

幫助學生。成就自己

教學心得

教學歷程檔



國立臺灣科技大學

NATIONAL TAIWAN UNIVERSITY OF SCIENCE AND TECHNOLOGY

莊榮輝

副校長兼教務長

2019/05/01

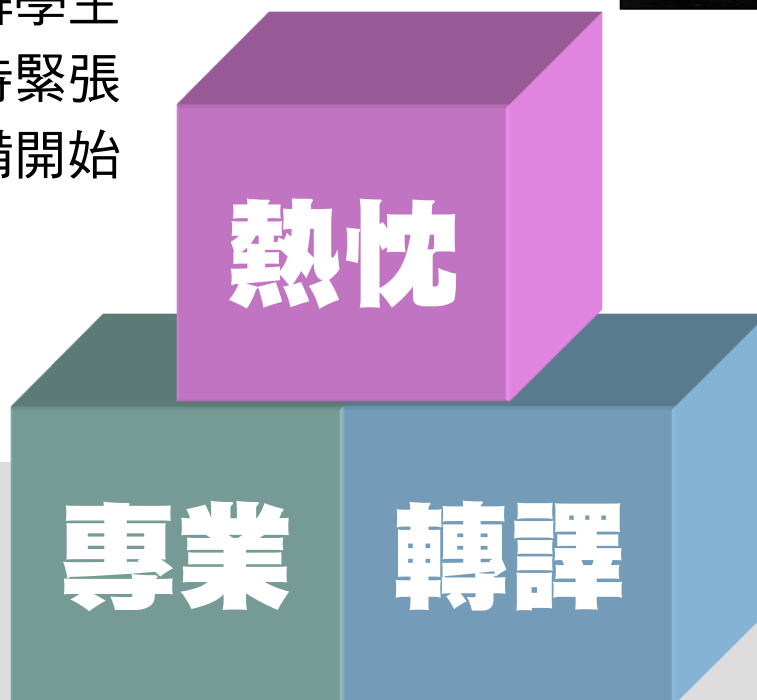
卓越教學的三個關鍵因素

招牌課

- (1) 無熱忱易被識破
- (2) 主動去瞭解學生
- (3) 平常心看待緊張
- (4) 以專業準備開始



- (1) 專業素養要深厚
- (2) 自己先累積趣味
- (3) 要配合學生背景
- (4) 啟發知識與見識



以學生之立場與角度



Great Mentors

- (1) 學識要經過轉譯
- (2) 以投影片為舞台
- (3) 充分預習與掌握
- (4) 利用問題與個案

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graph TD
    KB[課本] --> B[範圍]
    B --> T[轉譯]
    T --> JC[教材]
    JC --> WP[網頁平台]
    JC --> B1[編輯]
    B1 --> U[上傳]
    U --> WP
    B1 --> G[規定]
    G --> B
    W[網站] --> J[架構]
    J --> B1
    J --- FW[FrontPage  
DreamWeaver]
    B1 --> C[補充]
    C --- L1[論文]
    C --- L2[參考書]
    C --- L3[影帶]
    C --- L4[作品]
    T --- C2[搜集]
    C2 --> C3[消化]
    C3 --> C4[摘要]
    C4 --> C5[呈現]
    C5 --> C2
    JC --- C6[講義]
    JC --- C7[投影片]
    JC --- C8[影音檔]
    C6 --- L5[MS Word  
PowerPoint]
    C7 --- L6[Photoshop  
PowerDirector]
    C8 --- L7[Photoshop  
PowerDirector]
    WP --- K[課堂上]
  
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追求優質教學
必須付出心力
以及大量時間

課本

範圍

規定

轉譯

教材

網頁平台

網站

架構

編輯

上傳

補充

論文

參考書

影帶

作品

搜集

消化

摘要

呈現

講義

投影片

影音檔

MS Word
PowerPoint

Photoshop
PowerDirector

課堂上

FrontPage
DreamWeaver

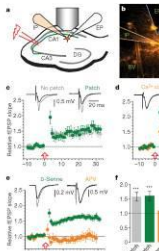
LETTERS

Long-term potentiation depends on release of D-serine from astrocytes

Christian Henneberger¹, Thomas Papouin¹, Stéphane H. Oliet^{1,2} & Dmitri A. Rusakov¹

Long-term potentiation (LTP) of synaptic transmission provides an experimental model for studying mechanisms of memory. The chemical form of LTP relies on N-methyl-D-aspartate receptors (NMDARs), and it has been shown that astrocytes can regulate their activation through Ca²⁺-dependent release of the NMDAR co-agonist D-serine¹. Release of D-serine from glia enables LTP 'cues' and explains a correlation between glial coverage of synapses and LTP in the septal hippocampus. However, because intracellular D-serine in astrocytes can also release other signalling molecules, most prominently glutamate², ATP and inosine³, it is unclear whether D-serine is the sole LTP cue. Here, we show that D-serine is the sole LTP cue by using a D-serine transporter inhibitor and a D-serine transporter substrate. Furthermore, adding an astrocyte with exogenous Ca²⁺ buffers does not suppress LTP in a hippocampal slice (ref. 14–16), and the physiological relevance of experiments in cultures or strong exogenous stimuli applied to astrocytes have been questioned¹⁴. The involvement of glia in LTP induction therefore remains controversial. Here we show that clamping internal Ca²⁺ in individual CA1 astrocytes blocks LTP induction in the septal hippocampus by depleting the occupancy of the NMDAR on agonist sites. This LTP blockade can be reversed by co-agonist or glycine, whereas depletion of D-serine or depletion of co-agonist in an individual astrocyte blocks local LTP. We therefore demonstrate that Ca²⁺-dependent release of D-serine from an astrocyte controls NMDAR-dependent plasticity in many thousands of excitatory synapses near it.

