

中國文化大學教師教學創新暨教材研發獎勵成果報告書

壹、計畫名稱: 論使用語料庫與字典之線上檢索資源培養學生之學術英文寫作以及自主學習能力

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參、前言:

詞彙學習是一個相當複雜以及多面向的發展(Kim, Crossley, & Kyle, 2018), 由於詞彙學習有三面向(Nation, 2001)- word meaning (詞彙意思), word form (詞彙形式) 以及word use(詞彙使用)(圖表1) 因此「認識詞彙」必須就三個面向分別做理解。然而學者指出, 詞彙教學當中, 詞彙用法教學與另外兩個面向同等重要, 卻常常被許多老師忽略 (Lewis,2000)。許多實證研究曾經檢視字典運用於詞彙以及寫作方面的學習, 也發現其帶來的學習效果(Godwin-Jones, 2018)。近年來, 由於大數據(big data)在技術上變的可能, 也成為許多學習領域重要的學習方式, 許多學者開始提倡使用語料庫學習詞彙以及寫作。

本計畫針對英文作文三的學生如何運用語料庫以及字典, 學習寫作四種學術英文寫作的體裁: Synthesis, data commentary, compare and contrast essay 以及summary。藉由培養學生詞彙運用概念以及線上語料庫與線上字典的實務操作, 旨在引領學生發現詞彙運用(word use) 的重要性, 並進一步理解以及實際操作線上字典以及線上語料庫, 進行學術寫作的自我糾錯(self error correction), 寫作字串與寫作概念的發掘(hunt for language patterns and content ideas), 以及線上資源之自主使用(autonomous use)。跟傳統教法最大的差異在於學生擁有自主搜尋詞彙以及自主糾錯的能力, 不需要跟傳統相同, 只等著老師給正確的標準答案, 而是懂得運用線上檢索資源, 進一步訓練自主學習能力。這種學習能力亦可以擴張到其他的學習面向, 對於學生來說有莫大的助益。

肆、計畫特色及具體內容:

本教學實踐研究計畫的研究主題與目的分為三個面向, 詞彙的深度學習, 線上檢索資料庫的運用, 以及學生自主學習的提升。首先, 根據 Nation (2000)指出, 詞彙有三個面向:word form, word meaning, word use。然而英文系的學生學習英文詞彙上面常常有只關注詞彙形式(word form), 例如說詞彙拼法以及詞彙的時態變化以及詞彙意思(word meaning)的問題。在於詞彙意思上, 學生也常常只關注詞彙字面上的意思, 而忽略其他例如說 connotation, figurative meaning 等部分。最重要的, 學生常常會忽略詞彙運用(word use)的部分, 例如說詞彙運用的語境(正式或非正式), 搭配詞彙, 文法結構。也因此學生常常會有認得某個詞彙, 也拚得出來, 但是在將詞彙運用在寫作當中時卻錯誤百出。第二個面向是學生在英文寫作的時候往往不懂得尋求相關資源的協助, 最多做的就是運用字典查詢單字意思, 然而這對於英文寫作的助益卻相當有限。有時候老師雖然有在上課期間介紹其他的線上檢索資源, 但是因為沒有恰當的融入在課堂當中, 教導學生如何有效地查詢資源, 並且讓學生養成一邊寫作一邊查詢資源的習慣, 這些資源就僅止於介紹, 而不會成為學生英文寫作或者是英文學習習慣的一部分

分。最後一個面向是學生自主學習的提升。學生往往將上課老師教導的知識當作唯一的知識來源，卻不懂得使用手邊或者是網路上面相關的資源，讓自己在課餘期間或者是沒有修課的時候依然有進修跟自我檢測的機會。

上述三個面向的問題將由教學方法探究以及革新做為途徑。教學方法的探究以及革新為融入線上檢索語料庫以及字典資源進入英文作文教學，一步一步由教師帶領，從統一答案的線上檢索語料庫以及字典資源搜尋，到最後學生可以一邊寫作一邊操作線上檢索語料庫以及字典查詢需要的詞彙，句構，以及內容靈感，提升英文詞彙以及英文作文教學的品質，讓學生不再只是運用重複的字詞於英文寫作，也不會常常在搭配詞彙以及句構方面，只等著教師給予答案跟糾正，而懂得藉由搜尋自我糾正，跟進一步探索字詞運用跟內容靈感。藉由這個方式，也可以讓學生親手一步一步習得線上檢索語料庫以及字典的能力，懂得更加好好運用相關資源協助自己的字彙學習以及寫作能力。最後更希望藉由培養線上語料庫以及字典檢索成為習慣，讓學生於字彙學習跟英文寫作更有自主學習能力，不用總是等著老師給予答案，而可以隨時隨地自己找到正確答案，或者是自我糾錯。這個自主學習能力更可以帶給學生學習其他面向的影響。讓學生習慣自主學習，自主找資源，而非總是被動等待老師給予答案。

(1) 研究設計說明

<1> 教學目標：

本教學研究計畫針對英文作文三的學生如何運用語料庫以及字典，學習寫作四種學術英文寫作的體裁：Synthesis, data commentary, compare and contrast essay 以及 summary。藉由培養學生詞彙運用概念以及線上語料庫與線上字典的實務操作，旨在引領學生發現詞彙運用(word use)的重要性，並進一步理解以及實際操作線上字典以及線上語料庫，進行學術寫作的自我糾錯(self error correction)，寫作字串與寫作概念的發掘(hunt for language patterns and content ideas)，以及線上資源之自主使用(autonomous use)。

<2> 教學方法：

教學方法在實驗組以及控制組有所異同。控制組跟實驗組教學目標都是四篇學術英文寫作(synthesis, data commentary, compare and contrast essay, summary)的教學，但是控制組採用傳統的學術寫作教學法，而實驗組除了寫作規則之外，其他部分都必須由學生自行檢索線上資源，包含語料庫以及字典，再融入自己的教學。

控制組採用傳統的學術寫作教學法。所有寫作內容，包含寫作架構，個別的學術寫作體裁，範例句構，以及範例詞彙都由教師主動提供規則以及範例。課程內容由包含教師解說教科書內容，運用投影片標誌重點做說明，給予個別這四種學術英文寫作體裁的範例文章，範例句構，範例詞彙使用。學生在寫作的時候可以參考上課所有教材。

實驗組學生除了四篇學術英文寫作體裁由教師解說教科書內容，運用投影片標誌重點的講授之後，學生必須自行運用線上檢索資源，包含語料庫以及字典的搜尋已完成以下任務，包含分析線上檢索的例句找到規則，自我改錯，搜尋以及收集句構與詞彙使用，以及寫作內容靈感。學生的四篇學術英文寫作，除了寫作的體裁由老師經由規則講授的 deductive 演繹方式教學之外，也就是直接告知學生寫作的架構規則之外，其他的句構，詞彙使用，以及內容靈感，學生必須從搜尋字典以及語料庫當中得知，並非由教師提供。

實驗組的教學方式為循序漸進的解說與學生線上資源，包含線上英英字典以及語料庫的實作。首

先，教師帶領三個工作坊，包含詞彙運用(word use)與搭配詞概念培養的工作坊，線上英英字典使用工作坊，以及語料庫使用的工作坊。接下來學生需要撰寫四篇學術英文作文(synthesis, data commentary, comparison essay, u 以及 summary) 並佐以線上字典與語料庫的不同方式的使用。所有的學術英文寫作以及線上資源使用都在上課時間於電腦教室當中完成，學生必須做電腦螢幕的錄影，以作為最後兩周的心得分享之用。教師以及教學助教會巡堂並且給予學生幫助。以下為四篇學術英文寫作的說明，同時適用於控制組與實驗組。實驗組會另外增加線上資源檢索的結合練習說明。

	控制組	實驗組
1. Synthesis	學生兩人一組，訪談三位跟自己系所或者是興趣相關的專業人士關於該職業甘苦談。學生將訪談內容個別寫為自己的一篇 synthesis。教師會提供 reporting verbs 的相關練習，學生寫作時亦可參考。學生可以參考上課資料，但是不可參考任何線上檢索資源	學生兩人一組，訪談三位跟自己系所或者是興趣相關的專業人士關於該職業甘苦談。學生將訪談內容個別寫為自己的一篇 synthesis。作文中需要放入課堂全班一起檢索的十個 reporting verbs (報告動詞)中至少六個。
2. Data commentary	學生拿到六個折線圖，運用教師提供的 change-of-state verbs 改變狀態動詞，描寫折線圖。教師會提供 change-of-state verbs 改變狀態動詞相關練習。學生可以參考上課資料，但是不可參考任何線上檢索資源	學生拿到六個折線圖，運用教師提供的 change-of-state verbs 改變狀態動詞，描寫折線圖。教師說明 data commentary 此文體之後，學生運用教師提供的 change-of-state verbs 改變狀態動詞寫出 data commentary。交還給老師後，老師會標出十個錯誤，請同學做線上語料庫及字典的搜尋自我修改。
3. Compare and contrast essay	學生撰寫主題 “Students Who Work and Unemployed Students” 並比較兩者不同。教師會提供相關範例文章，詞彙，概念，以及句構供參考。學生可以參考上課資料，但是不可參考任何線上檢索資源	學生撰寫主題 “Students Who Work and Unemployed Students” 並比較兩者不同。學生在寫作之前，必須搜尋字典以及語料庫，收集想要放進去文章裡面的「詞彙句構」以及「內容靈感」。經過三次課堂中的搜尋跟收集，學生要將至少十個搜尋到的融入在自己的文章。
4. Summary	學生撰寫一篇文章 Social Innovations 的 summary。期間不	學生撰寫一篇文章 Social Innovations 的 summary。寫作期

	可參考任何線上檢索資源	間，同學必須一邊寫作一邊查詢字典以及語料庫，每次的寫作必須至少查詢做線上資料檢索六個不同的項目，並融入於自己的 summary 寫作當中。
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<3> 實驗組以及控制組詳細各周課程進度如下表

