × 公庫紅色牌總張數)。

How much would you earn if other groups submit two red cards, but you submit only one? 如果別組都交2張紅色牌，但你們這組暗槓1張紅色牌，這樣你們會拿幾分？

ⓘ Start presenting to display the poll results on this slide.

▸ Group Earnings = (1pt ✖ red cards you keep)
    + (2pt ✖ total red cards in the pool)

  ▸ (小組報酬 = (1分 ✖ 私庫紅色牌張數) + (2分 ✖ 公庫紅色牌總張數)

▸ If all 30 groups submit two red cards, (如果30組都交出兩張紅色牌)

  ▸ Pool has 60 red cards, so each group earns 120pt! (公庫有60張
    紅色牌，每組得60*2=120分! 但如果別組都交出兩張紅色牌，你們這組卻暗槓一張紅色牌，)

▸ If others all submit two red cards, but you submit one,

  ▸ 59*2 + 1 = 118 + 1 = 119pt (分)!

▸ Is it worth it to keep one red card? No! (暗槓划得來嗎? 才怪!)

▸ Group Earnings = (50pt ✖ red cards you keep)
+ (2pt ✖ total red cards in the pool)

▸ (小組報酬 = (50分 ✖ 私庫紅色牌張數) + (2分 ✖ 公庫紅色牌總張數)

▸ How much would you earn if all groups submit two black card? (如果30組都交出兩張黑色牌，會拿幾分?)

▸ How much would you earn if others all submit two black card, but you submit one each?

▸ (如果別組都交出兩張黑色牌，但你們這組交出一張紅色牌，這樣你們會拿幾分?)

▸ Is it worth it to submit one red card? (交紅色牌划得來嗎?)

slido

Group Earnings = (50pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (50分 × 私庫紅色牌張數)
+ (2分 × 公庫紅色牌總張數)。

How much would you earn if all groups submit two black cards? 如果30組都交2張黑色牌，會拿幾分？

ⓘ Start presenting to display the poll results on this slide.

Group Earnings = (50pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (50分 × 私庫紅色牌張數)
+ (2分 × 公庫紅色牌總張數)。

How much would you earn if all groups submit two bla如果別組都交2張黑色牌，但你們這組交1張紅色牌，這樣你們會拿幾分？

ⓘ Start presenting to display the poll results on this slide.

▸ Group Earnings = (50pt ✖ red cards you keep)
+ (2pt ✖ total red cards in the pool)

▸ (小組報酬 = (50分 ✖ 私庫紅色牌張數) + (2分 ✖ 公庫紅色牌總張數)

▸ If all 30 groups submit two black cards, (如果30組都交出兩張黑色牌)

▸ Pool empty, but each group earns 0*2+50*2=100pt! (公庫空空,
但每組得0*2+50*2=100分! 但如果別組都交出兩張黑色牌, 你們這組卻交出一張紅色牌,)

▸ If others submit two black cards, you submit one each,

▸ 1*2 + 1*50 = 52pt (分)! (別人多2分但你們只得1*2 + 1*50 = 52分!)

▸ Is it worth it to submit one red card? No! (交紅色牌值得嗎? 才怪!)

▸ Group Earnings = (4pt ✖ red cards you keep)
+ (2pt ✖ total red cards in the pool)

▸ (小組報酬 = (4分 ✖ 私庫紅色牌張數) + (2分 ✖ 公庫紅色牌總張數)

▸ Please collect four cards from me (請在現場的隊友到前面領取四張牌)

▸ You have 60 seconds to discuss whether to submit two black, two red, or one each (各組有60秒討論要交兩黑、兩紅或一黑一紅)

▸ Then, submit accordingly (再由現場的隊友交出兩張牌)

▸ How many red cards do you expect from 30 groups?
(總共30組，你預期會交出多少張紅色牌?)

▸ Group Earnings = (4pt ✖ red cards you keep)
+ (2pt ✖ total red cards in the pool)

▸ (小組報酬 = (4分 ✖ 私庫紅色牌張數) + (2分 ✖ 公庫紅色牌總張數)

▸ Please collect four cards from me (請在現場的隊友到前面領取四張牌)

▸ You have 60 seconds to discuss whether to submit two black, two red, or one each (各組有60秒討論要交兩黑、兩紅或一黑一紅)

▸ Then, submit accordingly (再由現場的隊友交出兩張牌)

▸ How many red cards do you expect from 30 groups? (總共30組，你預期會交出多少張紅色牌?)

slido

Try Again: How many red cards do you expect from 30 groups? (再來一次: 總共30組，你預期會交出多少張紅色牌?)

ⓘ Start presenting to display the poll results on this slide.

- Group Earnings = (4pt **×** red cards you keep)
  + (2pt **×** total red cards in the pool)
  - (小組報酬 = (4分 **×** 私庫紅色牌張數) + (2分 **×** 公庫紅色牌總張數)

▸ **Please collect four cards from me** (請在現場的隊友到前面領取四張牌)

  ▸ You have 60 seconds to discuss whether to submit two black, two red, or one each (各組有60秒討論要交兩黑、兩紅或一黑一紅)

▸ **Then, submit accordingly** (再由現場的隊友交出兩張牌)

  ▸ This time, groups have 120 seconds to discuss (現場各隊有120秒可以討論)

▸ **How many red cards do you expect from 30 groups?** (總共30組, 你預期會交出多少張紅色牌?)

slido

If groups can discuss, how many red cards do you expect from 30 groups? (如果各組可以先討論...) 總共30組，你預期會交出多少張紅色牌?