To investigate the role of D-serine in NMDAR-dependent LTP, we focused on Schaffer collateral (SC)-CA1 pyramidal cell synapses, a classical model of LTP studies in the hippocampus. We used a patch pipette to load individual astrocytes with a Ca²⁺ indicator and monitored SC-mediated field excitatory postsynaptic potentials (fEPSPs) in the presence of D-serine.



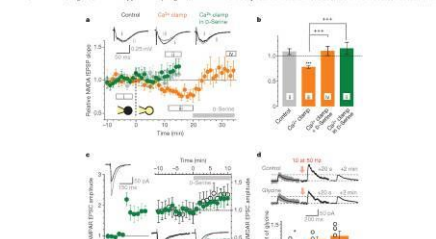
NATURE | Vol 463/14 January 2010

LETTERS

Stimulating, clamping the intra-astrocyte Ca²⁺ concentration completely suppressed LTP at nearby synapses, and the addition of D-serine to the bath restored LTP. These results indicate that D-serine is the sole LTP cue and that its release from astrocytes is necessary for LTP induction.

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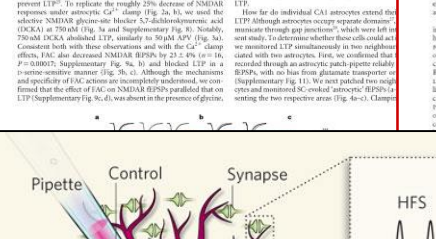
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NEWS & VIEWS

NEUROSCIENCE

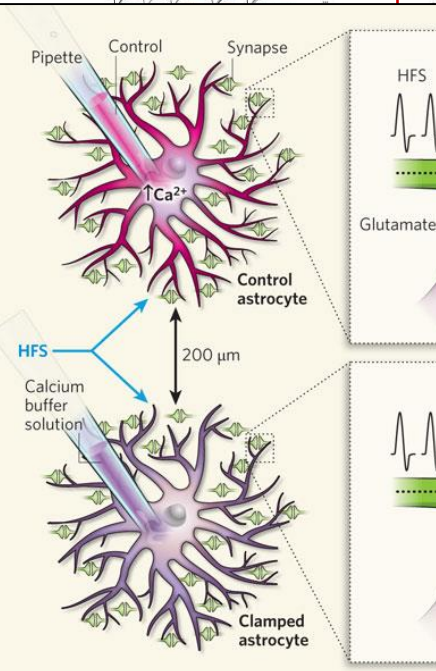
Astrocytes as aide-mémoires

Mirko Santello and Andrea Volterra

Memory formation is known to occur at the level of synaptic contacts between neurons. It therefore comes as a surprise that another type of brain cell, the astrocyte, is also involved in establishing memory.

Memory is the result of long-lasting changes in synaptic activity usually involving the activation of NMDA receptors (NMDARs) — a special class of receptor for the excitatory neurotransmitter glutamate. Memory formation has always been thought to depend on events occurring exclusively in neurons. But the brain possesses another cell population, glial cells, which include the highly ramified, star-shaped astrocytes. Despite their abundance — they make up 90% of all human brain cells — astrocytes have been relatively overlooked in the search for mechanisms of memory formation because they lack electrical excitability and do not communicate like neurons do. But astrocytes are

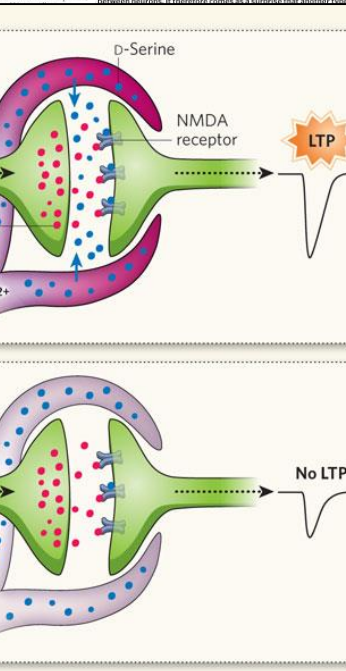
the first direct evidence for this proposal. The authors induce long-term potentiation (LTP) of excitatory synapses in the hippocampus using a high-frequency-stimulation protocol, which involves applying repetitive electrical stimuli to the presynaptic fibres. LTP is the sustained increase in synaptic strength associated with memory formation, and the authors monitored this synaptic potentiation locally, in domains roughly corresponding to the territories of individual astrocytes. They did this by recording the electrical signal generated by the ensemble of synapses in the territory, using an extracellular electrode or, alternatively, directly through the astrocyte.