Week	實驗組	控制組
1	介紹課程大綱與課程進度	介紹課程大綱與課程進度
2	詞彙使用(word use) 以及搭配詞介紹工作坊: 告知學生 word form, word meaning 以及 word use 的不同, 介紹搭配詞並做相關練習)	詞彙使用(word use) 以及搭配詞介紹工作坊: 告知學生 word form, word meaning 以及 word use 的不同, 介紹搭配詞並做相關練習)
3	字典使用工作坊: 學生學習運用英英字典搜尋詞彙三面向的能力, 並且運用字典檢索搜尋詞彙的三面向資訊(以 <i>interrogate</i> , <i>permeate</i> , <i>surrogate</i> 為例)。	教師帶領詞彙三面項活動: 延續討論詞彙三面向。教師給學生容易搞錯的多義詞跟近義詞範例, 並做相關配對練習(以 <i>interrogate</i> , <i>permeate</i> , <i>surrogate</i> 為例)
4-5	語料庫使用工作坊: 教導學生使用並且實際操作語料庫。特別深入去理解如何使用語料庫找尋搭配詞彙以及句構資訊(以 <i>compare</i> , <i>comparison</i> , <i>comparing</i> 為例)	教師帶領搭配詞以及句構活動: 教師帶領學生討論容易搞錯的搭配詞彙以及容易寫錯的句構 (以 <i>compare</i> , <i>comparison</i> , <i>comparing</i> 為例)
6	Synthesis 寫作預備: 學生在老師解釋 synthesis 的寫作架構之後, 進行 Synthesis 寫作預備: 報告詞彙(reporting verbs)之詞彙使用(word use)。 學生在教師引導下, 運用語料庫及線上字典搜尋十個報告詞彙(reporting verbs) 詞彙之搭配詞, connotation, 及句構資訊。	Synthesis 寫作預備: 學生在老師解釋 synthesis 的寫作架構之後, 老師並會進一步給予 synthesis 的範例句構, 範例詞彙, 以及範例文章。
7	Synthesis 寫作: 學生將拿到教師發下的十個報告詞彙的學習單, 挑選八個寫入自己的 synthesis 作文。	Synthesis 寫作: 學生可以參考教師給予的範例文章以及範例句構跟詞彙寫作 synthesis。唯學生不得抄襲參考資料。也不能使用任何的線上檢索資源。
8	Data Commentary 寫作:	Data Commentary 寫作預備:

	<p>學生寫作 data commentary 體裁，並融入至少十個教師給予的列表中的改變狀態動詞(Change-of-state verbs)。教師講解 data commentary 體裁並介紹改變狀態動詞 (Change-of-state verbs) 以及相關練習後，學生即開始寫作 Data Commentary。課程結束後教師收回學生作文，並標注個別學生文章中至少十個詞彙文法錯誤(改變狀態動詞為主，其他錯誤為輔)以作為下次練習之用。</p>	<p>教師講解 data commentary 體裁並帶領相關活動，給予相關範例討論</p>
9	<p>Data Commentary 寫作 & 自我改正錯誤： 學生懂得依照教師在他們文章標注詞彙文法錯誤於檢索資源，包含字典以及語料庫找尋到正確答案並且自我更正錯誤。</p>	<p>Data Commentary 寫作預備： 教師講 change of state verbs(e. g., <i>reduce, proliferate</i>) 並帶領相關活動，要求學生做 change of state verbs 字彙的配對練習。</p>
10	<p>Data Commentary 寫作 & 自我改正錯誤： 延續第九周，學生並且於課堂必須完成 data commentary 的 re-write。</p>	<p>Data Commentary 寫作： 學生可以參考教師給予的範例文章以及範例句構跟詞彙寫作 Data Commentary。唯學生不得抄襲參考資料。也不能使用任何的線上檢索資源。</p>
11	<p>Compare and Contrast Essay 寫作預備(1): pattern hunting 1 講解完 compare and contrast 的寫作架構之後，學生搜尋字典以及語料庫收集想要放進去文章裡面的「詞彙句構」以及「內容靈感」。第一次先依造教師給予的六個關鍵詞作為搜尋起點 (student, life, employment, career, recreation, occupation)。每一個關鍵詞，學生必須找到三種句構(形容詞+名詞，動詞+名詞，名詞+動詞) 個別三個搭配詞，及任何其他靈感至少三個。每個搭配詞彙必須附上至少三句語料庫或字典例句。</p>	<p>Compare and Contrast Essay 寫作預備(1): 教師講解 compare and contrast 的寫作架構，並參考幾篇相關文章分析寫作架構。</p>

12	Compare and Contrast Essay 寫作預備(2): pattern hunting 2 學生懂得如何「自行」找到想要的搭配詞彙，句構，以及內容靈感，並懂得在語料庫自行下正確的關鍵詞找到想要的答案。學生可以搜尋字典以及語料庫收集任何自己想要的搭配詞彙，句構，以及內容靈感。每一個項目都必須附上至少三句語料庫或者是字典例句。至少需找到五個項目。	Compare and Contrast Essay 寫作預備(2): 教師給予學生針對 compare and contrast essay 的範例句構以及範例詞彙運用的練習。
13	Compare and Contrast Essay 寫作預備(3): pattern hunting 3 同十二周。	Compare and Contrast Essay 寫作預備(3): 學生構思 compare and contrast 的 outline 跟先自己寫下想要置入寫作的句構及詞彙。
14	Compare and Contrast Essay 寫作: 學生將由第十二周到第十四周收集到的至少十個搜尋到的搭配詞彙，句構，以及內容靈感融入在自己的文章當中。學生會特別被提醒不要發生抄襲字典或語料庫例句的問題。	Compare and Contrast Essay 寫作: 學生可以參考教師給予的範例文章以及範例句構跟詞彙寫作 compare and contrast essay。唯學生不得抄襲參考資料。但也不能使用任何的線上檢索資源。
15	Summary Writing 1: 教師講解完 summary writing 的寫作基本原則之後，學生練習寫作 summary writing，同時，學生在教師的巡視及給予幫助之下，檢索字典以及語料庫搜尋想要的答案，隨時融入於寫作當中。	Summary writing 1: 教師講解完 summary writing 的寫作基本原則之後，學生在課堂上面練習寫作 summary writing。期間不能使用任何的線上檢索資源。
16	Summary Writing 2: 延續第十五周，完成 summary writing。學生回家必須完成一份跟學術寫作以及線上檢索資源的問卷，並準備下一周上台報告。	Summary Writing 2: 延續第十五周，完成 summary writing
17	學術寫作與檢索資源的報告 1: 教師統整學生的問卷答案跟同學報告。並請同學上台報告分享四篇寫作以及線上資源運用心得。	學術寫作報告 1: 同學上台報告四篇寫作在作文架構，句構，詞彙學習的心得。
18	學術寫作與檢索資源的報告 2:	學術寫作報告 2:

延續第十八周。	同學上台報告四篇寫作在作文架構，句構，詞彙學習的心得。
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(2) 研究步驟說明

A. 研究架構

本研究採用兩個大三作文班一個學期的課程當作實驗組以及控制組的比較。實驗組採用以上說明設計的，學生在由教師解說教科書內容，運用投影片標誌重點的簡短教學之後，在教師的幫忙之下，運用線上檢索資源，包含語料庫以及字典的搜尋，同時完成英文學術寫作四篇。實驗組的重點是學生必須自行搜尋包含語料庫以及字典等線上資源做下列事項：分析線上檢索的例句，自我改錯，搜尋以及收集句構與詞彙使用，以及靈感。除了寫作的體裁由老師經由 deductive 的方式教學，也就是直接告知學寫作的架構規則之外，其他的句構，詞彙使用，以及內容靈感，學生必須從搜尋字典以及語料庫當中得知，並非由教師提供。相對地，控制組則採用傳統的學術寫作教學法。所有寫作內容，包含寫作架構，個別的學術寫作體裁，範例句構，以及範例詞彙都由教師主動提供。課程內容由包含教師解說教科書內容，運用投影片標誌重點做說明，給予個別這四種學術英文寫作體裁的範例文章，範例句構，範例詞彙使用。學生在寫作的時候可以參考上課所有教材。

此教學實踐計畫有以下五個研究問題：

- (1) 實驗組跟控制組的學生在四篇學術英文寫作當中的動詞+名詞搭配詞，名詞動詞搭配詞，以及形容詞+名詞搭配詞這三類搭配詞的表現是否有所差異？
- (2) 實驗組的學生對於檢索線上資源，包含語料庫以及字典的態度為何？
- (3) 實驗組的學生如何檢索語料庫資源，完成四篇學術英文的寫作？(於 synthesis 中搜尋報告動詞，於 data commentary 中自我糾錯，於 compare and contrast essay 中收集詞彙句構跟內容靈感，以及在 summary 寫作中邊寫邊運用語料庫)
- (4) 實驗組的學生如何融合字典以及語料庫的使用？
- (5) 實驗組的學生是否研究結束之後的半年之內，依然會在非課堂的時間自行使用字典以及語料庫資源？如何使用？態度與想法為何？

B. 研究範圍

此課程教學於兩個英文系大三英文作文上學期為範圍。學習體裁如下：synthesis writing, data commentary, compare and contrast essay, 以及 summary writing。教學資源使用一人一機的電腦教室以利課堂英文寫作，以及課程討論網以利學生下載數位寫作講義。教材選用有三本相關教材，教師會將相關教材摘錄成為數位寫作講義以及投影片內容：

- (1) Frodesen, J. & Wald, M. (2017). *Exploring Options: Vocabulary and Grammar for Academic Writing*. Ann Arbor: University of Michigan Press
- (2) Swales, J. M., & Feak, C. B. (2012). *Academic Writing for Graduate Students: Essential Tasks and Skills*. University of Michigan Press ELT; 3rd edition.
- (3) Folse, K.S., & Pugh, T. (2015). *Great Writing 5: From Great Essays to Research*.