ⓘ Start presenting to display the poll results on this slide.

▸ Group Earnings = (4pt ✕ red cards you keep)
+ (2pt ✕ total red cards in the pool)

  ▸ (小組報酬 = (4分 ✕ 私庫紅色牌張數) + (2分 ✕ 公庫紅色牌總張數)

▸ Please collect four cards from me (請在現場的隊友到前面領取四張牌)

  ▸ You have 60 seconds to discuss whether to submit two black, two red, or one each (各組有60秒討論要交兩黑、兩紅或一黑一紅)

▸ Then, submit accordingly (再由現場的隊友交出兩張牌)

  ▸ This time, groups have to <u>disclose</u> their submissions and make them public information (決定時需亮牌、讓資訊公開)

▸ How many red cards do you expect from 30 groups? (總共30組, 你預期會交出多少張紅色牌?)

- Group Earnings = (4pt ✖ red cards you keep)
  + (2pt ✖ total red cards in the pool)
  - (小組報酬 = (4分 ✖ 私庫紅色牌張數) + (2分 ✖ 公庫紅色牌總張數)

- How much would you earn if all groups submit two red cards? (如果30組都交出兩張紅色牌，會拿幾分?)

- How much would you earn if others all submit two red cards, but you submit only one?

- (如果別組都交出兩張紅色牌，但你們這組暗槓一張紅色牌，這樣你們會拿幾分?)

- Is it worth it to keep one red card? (暗槓划得來嗎?)

Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。

How much would you earn if all groups submit two red cards? (如果30組都交2張紅色牌，會拿幾分?)

ⓘ Start presenting to display the poll results on this slide.

Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。

How much would you earn if others all submit two red cards, but you submit only one? (如果別組都交出2張紅色牌，但你們這組暗槓1張紅色牌，這樣你們會拿幾分?)

ⓘ Start presenting to display the poll results on this slide.

Group Earnings = (4pt × red cards you keep) + (2pt × total red cards in the pool)
小組報酬 = (4分 × 私庫紅色牌張數) + (2分 × 公庫紅色牌總張數)。

How much would you earn if others all submit two red cards, but you submit NONE? (如果別組都交2張紅色牌，但你們這組暗槓2張紅色牌，這樣你們會拿幾分?**)**

ⓘ Start presenting to display the poll results on this slide.

Suppose There are 30 Groups (假設這次總共有三十組參與...)

- ‣ Group Earnings = (4pt ✖ red cards you keep)
  + (2pt ✖ total red cards in the pool)
  - ‣ (小組報酬 = (4分 ✖ 私庫紅色牌張數) + (2分 ✖ 公庫紅色牌總張數)

- ‣ If all 30 groups submit two red cards, (如果30組都交出兩張紅色牌)
  - ‣ Pool has 60 red cards, so each group earns 120pt! (公庫有60張紅色牌，每組得60*2=120分! 但如果別組都交出兩張紅色牌，你們這組卻暗槓一張紅色牌，)

- ‣ If others all submit two red cards, but you submit one,
  - ‣ 59*2 + 4 = 118 + 4 = 122 (分)! (如果暗槓兩張紅色牌呢?)

- ‣ If others submit two red cards, but you submit NONE,
  - ‣ 58*2 + 4*2 = 116 + 8 = 124 (分)! Worth it to keep!(暗槓好!)

Public Goods Contribution (公共財自願捐獻)

- Group Earnings = (4pt **×** red cards you keep)
  + (2pt **×** total red cards in the pool)
  - (小組報酬 = (4分 **×** 私庫紅色牌張數) + (2分 **×** 公庫紅色牌總張數)

- **Group Discussion:** (小組討論問題)
  1. What is the cost of submitting one red card to the pool? (繳出一張紅牌到公庫的代價是什麼?)
  2. What is the rate of return for submitting one red card to the pool? (繳出一張紅牌到公庫的投資報酬率是多少?)
  3. Is it good for the society as a whole that a group submits red cards to the pool? Explain. (從所有組別的整體觀點來看，單一組別繳出紅牌到公庫是好事嗎? 請解釋你的推理。)

Q & A
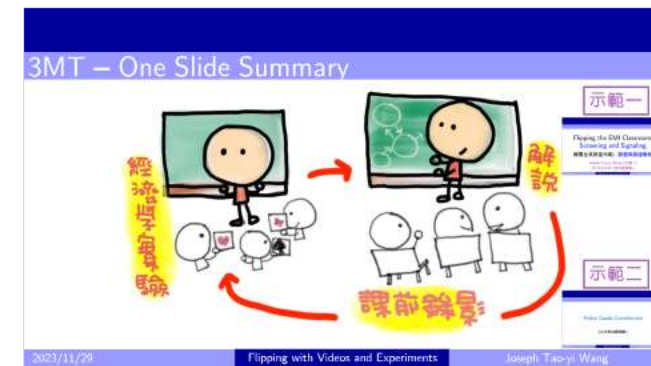
Audience Q&A Session

ⓘ Start presenting to display the audience questions on this slide.