Neuroscience Astrocytes as aide-mémoires

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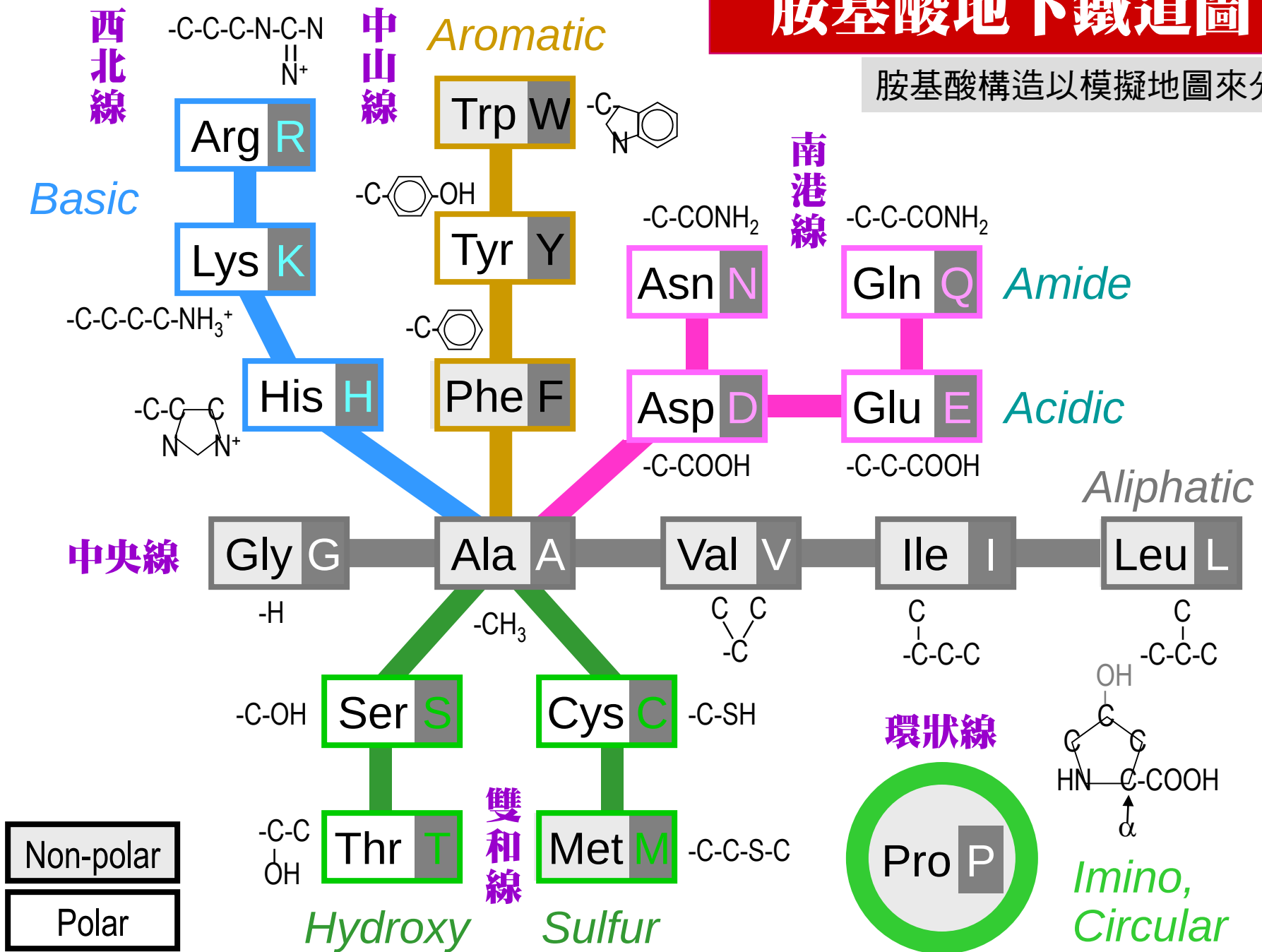
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Nature: News & Views Science: Perspectives Scientific American

胺基酸地下鐵道圖

4

胺基酸構造以模擬地圖來分類



上課前

工作提要

基本

- (1) 儘早決定課程範圍，預留足夠 **時間**，以便充分準備上課資料。
- (2) 把課程內容一一 **轉譯** 成教材，記得要以學生的觀點為出發點。
- (3) 至少要完成所負責課程範圍的 **講義**，可以是文字檔或投影片。
- (4) 儘早完成講義之 **第一稿 (first draft)**，再逐步修改內容及格式。
- (5) 把上課資料公佈在 **課程平台**，並且讓學生知道所有 **重要規定**。