實驗組則多增加以下線上檢索語料庫以及字典的應用：

- (1) Corpus of Contemporary American English (COCA) <https://corpus.byu.edu/coca/>
- (2) British National Corpus (BNC) <http://www.natcorp.ox.ac.uk/>
- (3) TANGO: <http://candle.fl.nthu.edu.tw/collocation/webform2.aspx>

(4) Longman Dictionary of Contemporary English Online <https://www.ldoceonline.com/>

(5) Oxford Advanced Learner's Dictionary
<https://www.oxfordlearnersdictionaries.com/>

C. 研究對象

本教學實踐計畫的研究對象為文化大學英文系之大三作文學生。大三作文的學生英文程度約略在 A3-B1 之間(歐洲語言學習標準 Common European Framework of Reference for Languages)。大三作文的學生在修習了大一作文(以複習高中文法為主) 以及大二作文(以篇章寫作為主，體裁為 definition paragraph, process paragraph, narrative paragraph 以及 causal relation paragraph) 之後，到了大三作文進階到學術英文寫作(synthesis, data commentary, compare and contrast essay, summary)。文化英文系大三學生的學習特質如下：(1) 依然沿用高中字彙學習的方式，運用詞彙在寫作的時候只注重字意跟拼法，不注重字彙如何運用(例如說字彙意涵，正式非正式場域，搭配詞彙，句構等等)(2) 學生在寫作不懂的使用其他資源輔助，學習習慣被動。學生往往將上課內容當作唯一的知識來源，在寫作的時候只會參考上課的教材，不懂得另外參考其他課外教材 (3) 學生對於輔助寫作的相關資源使用常常僅限於奇摩字典跟 google translate，只在乎迅速確認或者是發現字彙的意思對於字彙的其他面向不懂得做進一步搜尋 (4) 學生的學習常常止於課堂結束。學生回到家之後除了完成課堂作業之外，不會進行任何自己有興趣的，跟專業相關的學習。即使是英文系的學生對於英文有興趣，常常在英文課外資源的使用上，僅限於看歐美影集 (但缺乏相關的語言學習訓練，如參考字幕單字並學習)，或查詢奇摩字典跟 google translate 快速找到字義。

D. 研究方法及工具

研究問題	研究方法及工具	資料處理跟分析
(1) 實驗組跟控制組的學生在四篇學術英文寫作當中的動詞+名詞搭配詞，名詞動詞搭配詞，以及形容詞+名詞搭配詞這三類搭配詞的表現是否有所差異?	將由教師也就是研究者摘錄實驗組跟控制組學生四篇學術英文寫作的這三類搭配詞，並做給分。給分標準參照圖表三	研究者將使用敘述型統計以及 t 檢定中的獨立樣本 t 檢定。

<p>(2) 實驗組的學生對於檢索線上資源，包含語料庫以及字典的態度為何？</p>	<p>(1) 實驗組的學生寫完四篇學術英文寫作之後在學期末填寫一份問卷，調查他們對檢索線上資源的態度(附錄二)。</p> <p>(2) 學生兩人一組上台報告檢索線上資源碰到的困難以及解決方式，上台報告內容必須附上他們檢索資源的錄影片段。</p>	<p>問卷內容有以下主題：</p> <p>(a) 個人資料</p> <p>(b) 線上檢索資源好處</p> <p>(c) 線上檢索的困難</p> <p>(d) 使用字典與語料庫的比較與融合使用</p> <p>(e) 四個學術英文寫作與檢索資源的個別感想</p> <p>每個主題有數題五等級的李克特量表(Likert Scale)問題以及問答題。研究者將作五等級的李克特量表的統計分析及問答題的主題分析，並融合學生上台報告自行挑選的檢索資源錄影片段做對照分析。</p>
<p>(3) 實驗組的學生如何檢索語料庫資源，完成四篇學術英文的寫作？(於 synthesis 中搜尋報告動詞，於 data commentary 中自我糾錯，於 compare and contrast essay 中收集詞彙句構跟內容靈感，在 summary 寫作中邊寫邊運用語料庫)</p>	<p>(1) 研究者將會參考學習者檢索資源的錄影作分析</p> <p>(2) 研究者並挑選十位學生進行 stimulus recall-session interviews (Yoon, 2016a, 2016b)。詢問學生檢索資源的錄影當中的想法跟判斷。</p>	<p>研究者將會綜合分析學生檢索資源的錄影以及訪談結果作分析。</p>
<p>(4) 實驗組的學生如何融合字典以及語料庫的使用？</p>	<p>(1) 研究者將會參考學習者檢索資源的錄影作分析</p> <p>(2) 研究者並挑選十位學生進行 stimulus recall-session interviews (Yoon, 2016a, 2016b)。詢問學生對於融合字典以及語料庫的使用的想法。</p>	<p>研究者將會綜合分析學生檢索資源的錄影以及訪談結果作分析。</p>

<p>(5) 實驗組的學生是否研究結束之後的半年之內，依然會在非課堂的時間自行使用字典以及語料庫資源？如何使用？態度與想法為何？</p>	<p>此教學研究計畫結束之後(英文作文三上學期)的半年之後(英文作文三下學期期末)，研究者將會發給學生填答一份問卷，詢問關於下學期時間學生日否有自行使用字典以及語料庫資源。(下學期的作業教師不會要求學生使用任何線上檢索資源)</p>	<p>問卷內容有以下主題： (a) 線上字典使用 (b) 線上語料庫使用 每個主題有數題五等級的李克特量表(Likert Scale)問題以及問答題。研究者將作五等級的李克特量表的統計分析及問答題的主題分析</p>
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圖表三 Rating Scale

Rating	Description
5	<p><u>Correct collocation & appropriate embedment</u> (The collocation is perfectly correct and it is appropriately embedded in the sentence) e.g., <u>sea level will rise</u></p>
4	<p><u>Correct collocation & you need more information or clarification because they can have multiple interpretation</u> (The collocation is perfectly correct but it can have multiple interpretation because of insufficient elaboration or clarification) e.g., <u>raise people's awareness</u> to solve this severe problem</p>
3	<p><u>Correct collocation & inappropriate embedment</u> (The collocation is perfectly correct but it is inappropriately embedded in the clauses or sentences or it does not provide) e.g., The phenomenon will <u>enlarge the territory</u> of environment crisis</p>
2	<p><u>Incorrect collocation but it is intelligible</u> even though some guessing work may be required.e.g., <u>20% of the land will diminish</u></p>
1	<p><u>Incorrect collocation that it is unintelligible</u> (no idea what the speaker is talking about)e.g., the <u>competition in Taiwan will drop</u></p>

E. 實施程序

周次&內容	實驗組	控制組
Week 1: 課程介紹 & 背景問卷	課程介紹 背景問卷(附錄一)	課程介紹 背景問卷(附錄一)
Week 2-5: 詞彙三面向& 資源檢索訓練 (實驗組)	1. 詞彙三面向以及搭配詞訓練 2. 線上檢索(語料庫及字典)訓練	1. 詞彙三面向以及搭配詞訓練 2. 教師領導的相關練習

Week 6-7: Synthesis	Synthesis 寫作& 語料庫以及字典檢索(螢幕錄影)	學生參考上課教材做 Synthesis 寫作
Week 8-10: Data commentary	Data commentary 寫作& 語料庫以及字典檢索(螢幕錄影)	學生參考上課教材做 data commentary 寫作
Week 11-14: Compare and contrast essay	Compare and contrast 寫作& 語料庫以及字典檢索(螢幕錄影)	學生參考上課教材做 compare and contrast 寫作
Week 15-16: Summary Writing	1. Summary writing 寫作& 語料庫以及字典檢索(螢幕錄影) 2. 發下英文寫作以及語料庫以及字典資源檢索問卷	學生參考上課教材做 summary 寫作
Week 17-18	學生上台報告學術英文寫作以及語料庫以及字典資源檢索心得 (學生須附上自己螢幕錄影片段)	學生上台報告學術英文寫作心得
Week 19-20	十位學生訪談	無
Week 35-36	發下語料庫以及字典資源檢索問卷，理解是否學生在上學習課堂語料庫以及字典資源檢索結束之後，依然延續使用該資源的習慣	無

肆、計畫可行性 (計畫執行可能遇到之困難及解決方案)

伍、預期的成效改善(學生學習成效及課程品質的改善)

(1)預期完成之教學成果:

本教學實踐計畫預期完成的教學成果分為三個部分討論:教材，新課程，以及教學評量。首先教材部分，教師將自行開發的教材，包含三個工作坊(詞彙運用，線上字典運用，語料庫運用)，四種學術寫作講義，以及學術寫作如何與線上檢索結合的教學講義集結成冊出版，並放到網路上成為免費資源共享(open access)，分享給其他對於運用線上檢索於詞彙學習以及學術寫作有興趣的教學者使用。再來，我亦會跟本校申請電腦教室，開設一門線上檢索與學術寫作的課程，針對大三大四的學生，教授如何運用線上語料庫以及字典的使用，增強學術寫作。最後，這門教學實踐計畫亦會產生新的教學評量。在寫作課程當中，除了本來的寫作內容為評分方式之外，我亦將線上搜尋資源的學習單以及問卷列為學習評量之一。這種方式可以讓學生了解寫作是一個「過程」而非只是看到最終的「結果」。而這個過程當中，不只是語言的進步是重要的，學生如何使用線上檢索資源促成這個「語言的進步」亦是被強調的一環。學生可以理解英文的進步不是只有語言是最重要的，如何懂得使用資源，並且自

主的使用資源，也會是學習評量中被重視的一塊。最後，學習者的檔案(learning portfolio) 必須請學生將所有的寫作稿子，以及搜尋資源的學習單跟問卷放入，這也可以促成學習者日後自主運用檢索的時候，可以隨時回來查閱並赴習自己的資源運用的學習檔案，不只是知道「有哪些資源可以用」，「如何用」更可以藉由回溯自己的學習檔案理解「自己怎麼用，曾經怎麼用是對的，怎麼用是需要改正的，以及如何改正」。這個對於學習者可以在課堂結束之後依然自主的使用線上檢索資源必有相當大的助益。

伍、實施成效及影響（量化及質化，且說明是否達到申請時所期之學習目標與預期成效）

學習目標與預期成效良好。在量化的部分，我們發現學生在後測跟延後測的寫作成績都有所進步，並且增強了自主使用語料庫的習慣。在質化的部分，我們發現學生對於語料庫的使用更有信心，也對於自己寫作更有自主審視錯誤的意識。

相關的實施成效，於2019年12月月獲得SSCI 期刊 *LANGUAGE LEARNING & TECHNOLOGY* 的接受信函。這邊將節錄結果：

RESULTS

RQ1: Writing Performance on the Collocation of Change-of-State Verbs over Time

From the seven participants, a total of 93 collocations of change-of-state verbs were identified and rated in the pre-test writing, with 113 in the post-test writing and 102 in the delayed post-test writing. The average word counts in the pre-test, post-test, and delayed post-test writing were 303, 324, and 336 words, respectively. Figure 3 presents an overview of the learners' collocation performance using change-of-state verbs in the three writings (out of the total=5.00). Their performance improved from the pre-test writing in week seven (mean=3.48, sd=1.2) to the post-test writing in week 15 (mean=3.91, sd=1.08) and remained in the delayed post-test writing in week 27 with a slightly higher score (mean= 4.05, sd=1.17).