進階

- (6) 建立自己的 **課程網頁**，適時加入影音資料，可提升學習印象。
- (7) 申請教學助理，帶領 **TA 團隊**，與學生對話，共同經營班級。

上課時

工作提要

基本

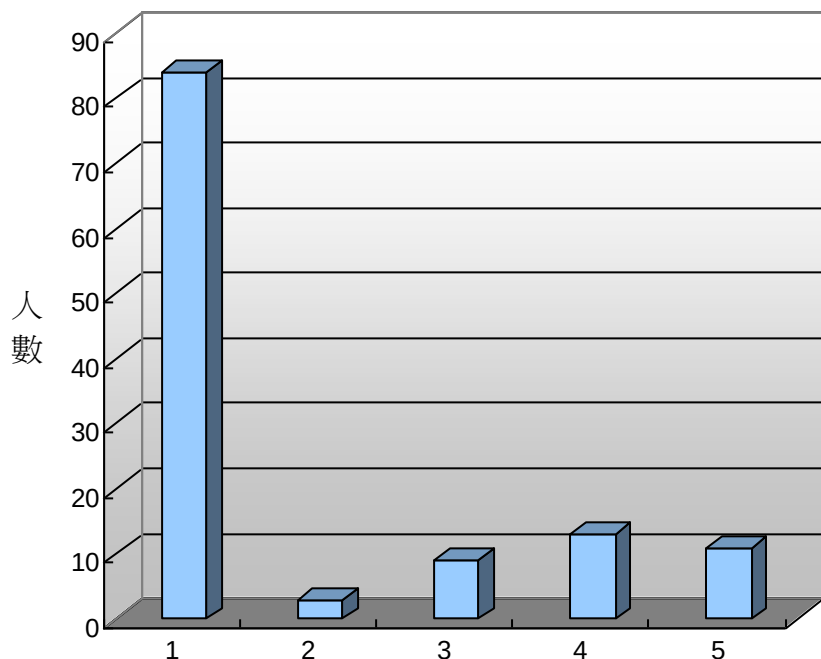
- (1) 每堂課前 **充分預習**，要熟悉每一張投影片，並條列記下重點。
- (2) 一定要控制好 **時間**，不要在規定時間內，塞入了太多投影片。
- (3) 開始上課就簡要描述當日 **重點**，讓學生預知將要學習到什麼。
- (4) 難免會 **焦慮緊張**，充分備課並熱忱講授，就能得到學生肯定。
- (5) 上一堂課成功或失敗，**不見得** 下次也是如此，都要重新出發。

進階

- (6) 必要時，可以自行在課堂中進行教學效果之 **回饋問卷 (KQS)**。
- (7) 每課程段落，對關鍵性概念提出問題，利用 **表決器** 帶動討論。

有關生命源起的看法？

(我的通識課上課實例)



- (1) 我支持演化論
- (2) 我支持創造論
- (3) 我支持智慧設計
- (4) 我都可以接受
- (5) 都不接受

學生都很想知道表決結果



考試不能考這種題目 | 利用 clicker 即時回應

在教務處服務幾年後 ... 發覺

- (1) 新進教師的第一年經驗很重要**
- (2) 每學期開學的第一堂課很重要**
- (3) 大學生的第一年生活史很重要**
- (4) 大學最後一年之收網整合亦然**
- (5) 研究生第一年的養成也很關鍵**

慎始

成就自己

好好經營個人的教學歷程檔案

教學歷程檔案為何重要？

- (1) 教學與研究是大學重要的基本功能
 - (2) 沒有優質教學就不會產出傑出研究
 - (3) 教學歷程檔案可有效反思教學成效
 - (4) 理念加文字配合實際證據展現成果
 - (5) 除供評鑑與升等更可陪伴永續成長
- 

集中、廣用、有效

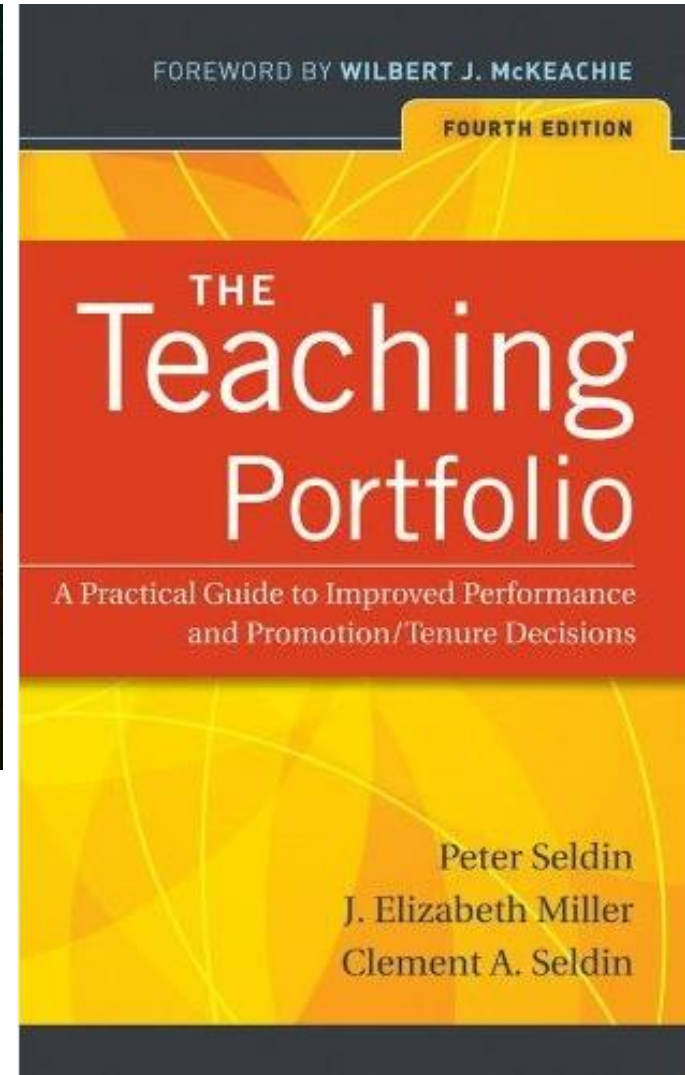


Peter Seldin

Distinguished Professor, Management &
Management Science, Pace University,
Pleasantville, New York, USA

J. Elizabeth Miller

Associate Professor, School of Family, Consumer &
Nutrition Sciences, Northern Illinois University,
DeKalb, IL, USA



**2009/03/07 臺大杜鵑花節
教學發展中心 教學工作坊**

教學歷程檔是什麼？

- (1) 收集教師教學活動相關材料與文件
- (2) 非僅資料之堆積還要費心提煉精髓
- (3) 所有成果記錄均需提供實際之證明
- (4) 更甚於個人的履歷表與研究著作表
- (5) 長期追蹤教師教學努力以引領反思

一般的cv – 缺乏靈魂、內涵

教學歷程檔有何用途？

- (1) 精確記錄教學理念與成果以供評鑑
- (2) 可供求職、升等、計畫或獎勵申請
- (3) 完整歷史資料可作為教學改進依據
- (4) 提供年輕教授參考以延續教學主旨
- (5) 漸漸推廣教學成果『代表課』概念

反思 → 評鑑 → 升等 → 獎勵 → 歷史 → 傳承

如何準備教學歷程檔？

(1) 尋求資深教授之引導、檢視與批評

隱性目標－建立 mentor 關係

(2) 規劃檔案架構以及預定完成的目標

(3) 論述你的教學任務以及達成的方法

(4) 決定整體內容項目再逐一精要撰寫

(5) 收集證據文件並完成一份整體目錄

靈魂

實證 描述事實 → 證據支持

Evidence!

Table of contents

Cover letter

↑ 可能是成敗關鍵！

理念

(1) Teaching responsibilities

(2) Teaching philosophy

(3) Teaching objectives, strategies, and methodologies

(4) Teaching materials (syllabi, handouts, assignments)

如何執行

(5) Efforts to improve teaching:

- Innovation in teaching
- Curricular revisions
- Teaching conferences/workshops attended

成效

(6) Student ratings

(7) Evidence of student learning

Learning-outcome based

(8) Short-term and long-term teaching goals

Appendices

1 基本教學理念與方法 Teaching philosophy and methodology

2 教學經歷 Teaching experiences

- 2.1 教學經歷 Past responsibilities in teaching
- 2.2 授課列表 List of courses you taught
- 2.3 教學獲獎記錄 Teaching awards & honors
- 2.4 學生評語 Student commentary

3 檢討與自評 Self reflection and improvement

- 3.1 自評 Self evaluation
- 3.2 開授課程之檢討 Curricular revisions
- 3.3 教學方法之改進 Improvement in methodology
- 3.4 未來教學願景 Future vision

4 其他有關項目 Optional documentation

- 4.1 教學作品 Teaching materials
- 4.2 教學觀察報告 Classroom observation
- 4.3 學生作品 Sample of student work
- 4.4 教學網頁 Teaching web sites
- 4.5 推薦信 Letters of recommendation

簡要論述個人整體的教學理念、目標、與方法。
以下為參考描述架構：

- (1) 你對學生學習的目標為何？對個人教學的課程，學生應該如何學習，才能達到課程之精髓？
- (2) 你覺得如何教導，才能幫助學生達到上述目的？
- (3) 你採用的教學方法和行動如何呈現自己的教學理念？具體證明為何？
- (4) 你如何調整教學方法以因應學生特質、教材或課程的改變？
- (5) 你曾經發展過哪些教材或教學資源？
- (6) 你曾經設計過哪些創新的教學活動？