Repeated-Measures ANOVA was conducted to compare the effect of time on their writing performance. A statistically significant effect of time on the scores after corpus use was found ($F(2, 20) = 5.807, p = 0.017$). The results showed a significant change in the scores of the seven subjects on the three tests ($p=0.017$), which was confirmed by the ¹Eta-square effect size analysis as showing a ²large effect size (partial $\eta^2 = 0.49$). A paired t -test for pairwise comparison showed a statistically significant difference in scores between the pre-test writing and the post-test writing ($p=0.081$) and between the pre-test writing and the delayed post-test writing ($p=.016$), although no statistically significant difference between the post-test writing and the delayed post-test writing ($p=0.24$) was found. These results indicate that the corpus activities

¹ Partial η^2 was used because we wanted to know the percentage of variance in the mean scores of three tests (i.e., pretest, posttest, delayed posttest). Cohen's d was not used as it can only indicate the size of the difference between the mean scores of two tests as a pair (e.g., pretest & posttest, posttest & delayed posttest, pretest & delayed posttest) rather than the percentage of variance in the mean scores of three tests.

² According to Cohen (1988), a partial η^2 value over 0.14 indicates a large effect size.

improved and sustained the learners' collocation use of change-of-state verbs.

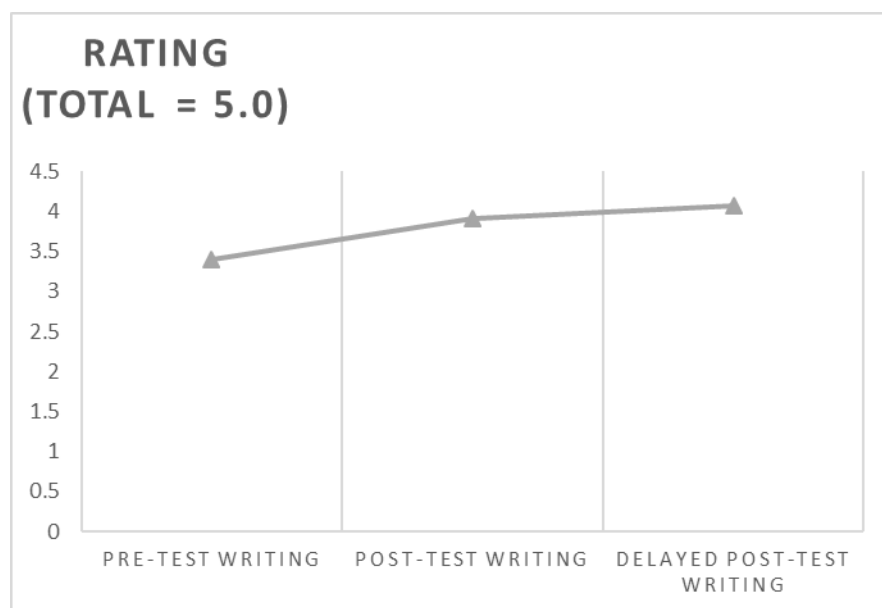


Figure 3. An Overview of Learners' Collocation Performance of Change-of-State Verbs Over Time

RQ2: Learners' Use of Collocation Patterns and Ideas about "Change"

Among all the collocation patterns borrowed into learners' post-test writing (n=105), 54 items (51%) were collocations of change-of-state verbs, and 51 (49%) were collocations with no change-of-state verbs. Two aspects were examined to understand the process: **the type of borrowing** and **the type of usage**.

First, regarding the type of borrowing, single two-word collocation borrowing was the most common (frequency = 71 items, 68%), followed by longer phrase/clause borrowing (24 items, 23%) and longer sentence(s) borrowing (10 items, 9%).

Second, regarding the type of usage incorporated in the post-test writing, I identified three types, in which change-of-state verbs and eight nouns designated in the *pattern-hunting* activity were taken as the node words. **Same usage** refers to the formulaic patterns of node words incorporated into the post-test writing that shared the main collocate (noun when examining change-of-state verbs and verb when investigating eight nouns) with the ones in the pre-test writing, such as *financial economy shrinks* in the post-test writing and *the world economy shrinks* in the pre-test. **New usage** refers to a different main collocate used in the pre-test and post-test writings of the same node words, such as *industry loses benefits* in the post-test writing and *people lose their health* in the pre-test. **Change of transitivity** refers to a collocation pattern of the same node word and main collocates in both writings, but the transitivity was changed, such as *slashes spending* and **spending slashes*.

Among 105 borrowed items that appeared in the post-test writing, 84 items also showed up in the pre-test writing. Of those 84 items, more than half (57 items, 54%) of the patterns were new usages, compared to 23% (24 items) that were the same usages that appeared in their pre-test writing. Only 3% (three items) of the change involved a change of transitivity.

RQ3: Learners' Behaviors and Perceptions in the *Pattern Hunting* and *Pattern Refining* process

In examining learners' behaviors and perceptions in the pattern hunting and pattern refining process, three dimensions emerged as the most significant: **learners' type of borrowed patterns**, **learners' purposes of borrowed patterns** and **learners' difficulty in borrowing patterns**

1. Learners' type of borrowed patterns

First, learners differed in the type of pattern borrowed, contingent on their preferences for the novelty of induced patterns, the familiarity of vocabulary constituents, and their efforts to map meaning. Their choice of patterns could be divided into three types: (1) familiar patterns with familiar vocabulary constituents, (2) novel patterns with familiar vocabulary constituents, and (3) novel patterns with unfamiliar vocabulary constituents.

Learners such as Yen and Hao borrowed mainly familiar patterns with familiar vocabulary constituents derived from the pretest and modified through corpus consultation. They paid little attention to new and unfamiliar usages and were suspicious of borrowing new patterns in their essays because “those items beyond my mastery of vocabulary are too risky to use...more errors could be made accordingly” (Hao, final interview). For example, Hao searched the corpus to modify the chunk *accelerate the speed of aging population* in his pre-test writing. He corrected the pattern and changed it to *a rapid aging population* in his post-test writing, which is the pattern he reported knowing but forgetting in the pre-test writing.

Learners such as Wei and Chun preferred finding “novel combinations” of familiar vocabulary constituents, although they also avoided choosing patterns with unfamiliar vocabulary and rarely spent time with other reference resources. For example, Wei elicited the pattern “*undergo a sex change*” in the concordance “*teenager who killed himself when his parents objected to his desire to undergo a sex change*” and incorporated it into the topic of “gay pride” in his post-test writing. He described the unexpected finding as “the excitement of learning something new effortlessly from something old” because he knew the meaning of each constituent of this newly induced pattern.

Three learners, Ting, Yue, and Xin, favored the last type: choosing novel patterns with unfamiliar vocabulary constituents. These learners viewed corpus practice as “a precious learning opportunity” (Xin, final interview) and devoted time to consulting other reference resources to clarify the meanings of patterns. They tended to incorporate unfamiliar patterns with difficult vocabulary into their post-test writing (e.g., *population dwindled* in Table 2) and favored longer clauses or complete concordance lines (e.g., *villages disappear as the value of coastal land skyrocketed* in Table 4).

2. Learners' purposes of borrowed patterns

Additionally, learners also displayed a wide array of **purposes** identified as enhancing collocation accuracy, collocation complexity, and enrichment of content ideas in borrowing collocation patterns when borrowing patterns into writings.

(1) Collocation accuracy

First, all learners expressed positive evaluations of how the corpus helped them to find accurate collocations. Most learners' corpus consultations reflected their high awareness of transitivity and precise collocates, as many learners alternated their observations of “left” or “right” of the searched verb to elicit the use of verbs as transitive or intransitive. Table 1 illustrates how Wei's wrong use of *slash* as an intransitive

verb in the pre-test writing was corrected through corpus consultation, and it remained correct in the delayed post-test writing.

Table 1. *Example of Wei's Correction of Transitivity*

Pre-test writing	The garbage worldwide will dramatically slash ...
Post-test writing	The price plunges with the costs being slashed ...
Delayed post-test writing	To slash their costs , business owner tend to ...

(2) *Collocation complexity*

The learners also stated that the corpus tool informed them of advanced patterns or longer phrases with greater sophistication, as evident in their post-test writing. Table 2 shows how Yue's use of change-of-state verbs to describe *population* improved in both accuracy and complexity after the corpus use, as she not only corrected a wrong usage but also used the advanced change-of-state verbs (*accelerate*, *dwindle*) to collocate with *population*.

Table 2. *Example of Yue's Sentences with "Population"*

Pre-test writing	Corresponding sentences in post-test writing
1. Although the population will slowly reduce ...	1...many animals have diminishing habitat and their population dwindled to 10% .
2... the growing of the population will gradually drop down	2. As the growth of population accelerate on the earth II...

(3) *Enrichment of content ideas*

Some learners found that induced patterns helped them to generate new ideas for writing. Table 3 shows how Chun was inspired to incorporate a new topic about "the Internet" in the post-test writing, after consulting COCA on the use of "gain" and finding concordances about "the hackers," which was evident by her note "I can write about hackers" that she left for herself. She expressed her gratitude by saying, "COCA is like a magic wand which activates my imagination... I have many new thoughts now to be included in my writing" (Chun, first interview).

Table 3. *Example of Chun's Enrichment of Content Ideas*

Pre-test writing	In order to gain more resource and expand their occupation...
Concordance lines and note	The FBI is warning that hackers may try to gain control of a cockpit's navigation system ... (可以寫到 hackers!) (<i>Translation of the note: I can write about hackers!</i>)
Post-test writing	The hackers are like soldiers at that time, hackers may try to gain control of other country by hacking other country's internet system. If one control the internet, the probability he wins the

world will significantly climb.

After their corpus use, the learners also used more precise and advanced language embodying a fuller, more sophisticated description of their life experiences. Table 4 shows the change in Xin's depiction of her hometown. In the pre-test writing, her depiction was micro-oriented, plainly describing her experience of buying bread in a convenience store as an analogy of rising prices and changes in society. In the post-test writing, she elevated her depiction to a macro-oriented, societal level by using newly induced patterns borrowed from concordances, which included “*religious life*” and “*villages disappear*” and “*the value of coastal land skyrocketed*.” She indicated that borrowed patterns made her “feel empowered as a university student” who could write sentences of “higher level of complexity and sophistication” (Xin, first interview).

Table 4. Example of Xin's Enrichment of Content Ideas

Pre-test writing	When she walked into the store, clerks didn't say “hello” to the customer, the warm and love images in Ann's mind toward the convenience store slashed . As she looked the products on the shelf, she couldn't believe what she saw. Compared to the past, the prices skyrocketed because no one wanted to be a farmer in villages .
Concordances	(1) Religious life has passed through far more difficult days than the present (2) He had seen shrimping villages disappear as the value of coastal land skyrocketed .
Post-test writing	Traditional religious life is going not to exist anymore, and the village , which full of versatile villagers and good images, shrinks <u>rapidly</u> . The most depressing truth is that the village disappears as the value of coastal land considerably skyrocketed and they even don't gain any attractions.

While learners unanimously praised corpus use for enhancing their collocation accuracy, their attitudes varied regarding whether the corpus helped with collocation complexity and idea development. Learners such as Xin, Yue, and Ting explored “advanced and unfamiliar patterns” in the corpus to enhance their essays and incorporated complex and advanced patterns (Table 2), new topics inspired by the induced patterns (Table 3), and greater sophistication in depiction (Table 4), but learners such as Yen and Hao mostly consulted the corpus to check the accuracy of old usages in their pre-test writing or their assumptions about collocations.

3. Learners' difficulties in borrowing patterns

Although the learners differed in terms of their preferences for borrowed patterns and their purposes of borrowing patterns varied, their perception of borrowing patterns was similar: borrowing patterns was easy and familiar because of their experiences of incorporating patterns into their essays from a collection of

“good usages” provided by instructors in their English classrooms. Nevertheless, when examining the longer clause(s), sentence(s) or paragraph(s) where borrowed chunks were incorporated into their essays, numerous pitfalls were found.

First, the learners might have induced the patterns correctly, but when they extended the induced collocation patterns into longer and holistic units, the extended collocations were problematic. Example (1) in Table 5 shows that although Wei successfully induced the pattern “*diminish the value*” from (1a), his implementation of the pattern with the extended collocation phrase *diminish “humane” value* in (1b) was incorrect.

Second, the learners failed in “making the patterns their (learners) own” (Kennedy & Miceli, 2017, p. 5) by recontextualizing the corpus concordances in their writings. Several patterns in the post-test writings were borrowed without appropriate adaptation, such as reorienting the pronouns and verb tenses of the borrowed clauses to the sentences they were writing. Example (2b1) in Table 5 shows that the learners failed to change the past tense in the concordances into the future tense that their writing required. Likewise, the learners failed to provide clear pronoun referents when they resituated the addressee of the induced patterns into those suitable for the sentences they wrote, as Example (2b2) shows.

Third, although some longer sentence(s) borrowings were carefully adapted and incorporated into the learners’ essays, some borrowing beyond the sentence level was characterized by inappropriate textual borrowing, including lack of elaboration and plagiarism (Li & Casanave, 2012). Example (3) in Table 5 demonstrates that Xin presented a “laundry list” of items in her writing (3b), with patterns directly copied from the concordances (3a). She did not elaborate on any of the items in her sentences, nor did she provide logical or temporal connectives to explicitly blend the borrowed sentence into the sentence she generated.

Finally, the inappropriate textual borrowing also resulted in another serious issue, plagiarism, which raises ethical concerns. Example 4 in Table 5 illustrates how Xin’s use of the pattern in her sentence (4b) included copying the whole paragraph of the concordance line from the corpus in (4a). Nevertheless, Xin was shocked to learn that her copying of sentences, which she had learned from all her English teachers was a “model of good usage,” was now viewed as misbehavior with serious consequences: “... Plagiarism was copy and paste of others’ assignment...but not modeling on good usages like what I did” (Xin, the final interview).

Table 5. *Examples of Learners’ Difficulties in Incorporating Patterns*

Types of difficulty	Student name	Examples (a) Excerpt(s) of text found, with searched word(s) and patterns used for borrowing in bold (b) Use in student’s post-test writing, with implemented patterns in bold
1. Errors in extended collocation	Wei	(1a) Supporters of the law said the phonies diminish the value of the prestigious awards.

		(1b) Robots diminish humane value
2. Failure to recontextualize the concordances	Yue	(2a1) As of 2012, 82 percent of U.S. households had access to high-speed Internet... (2b1) Third, households had access to high-speed internet , so there's no need to worry about the slow rate. (2a2) Therefore, the social constructivist environment includes activities where students experience their level of understanding and seek assistance to get to the next level. (2b2) Parents love to send their children to schools which can allow them to experience their level of understanding and seek assistance to get to the next level.
3. Insufficient elaboration	Xin	(3a) Psychological needs often include issues of crisis intervention, personal hygiene, mental health, substance abuse, self-esteem, and a lifestyle allowing for safe living. (3b) And, some groups emphasize on the mental health. They deal with issues of crisis intervention, personal hygiene, mental health, substance abuse, self-esteem, and a lifestyle allowing for safe living. Besides, some even notice the severity of the significantly steep population.
4. Plagiarism	Xin	(4a) Many congregations and nongovernmental organizations are at the cutting edge of creative social engagement: developing community projects focused on sustainable agriculture and water quality. (4b) Although the government is noticeably poor at addressing difficulties. Fortunately, many nongovernmental organizations are at the cutting edge of creative social engagement developing community projects focused on sustainable agriculture and water quality.

This study investigated whether the combination of *pattern hunting* and *pattern refining* helped learners to draft their academic writings. Through data triangulation that connected learners' writing performance in three time frames, video files of corpus-use behavior, and learners' perceptions through questionnaires and follow-up interviews, the study provided an in-depth picture of how learners' behaviors and perceptions in *pattern hunting* and *pattern refining*, focused on discovering collocations of change-of-state verbs, was associated with their immediate and sustained improvement in writing. It also shed light on how learners prepared and collected collocation patterns to describe "changes" in this process. The study complements the

findings of Kennedy and Miceli (2017) by addressing their methodological restriction, as they failed to map learners' perceptions, writing performance, and corpus use.

Pattern Refining and Pattern Hunting for Learning Change-of-State Verbs and Other Collocations about “Change”

First, through a rating measurement on change-of-state verbs in writing exercises conducted over three time frames, the statistically significant results of this study demonstrate how *pattern hunting* and *pattern refining* enhanced students' collocation use in academic writing, compared with prior studies that did not include pre-tests for comparison (Geluso and Yamaguchi, 2014; Kennedy and Miceli, 2001, 2010, 2017). The learners in this study differentiated the collocation use of near-synonyms (Laufer & Waldman, 2011) in change-of-state verbs and incorporated correct collocations with a higher level of complexity (Huang, 2014). These findings demonstrate learners' heightened awareness of the “idiom principle” (Sinclair, 1991) and “chunk-aware mentality” (Kennedy and Miceli, 2017, p. 14) in language production.

Second, the learners in this study not only autonomously consulted corpora to draft their writing without having obtained prior feedback (e.g., Cresswell, 2007; Geluso, 2013; Park, 2012; Li, 2017; Yoon, 2008; Yoon & Hirvela, 2004), but by inducing and selecting patterns for possible future use, the learners were also “proactive” by exploiting the corpus to *prepare* and *collect* language patterns and content ideas *prior* to their actual production, as evident in the unusual post-test writing results. For example, 30% of the textual borrowing went beyond “two-word collocation,” and the learners incorporated two times more new usages than old usages, compared with their pre-test writing. This result contrasts with those of prior studies in which learners mostly confirmed assumptions and rarely elicited new usages (e.g., Yoon, 2008).

Thirdly, the learners in this study did not merely copy and paste induced patterns into their writing for language accuracy *per se*; they further “transferred” the patterns originally addressing collocation errors to develop and enrich the ideas in their writings, as evident in Chun's “hackers may try to gain control of other country.” This indicates that the learners not only showed the “observe and borrow chunks” mentality used by effective learners in Kennedy and Miceli's (2017) study; they further transferred chunks to fulfill multiple affordances of corpora and demonstrated an “observe, borrow and transfer chunks” mentality.

Finally, the learners in this study not only improved their collocation use of change-of-state verbs in the immediate post-test writing, but their performance improved slightly in the delayed post-test writing. The improvement reflected the noticing hypothesis of Schmidt (2001), such that the learners' conscious attention to linguistic input enhanced their acquisition of input. In the study, the input from the concordances was enhanced through “noticing” (Flowerdew, 2015), i.e., learners' active attention to recurrent phrases in concordances in the three COCA activities, including conscious comparison of the corpus input and the learners' output (Li, 2017), exploration of the lexical and grammatical environments of collocations (Thomas, 2015), and learners' implementation of induced patterns in their post-test writings. Those practices entailed deep, thoughtful mental processing of language input, which ultimately manifested as “linguistically longer-term benefits of DDL” (Boulton, 2011) through the learners' intake (Schmidt, 2001) of collocation patterns of change-of-state verbs in the delayed post-test writing three months after the treatment.

Learners' Various Uses and Perceptions of the Multiple Affordances of the Corpora

Learners' **type** of borrowed patterns varied significantly, as evident in their various preferences toward

the novelty of induced patterns, the familiarity of vocabulary constituents, and their efforts to map meaning. Moreover, their distinct choices derived from various **purposes** of borrowed patterns: *enhancing collocation accuracy*, *collocation complexity*, and *enrichment of content ideas*, identified as multiple affordances of corpus (Leńko-Szymańska & Boulton, 2015). These results demonstrate not only the learners' autonomy in corpus use but also the new dimensions of individual differences in DDL. First, while learners differed in their correction rates when they implemented induced patterns to self-correct writing errors (e.g., Tono et al., 2014, Wu, 2016), their preferences of the types of patterns borrowed also varied. Furthermore, learners not only differed in their corpus-consultation behavior (e.g., Yoon, 2016) in their individual “reference-resource-using style” (Kennedy & Miceli, 2010), their use of corpora in relation to other reference resources (e.g., Lai & Chen, 2015), and their evaluations of corpus use (e.g., Lee & Swales, 2006), they also displayed diverse perceptions and actualizations of the multiple affordances offered by corpora (Hafner and Candlin, 2007; Yoon, 2016).