理念文字
盡量精簡

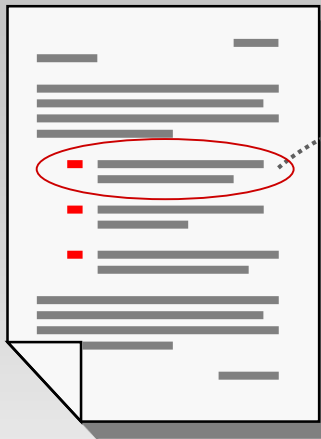
大部份資料
可自動帶入

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網址: https://f163.aca.ntu.edu.tw/cou/show_data.aspx									
(SD)									(±4.48)
課程名稱	生物化學上								課 號
學 分 數	4	合授人數	3	分攤比例	49.63%	其他說明		課 號	B02 20101
評 量	93 (1)	93 (2)	94 (1)	94 (2)	95 (1)	95 (2)	96 (1)	96 (2)	97 (1)
上課人數	200		162		159		236		
填答人數	167		83		141		196		
填答比例	0.84		0.51		0.89		0.83		
評 量 值	4.50		4.47		4.73		4.70		
英語授課	NO		NO		NO		NO		
平均成績 (SD)	74.69 (±10.33)		72.28 (±11.98)		75.55 (±11.44)		78.92 (±11.87)		
課程名稱	生物化學上								課 號
學 分 數	4	合授人數	3	分攤比例	50.00%	其他說明		課 號	B02 20101
評 量	93 (1)	93 (2)	94 (1)	94 (2)	95 (1)	95 (2)	96 (1)	96 (2)	97 (1)
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課程名稱	生物化學上								課 號
學 分 數	4	合授人數	3	分攤比例	61.19%	其他說明		課 號	B02 20101
評 量	93 (1)	93 (2)	94 (1)	94 (2)	95 (1)	95 (2)	96 (1)	96 (2)	97 (1)
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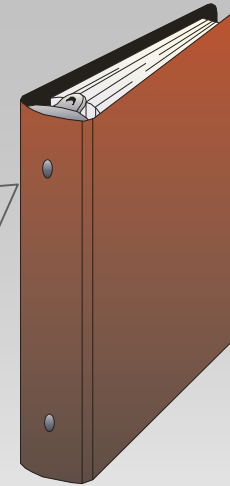
相關事實

- (1) 準備教學歷程檔要花多少時間？ 大約 15~20 小時
- (2) 教學歷程檔主體部份要寫幾頁？ 大約 10 頁 (A4)
- (3) 主體部份要編頁碼、日期及詳細目錄 (正式格式)
- (4) 附錄也要編目錄 (A, B, C...)，其文件得依序編碼
- (5) 重要成果要以事實證據說明之，而非僅模糊描述
- (6) 實例說明要精簡確實，避免長篇大論 (列點說明)
- (7) 大體積的證據列入附錄，但做好本文與附錄連結
- (8) 學生評鑑文字要整理列表，僅列出具代表性評語
- (9) 先跟循某個 template，再慢慢修改成自己的風格

Cover letter

**1**

Teaching portfolio

**2****3**

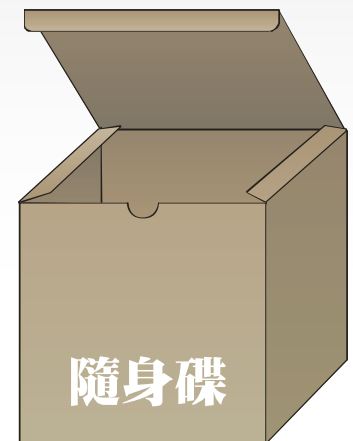
Appendix



Content



Evidence



以 1~2 頁簡要說明
你在教學的理念與
成就，可以列出最
重大的幾點，並註
明本文頁數

歷程檔本文約 10 頁



全面網路化之
電子歷程檔案
也可輸出履歷

佐證文件與資料列為附件

A 基本資料 Basic information	(C1) 本學期期中調查 Period survey in this semester	
B 歷年課程 All teaching courses	(C2) 五年學生評鑑 All student evaluations in 5 years	Open Close Download
C 學生評鑑 Student evaluations	說明：專題討論、專題研究、服務課程、碩士論文、博士論文等不計入。	
D 教學理念 Teaching philosophy	(C3) 歷年學生評鑑 All student evaluations in past years	Open Close Download
E 教學滿意 Teaching materials	說明：專題討論、專題研究、服務課程、碩士論文、博士論文等不計入。	
F 活動記錄 Related activities	(C4) 教師學生文字意見 Selected student opinions	Save Cancel
X 參考資料 Miscellaneous	說明：限100字(含空白) 編輯字數 ：8	
	新增學生文字意見	



國立台灣大學

製作教學履歷

tCV

Curriculum Vitae

A 基本資料
Basic information

B 歷年課料
All teaching courses

C 學生評鑑
Student evaluations

D 教學反思
Teaching philosophy

E 教學資料
Teaching materials

F 活動紀錄
Related activities

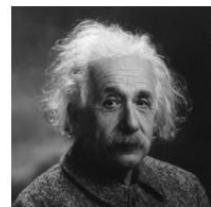
X 參考資料
Miscellaneous

(1) 挑選顯示項目 Select items displayed in tCV

Cover letter	X1		Display
Contents		自動產生 (不計入頁碼)	☐
A 基本資料	A	自訂 1 頁開始	☐
B 歷年課程	B1	本學期開授課程	☐
	B2	歷年開授課程	☐
	B3	五年授課統計表	☐
C 歷年學生評鑑	C1	歷年學生評鑑值	☐
	C2	五年學生評鑑值	☐
	C3	簡練學生文字意見	☐
D 教學反思	D1	教學理念	☐
	D2	教學成效	☐
	D3	自我反思	☐
E 教學相關	E		☐
F 活動紀錄	F		☐
X 參考資料	X2		☐