Learners' Lack of Awareness of Pitfalls in Borrowing Patterns

Finally, the results illustrate that the learners lacked awareness of some of the pitfalls of borrowing patterns into their essays. Contrary to findings from prior studies (e.g., Geluso & Yamaguchi, 2014; Park, 2012), the learners in this study did not find borrowing patterns difficult because “modeling good usages” from authoritative sources was a familiar literary practice in English classrooms (Li & Casanave, 2012). **Nevertheless, the learners still encountered some difficulties incorporating patterns into their writings, including inappropriate textual borrowing, erroneous extended collocation, no recontextualization of concordances, and plagiarism.** This indicates that they were not fully capable of “authenticating the corpus data” (Mishan, 2004) by making the use of the patterns they induced in *pattern hunting* and *pattern refining* in their own essay writings. The results, which enumerated specific types of pitfalls in borrowing patterns, also shed light on the gap between learners' perceptions and their actual use of a corpus (Wu, 2015). Specifically, learners showed much higher awareness of the difficulty in inducing patterns from a corpus than incorporating

陸、結論

相關的實施結論，於2019年12月月獲得SSCI 期刊 *LANGUAGE LEARNING & TECHNOLOGY* 的接受信函。這邊將節錄結論：

The findings suggest that in the *pattern hunting* and *pattern refining* activities, learners not only autonomously consulted corpora without prior feedback (e.g., Yoon, 2008), they were “proactive” in exploiting corpora to *prepare and collect* language patterns and ideas about “changes” in preparation for writings, although learners differed in their perceptions and actualization of multiple affordances of corpora (Leńko-Szymańska & Boulton, 2015). An examination of the learners' writings revealed that, although they encountered some difficulties in incorporating induced patterns into essays (e.g., Geluso & Yamaguchi, 2014), their collocation use in writing improved in terms of both accuracy (Li, 2017) and complexity (Huang, 2014), which showed their heightened awareness of the “idiom principle” (Sinclair, 1991) and “chunk-aware

mentality” (Kennedy and Miceli, 2017). Specifically, learners differentiated the collocation use of near-synonyms (Laufer & Waldman, 2011) in change-of-state verbs in both the posttest and delayed posttest. This finding provides support for Schmidt’s (2001) theoretical construct of “noticing,” as it indicates that *pattern hunting* and *pattern refining* enhanced learners’ “noticing” of input about collocations of change-of-state verbs from concordances and helped them to “intake” (Schmidt, 2001) it, as the improvement was sustained three months later. These findings, as well as those of prior studies, show that suggestions regarding appropriate learner training and guidance are needed to entail positive learning effects.

The first pedagogical implication of this study echoes Kennedy and Miceli’s (2001, 2010, 2017) warning that *pattern hunting* for content and idea development should not be peripheral to *pattern refining* for linguistic accuracy. In the study, learners’ top concern in correcting linguistic errors drove some of them to explore the corpora only to address linguistic accuracy. Thus, it is suggested that their possible negligence of corpus affordances of enhancing language complexity and content ideas should be preempted. Learners need to be taught and guided to exploit the full array of the multiple affordances of a corpus, including enhancing *linguistic accuracy*, *linguistic complexity*, and *content enrichment*. Secondly, learners should also be encouraged to actively exploit the potential of induced patterns, because induced patterns originally used to address errors could further spark the development of ideas.

Finally, given that scholars have emphasized the importance of learner training in pattern induction (e.g., Han and Shin, 2017), this study further advocates learner guidance for incorporating patterns into writing, such as useful strategies and pitfalls to avoid, as shown in this study. Specifically, for undergraduate non-English majors, even those with intermediate proficiency like the learners in this study, insufficient training in academic writing could result in numerous pitfalls in incorporating induced patterns.

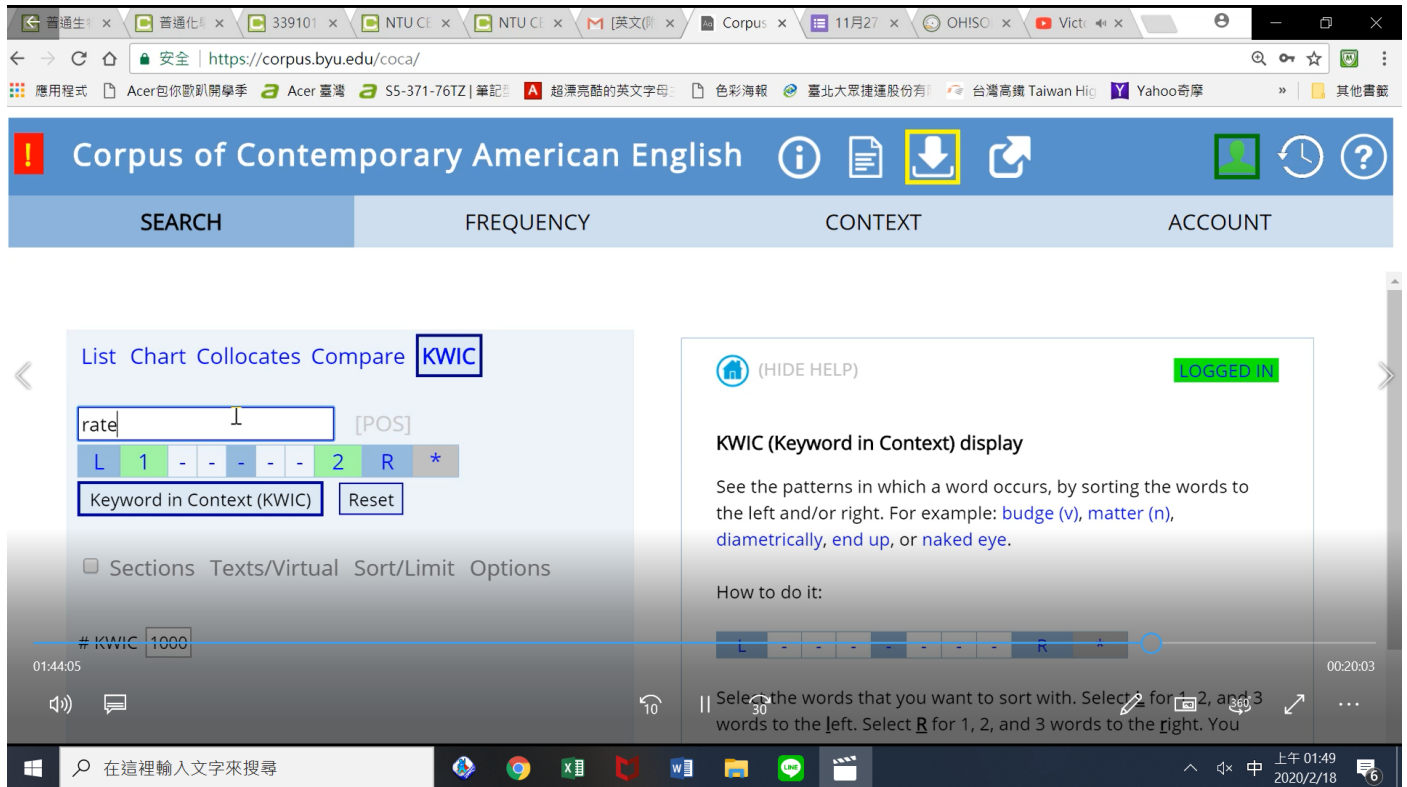
Although the study shed some new light on the under-researched approach of DDL, *pattern hunting* and *pattern refining* (Boulton, 2017), there were **some limitations which lead to** suggestions for future research. First, although the learners demonstrated that they could “prepare and collect” language patterns and content ideas in *pattern hunting* and *pattern refining* activities and ultimately incorporated the patterns into their essays, we do not know if the corpus literacy developed in those activities was transferrable to new tasks. It would be intriguing to investigate whether the same group of participants could apply the skills they learned about consulting a corpus for both language patterns and content ideas in this task to another new writing task with similar writing prompts. Second, since this study focuses on how learners consulted corpora in *pattern hunting* and *pattern refining* activities in the drafting stage of writing, it would be useful for future research to explore the process and learning effects of *pattern hunting* and *pattern refining* activities in different stages of the writing process, such as the revising stage of writing.