自訂履歷

履歴様本



五年後的評鑑

現在開始準備



面對教學評鑑

建立教學歷程檔案的目標與任務

**閱讀學生文字意見之前 ...
請先找一張椅子坐下來**



(可能的結局之一)

(B2) 五年開授課程表

All courses in 5-years

Open

Close

如何面對教學評鑑？

再優秀的教師都會遇到不公平的文字

開課年度	課號	課程識別碼	班次	課名	學分	全半年	授課教師	時間教室	修課人數	教學平台	成績統計分析
103-1	BST8001	B22 D1050		進階生化探索							
103-1	BST7010	B22 M1010	04	專題研究一							
102-2	Biot8004	642 D0050		免疫學技術-抗體工具							
102-2	BST7011	B22 M1020	04	專題研究二							
102-1	BST8001	B22 D1050		進階生化探索							
102-1	BST7010	B22 M1010	04	專題研究一							
101-2	Biot8004	642 D0050		免疫學技術-抗體工具							
101-2	BST4007	B02 41020	19	專題研究二							
101-2	BST7011	B22 M1020	04	專題研究二							
101-1	BST4006	B02 41010	19	專題研究一							
101-1	BST7010	B22 M1010	04	專題研究一							
100-2	md&ph5043	420 U1610		蛋白質體學之醫藥應用							
100-2	AM5019	543 U6970		實驗室晶片導論							
100-2	Biot8004	642 D0050		免疫學技術-抗體工具							
100-2	BST3018	B02 11040		細胞、分子與人類							
100-2	BST8001	B22 D1050		進階生化探索							
100-2	BST8006	B22 D1080		生技博士論文精研三							
100-2	BST8007	B22 D1090		生技博士論文精研四							
100-2	BST7011	B22 M1020	04	專題研究二							
100-1	AM7156	543 M6400		實驗室晶片專題設計							
100-1	BST3017	B02 11030		細胞、分子與生命							
100-1	BST3017	B02 11030	01	細胞、分子與生命							

● 開課年度： 1002

● 課 名： 細胞、分子與人類

● 課號/班次： BST3018 /

● 授課教師： 莊榮輝

個人期末文字意見內容

(1) 非常感謝老師提供這麼精彩的教學內容，在過程中，老師總能一針見血地講出我們所遭遇的問題，同理我們的處境，更進一步地勉勵我們發揮個人價值，這是在豐富的知識傳授之外，我所得到的最大收穫~

(2) 很充實

(3) 我覺得老師在成績上過於嚴格明明我認為自己在報告與期中考上都有寫到應該要寫的東西但卻都只有得到普通的分數我都有寫信問助教自己哪裡寫不好助教都跟我說我都有把該寫到的寫到但是他們認為我不夠深入我覺得成績的標準過於嚴苛我都已經把老師投影片的東西消化填答於期中考上助教竟然還覺得我不夠深入這只是一門通識課沒有必要因為成績而讓學生失去興趣吧

(4) 教授非常風趣，讓生物學更顯平易近人，而且意圖讓我們能夠將生物學結合其他領域的知識，或是融合自己的經驗，對於我們應用課堂上的知識以及獨立思考的能力增進皆有極大效用。

(5) 這門課讓我首度改變對於生物學的看法，讓我覺得原來生物學是這麼活潑的，更讓我從生命的自然現象去思考很多關於生命以及生活的態度，老師的授課方式讓我獲益良多之餘也對生物學有了興趣，是一堂很棒的課。

(6) 老師利用多元的教法來讓我們理解專業名詞 從淺漸漸深入 還有影片清楚說明並調劑 老師上課幽默 並提供自己的經歷給我們參考和勉勵 讓人覺得很感動!

(7) 謝謝

(8) 老師很認真教學!! 謝謝

(9) 上了快一年的課，很喜歡老師！覺得老師人很好，課程內容也很有趣。

(10) 老師很用心,但希望評分上能再好一點(通識課似乎普遍稍微甜一點)感覺期中準備的滿認真的,寫出來自己覺得也不差,但拿到的等第不太理想除此之外老師很棒喔)