柒、執行計畫活動照片

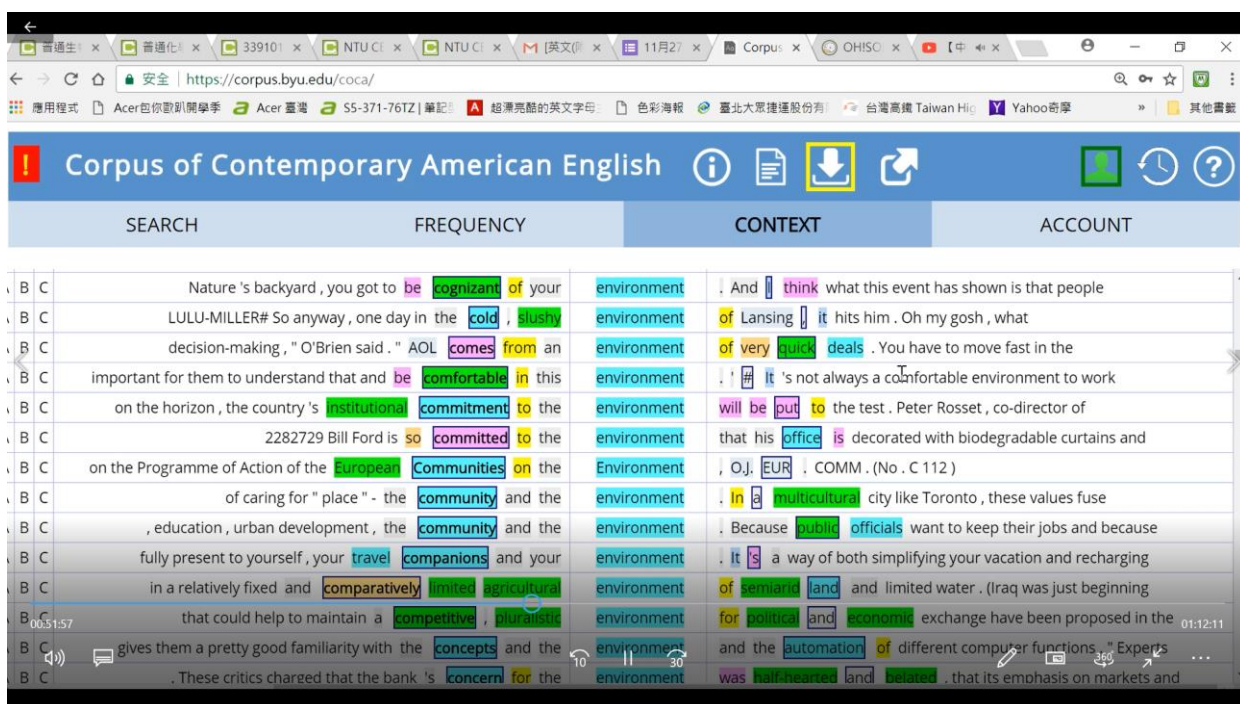
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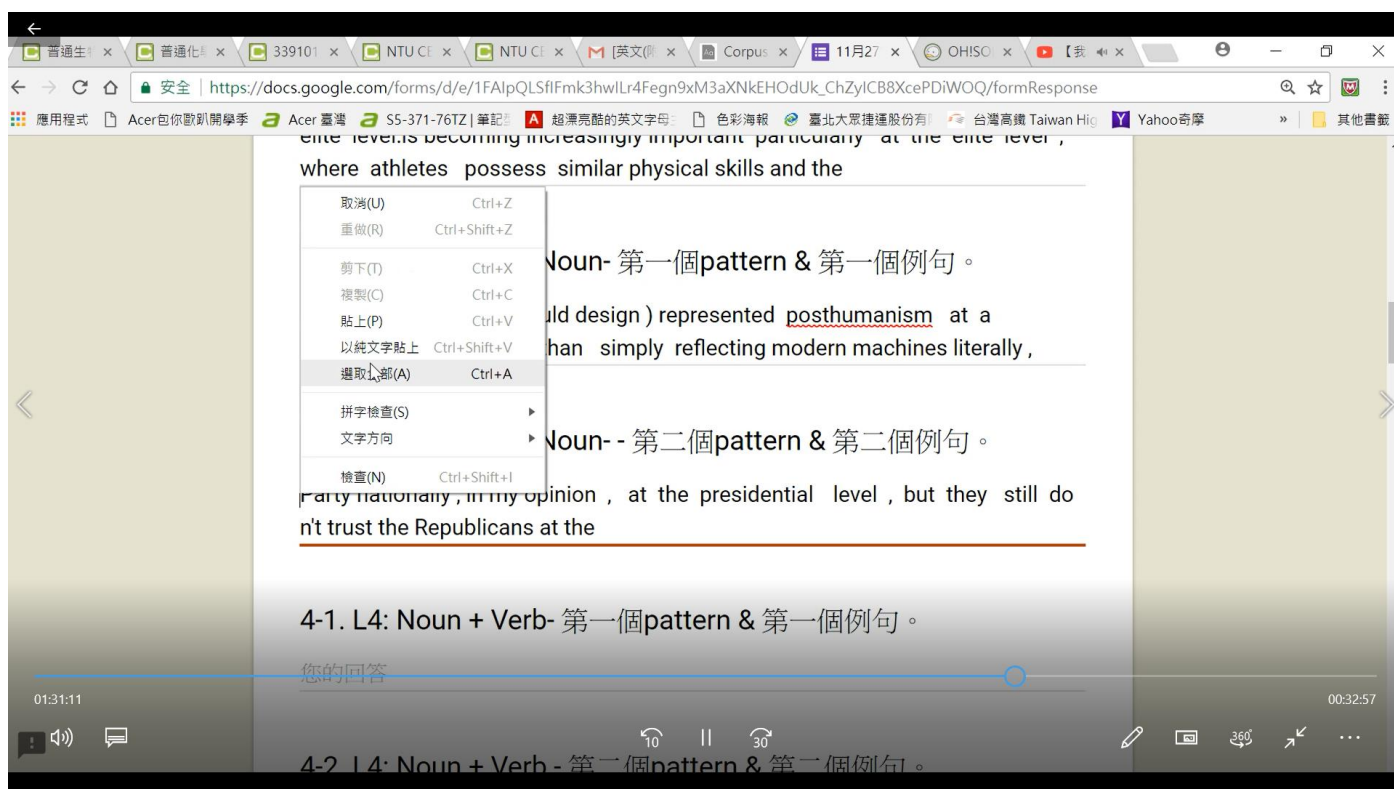
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圖二 語料庫查詢結果畫面



圖三 學生需要填答的語料庫檢索結果表單



捌、附件

此教學研發計畫之SSCI被接受的期刊全文如下:

Discovering Collocations via Data-driven Learning in L2 Writing

Adopting the approaches of *pattern hunting* and *pattern refining* (Kennedy and Miceli, 2001, 2010, 2017), this study investigates how seven freshman English students from Taiwan used the Corpus of Contemporary American English to discover collocation patterns for 30 near-synonymous change-of-state verbs and new ideas about the topic of “change” in the drafting stage of their essay writing. The study used a mixed-methods approach to examine the learning outcomes, learners’ corpus use, and their perceptions of the process, by analyzing writings in three time frames (pre-test, post-test, delayed post-test), video files of corpus consultation, questionnaires, and stimulus recall-session interviews. The results showed that the learners successfully discovered and incorporated collocation patterns in change-of-state verbs and ideas about the topic of change into their essays, although some difficulties emerged. Their performance on change-of-state verbs improved, and this improvement remained three months after the treatment. The study also demonstrated learners’ different perceptions and actualizations of the affordances offered by the corpus.

While all learners used the corpus to correct collocation errors, they had diverse attitudes and uses of the corpus to address content ideas or collocation complexities in their writing. The study concludes by discussing the theoretical and pedagogical implications of the results.

INTRODUCTION

Collocation, which refers to the co-occurrence of word pairs that are more likely to appear together (Sinclair, 1991; Wray, 2002), is an essential component of L2 learners' lexical knowledge. Nevertheless, L2 learners struggle to accurately use collocation in language production because they are unaware of the "idiom principle" (Sinclair, 1991), whereby semi-preconstructed collocations are the building blocks of language. In academic writing, change-of-state verbs are an important element for expressing changes in conditions, reasons, and results (Frodesen & Wald, 2016) in many disciplines (Swales & Feak, 2012). Yet, collocations of change-of-state verbs are challenging for L2 learners because they may not understand the transitivity of verbs (Schleppegrell & Colombi, 2002). Their collocation knowledge of verbs might be insufficient (e.g., Boers, Demecheleer, Coxhead, & Webb, 2014), especially when differentiating the collocational behaviors of near-synonyms (e.g., Chan & Liou, 2005) such as *expand* and *extend*. Lastly, learners' collocation production can be characterized by a restricted repertoire (Durrant and Schmitt, 2009), as learners overuse familiar and underuse less familiar collocations. Corpus-based learning, in which learners consult corpora by themselves, including the use of corpus-based concordance lines (e.g., Daskalovska, 2015) and self-correction in writing (e.g., Tono, Satake & Miura, 2014), has shown to be effective in collocation learning. To address the challenges of using collocations of change-of-state verbs and limited use of collocations and ideas in writing, through triangulation of quantitative and qualitative data, this in-depth study investigated how seven learners used a corpus in *pattern hunting* and *pattern refining* activities (Kennedy and Miceli, 2001, 2010, 2017) to discover collocations in change-of-state verbs and new

ideas about “change” in the drafting stage of their writing on the topic of “changes in the future”; learner behaviors and perceptions in the process were also examined.

Data-Driven Learning

Corpus-based learning, originating in Tim Johns’ argument for “data-driven learning” (hereafter DDL) (Johns, 2002), refers to “any use of language corpora by second or foreign language learners” (Boulton, 2012, p.263). Corpus consultation facilitates constructivist learning (Boulton & Cobb, 2017), which cultivates learner autonomy (Vyatkina & Boulton, 2017) and learning strategies (Han & Shin, 2017), as learners play an active, conscious role in building their own language knowledge (O’Sullivan & Chambers, 2006) by inducing rules from authentic language data (Lin, 2016). Additionally, corpus use has brought learning gains to various aspects of language learning (Boulton & Cobb, 2017; Boulton & Pérez-Paredes, 2014), specifically vocabulary learning (Lee, Warschauer and Lee, 2018) and writing (e.g., Cotos, Link, & Huffman, 2017).

In writing, the autonomous use of corpora refers to learners’ use of corpora to draft or revise their writing without having obtained prior feedback on the writing (e.g., Chang, 2014; Cresswell, 2007; Geluso, 2013; Yoon, 2016; Yoon & Hirvela, 2004). Although learners may find it difficult to incorporate discovered patterns into their writing (e.g., Park, 2012) and formulating questions can be challenging as errors are left “unmarked” (e.g., Geluso, 2013), through the autonomous use of corpora, they become independent learners (Yoon, 2008). Their writing significantly improves, and these improvements can remain months after the treatment (Li, 2017).

Pattern Hunting vs. Pattern Refining

To describe the autonomous use of corpora and emphasize exploration of both language patterns and content ideas, Kennedy and Miceli (2001, 2010, 2017) coined the terms *pattern hunting* and *pattern refining*. *Pattern hunting* refers to the exploration of the corpus via open-ended questions, to find ideas and language patterns that enrich the content and language of a text; *pattern refining* involves searching for language patterns in which learners already know some words of the target patterns, to enhance the lexico-grammatical accuracy of a text (Kennedy and Miceli, 2017, p.3-4).

Kennedy and Miceli (2001, 2010) investigated how Italian learners wrote autobiographies and engaged in *pattern hunting* and *pattern defining* by consulting the Contemporary Written Italian Corpus (CWIC) corpora, a small, monolingual corpus of “Italian autobiographies” developed by the researchers. Their study showed that while observation and reasoning skills were essential, learners’ involvement, use of, and attitude toward *pattern hunting* and *pattern defining* varied due to their own “reference resource-using style” (p. 40, 2010). In a follow-up study, Kennedy and Miceli (2017) demonstrated that learners could successfully develop an “observe-and-borrow chunks’ mentality” (p.3) and become effective corpora users by posing open-ended questions for their data queries and remaining open-minded when observing the data.