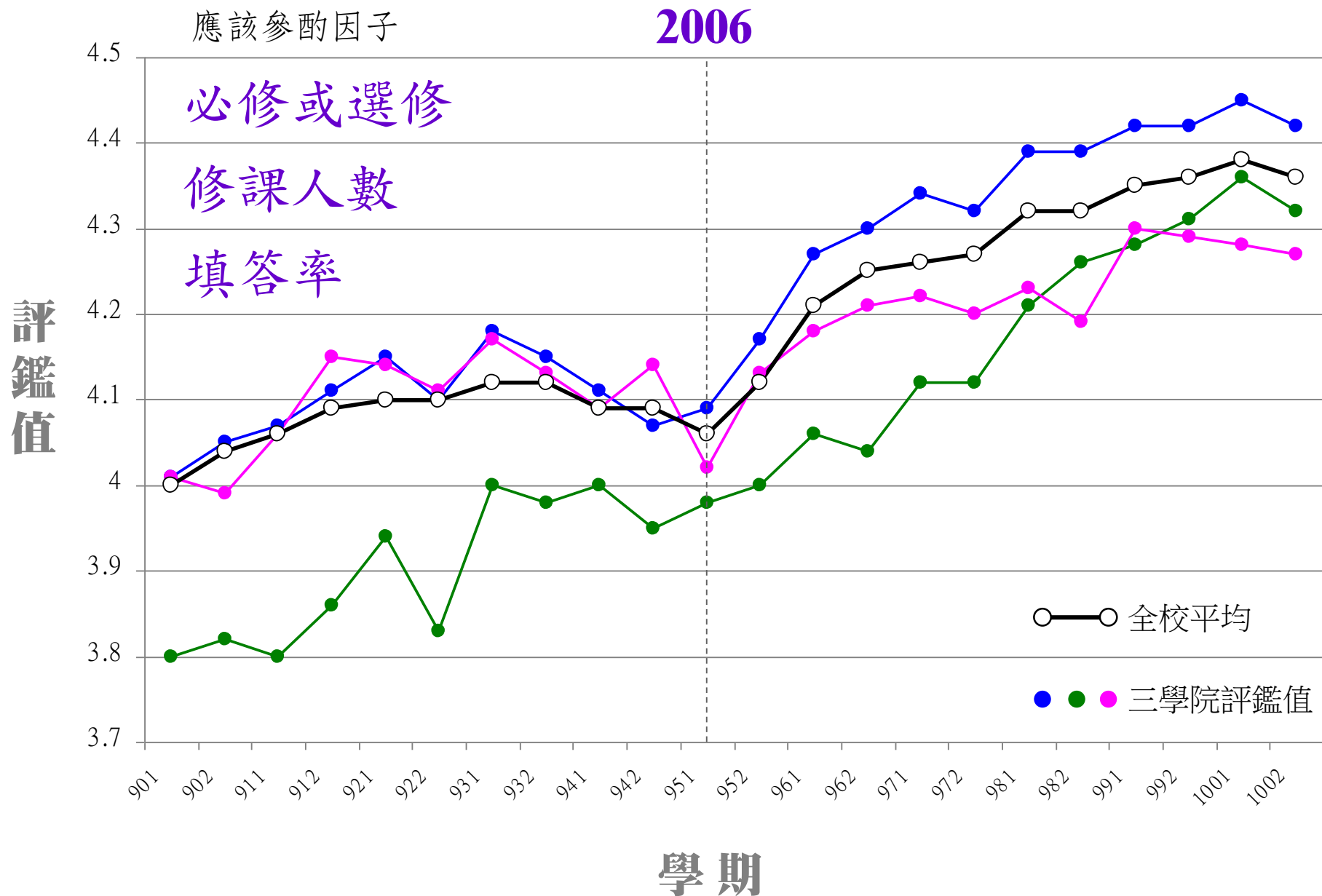
(11) 老師的兩堂課我都上過了，真的有助於去反思我們的人生及生活中的事物。很謝謝老師給我的知識及思考能力。

(12) 用具有一般性，通同性的方式，來講解生物體以及其相關的生命行為，並鼓勵大家用自身的想法去解是生命現象，非常具有啟發性的方式。

(13) 老師有時後講課的時候有點卡卡的，其他都很好。

(14) 老師補充的影片真的令我從嶄新的角度觀看生物界和自己的生命

- (0) 教學調查結果只是個人意見，並非普遍事實。
- (1) 學生難免有不中聽的極端文字，要冷靜面對。
- (2) 雖然負面意見易受注意，更要珍視正面意見。
- (3) 若類似的文字意見再三出現，就要慎重反省。
- (4) 看到負評文字令人氣餒，但可視為精進動力。
- (5) 可在學期授課的過程中，多與學生溝通意見。
- (6) 填答率之高低顯示學生對這門課的在乎程度。
- (7) 評鑑值在全校平均值上下，表現就算很優秀。
- (8) 努力備課並在課堂上熱忱講授，多可獲認同。
- (9) 若無法解讀或承受，可尋求資深教師之協助。



多元參採

巨觀數據

長期觀察

定期檢討

務必用心經營 教學歷程檔案

Finish



面對實相

在聘書上大學教師的任務是：教學、研究、服務

- (1) 要全面兼顧教學、研究與服務幾乎是不可能。
- (2) 需站穩研究表現，才能追求其他兩塊之卓越。
- (3) 教學必須及早耕耘，一開始沒教好就難挽回。
- (4) 教學成果將回饋到研究，許多工作要靠團隊。
- (5) 剛開始不必追求高點數論文，但一定要發表。
- (6) 除科學成果報告外，校內有很多啟發性演講。
- (7) 找個與自己興趣相投的服務工作，利人利己。
- (8) 人才絕對是所有問題最終因素，資源是其次。
- (9) 對個人而言時間規劃與樂觀反思能力最重要。



教學、研究 = ？

呼吸 & 心跳

如實面對！

可申請教育部「教學實踐研究計畫」並發表教學論文

人才是邁向頂尖的唯一關鍵

Human resource is critical to achieve the university excellence



以教育彩繪臺灣的未來

Education brings Taiwan a colorful future