Adopting the *pattern-hunting* approach, Geluso and Yamaguchi (2014) examined how 30 lower-intermediate-level Japanese English learners looked for formulaic sequences in the Corpus of Contemporary American English through a *pattern-hunting* activity and how they embedded the patterns in their speech. The results showed a high level of “naturalness” of formulaic sequences embedded in their speech. Learners also positively evaluated the *pattern-hunting* activity but found it challenging to implement

patterns into their speech.

In sum, prior studies have shown that *pattern-hunting* and *pattern-refining* activities enhanced both lexico-grammatical patterns and content ideas in writing and speaking. Nevertheless, several issues have not been investigated. First, although *pattern refining* and *pattern hunting* are identified as a vigorous approach in DDL (Boulton, 2017), their potential has been insufficiently explored given the small number of empirical studies. Second, as there was no rating of the writing products (Kennedy & Miceli, 2001, 2010, 2017) nor of a pre-test included for comparison (Geluso and Yamaguchi, 2014), whether this approach brings statistically significant and enduring learning effects requires further examination. Finally, although *pattern-hunting* and *pattern-refining* approaches advocated searching for linguistic features and content ideas as possibilities of corpora use, how learners differ in their perception and actualization of these affordances is unknown.

This study bridges the gap by investigating how learners consulted a corpus in *pattern hunting* and *pattern refining* activities to discover collocation patterns in change-of-state verbs and ideas about the topic of “change” in the drafting stage of their writing. Specifically, the study investigates two focuses (1) **corpus use**, in particular the process of *pattern hunting* and *pattern refining*, and (2) **language use**, including learners’ performance and improvement of collocation patterns in change-of-state verbs after corpus use, learners’ use of other collocation patterns about “change,” and ideas about the topic of “change.” It is important to note that the two dimensions are highly related and closely intertwined. Examples in language use exemplify learners’ corpus use, and learners’ corpus use provides a bigger picture of **how language use is enhanced** through *pattern hunting* and *pattern refining*. The study also discusses learners’ behaviors and perceptions in the process.

Research Questions

The following research questions were investigated:

1. After the *pattern hunting* and *pattern refining* activities, how do learners perform and improve in using collocation patterns in change-of-state verbs in the drafting stage of essay writing?
2. After the *pattern hunting* and *pattern refining* activities, how do learners change in using collocation patterns and ideas about the topic of “change”?
3. What are learners’ behaviors and perceptions in the process of *pattern hunting* and *pattern refining*?

METHODS

Participants

This study took place in a year-long freshman English class in one university in northern Taiwan. The class met three hours weekly for 18 weeks in a computer-furnished room.

As part of a ³larger study with 35 learners, this study focused on seven participants with very different

³ Wu, Y. J. (2018). *Discovering the Collocation Use of Change of State Verbs through Data-Driven Learning: Students use, performance and attitude*. Unpublished proposal funded by the Ministry of Science and Technology, Taiwan, R.O.C., under Grant No. MOST 107-2410-H-034 -022 -

scopes and focuses. The larger study was a quasi-experimental study with a control group (30 students receiving traditional rule-based instruction without corpora) and an experimental group (35 students receiving corpus-based learning). The larger study aimed at comparing learners' overall writing performance including knowledge, organization, academic style and clarity of essays (Li, 2017) through examining the learner corpus that was built based on the essays of two groups of learners. The current study intends to provide an in-depth understanding of seven learners' corpus use in *pattern hunting* and *pattern refining* activities, use of collocations of change-of-state verbs and ideas about "change" in their writing, and learners' behaviors and perceptions of *pattern hunting* and *pattern refining* through examining learners' interviews, videotapes of corpus consultation behaviors, questionnaires and their essays.

The seven participants were non-native English speakers and spoke Mandarin Chinese as their first language. Before taking part in the study, the students had learned English for 10 years and had similar levels of English proficiency (between B1+ to B2 level in CEFR). The seven learners were placed in the same class as a result of a placement test administered by the university (see Appendix A for participant profiles).

The rationale for using this specific group was as follows: First, interviews with the 35 participants showed that these seven learners were particularly reflective about their corpus-consultation process, which could indicate willing and motivated corpus users (Yoon, 2016). Moreover, scholars have called for qualitative analysis and individual case studies of DDL (Godwin-Jones, 2017), and an investigation of seven participants would provide an in-depth understanding of their *pattern-hunting* and *pattern-refining* processes.

Materials and Instruments

The experimental procedures comprised the following: (1) a pre-test writing, (2) a preparation phase, (3) a treatment phase (COCA activities: *pattern refining*, *pattern hunting*, *your own choice*), (4) a post-test writing, (5) evaluation questionnaires and interviews, and (6) a delayed post-test writing three months after the treatment.

Teaching target

Thirty change-of-state verbs chosen from an academic writing textbook, Frodesen and Wald (2016), were the main teaching target of the study (see Appendix B). These verbs were selected based on the following criteria. First, they had to appear in the *Senior High School 7000 words*⁴list (administered by the Minister of Education in Taiwan for senior high school students) to ensure learners' comprehension of the lexical meaning of the verbs. Second, only words with more than 50% occurrence as verbs in COCA were selected. Finally, to facilitate successful learning through induction from concordance lines in COCA, only verbs that appear with at least 20 collocates, with each collocate including more than 20 concordance lines, were chosen.

Instruments

1. Writings: Pre-test Writing, Post-test Writing, Delayed Post-test Writing

This study adopted a single-group pre-test and post-test design, and three essay writing exercises on the

⁴ Senior High School 7000 words: http://www.ceec.edu.tw/Research/paper_doc/ce37/4.pdf

topic of “changes in the future” were implemented in three time frames (pre-test writing: week 7; post-test writing: week 15; and delayed post-test writing: week 27).

The learners were given 90 minutes to complete the pre-test writing, titled “Fifteen changes in a century,” in week seven, without access to any reference resources (Appendix B outlines the instruction of the writing). For the post-test writing in week 15, learners wrote on the same topic. They were also asked to incorporate at least ten patterns they had collected from the treatment of three corpus activities. Finally, to test whether the effects of the corpus-consultation activities would remain, a delayed post-test writing with a similar topic about changes in the future, titled “Fifteen changes in Asia in two centuries,” was implemented three months after the treatment, using similar writing prompts (week 27). The learners were not allowed to use any reference resources. Throughout the three writings, they could not check their previous essays, to ensure that their writing was original.

For the three essays, the learners had to choose 15 of the 30 change-of-state verbs. To ensure the students’ comprehension of the lexical meaning of the verbs, a Chinese translation obtained from English-Chinese dictionaries was provided. Yet, students were reminded that they should not rely too much on Chinese translations. They were also reminded to provide sufficient elaboration and coherence in their essays, rather than treating the exercise as a practice of “sentence making.”

2. Questionnaires and Interviews

The study administered two questionnaires in Chinese, with 5-point Likert-scaled questions and open-ended requests for further elaboration of the questions (Dörnyei & Taguchi, 2010). The first questionnaire (week 7) asked background questions, including English grades and learning history, technology use in language learning, and understanding of the concept of collocations. The second questionnaire (week 15), administered immediately after their post-test writing, focused on their corpus use and post-test writing and included three dimensions: (1) positive aspect of COCA use, (2) difficulty in COCA use, and (3) incorporating patterns and write-ups.

The first dimension examined the aspects that learners found helpful in COCA use, focusing on their attitudes toward using corpora to explore and collect language patterns and content ideas by investigating words that they anticipated would be useful in their writing (six open-ended questions). The second topic intended to explore the difficulties the learners encountered when inducing and selecting patterns for possible future use (15 5-point Likert-scaled questions). The last topic investigated how learners borrowed patterns and incorporated them into their essays and how they organized their post-test writing (seven open-ended questions) (see Appendix C).

Each participant was interviewed twice. The first semi-structured, follow-up interview with lead questions based on the questionnaire results was initiated right after the completion of the second questionnaire (week 15), to further probe answers from the questionnaire and their writings. The second interview was a stimulated recall session (e.g., Park, 2012; Yoon, 2016) based on a video recording of learners’ corpus consultation and was conducted within one week after the first interview (week 16).

3. Videotape Files of Corpus Consultation and Stimulated Recall Session

The students were required to videotape their corpus-consultation behavior on their computer monitor. Each video clip lasted approximately 80 minutes, and five screen recordings were collected from each

student. The researcher watched the video and made notes about the corpus-consultation process, learners' strategies and pitfalls. This became the source material for the stimulated recall session.

Treatment

In total, four instructional treatments were implemented, including one preparation phase and three phases of COCA activities (*pattern refining*, *pattern hunting*, *your own choice*).

The preparation phase included instruction on change-of-state verbs, dictionary use, awareness raising of collocation and DDL, and a corpus consultation workshop. The Corpus of Contemporary American English (COCA, Davies, 2008)⁵ was chosen as the corpus tool for its large size (containing more than 520 million words and updated biannually) and inclusion of mainly native-speaker data (Chang, 2014). In the corpus consultation workshop, after the search functions of COCA and concordance interpreting skills were introduced, the students were taught to use COCA for *pattern hunting* (obtain content or ideas about “trip”) and *pattern refining* (the students wrote five sentences about their ideal trip and checked COCA for written patterns). The instruction involved teacher demonstration and students' hands-on practice session.

Next, three COCA activities were conducted on searching for patterns that students wanted to include in their post-test writing, starting with a *pattern refining* activity for two weeks (80 minutes per week). For the *pattern-refining* activity (shown in Figure 1), the students provided extended collocations for the target collocations containing change-of-state verbs (e.g., *to 105 degrees* after *temperatures soar*), with analysis of its POS (e.g., n+v+prep+n) and at least three additional collocates of the target change-of-state verb (e.g., *costs*, *spirit*, *stocks* corresponding to *soar*). *Pattern hunting* (80 minutes per week) followed right after and continued for two weeks. The students searched COCA for the eight most-used nouns (*change*, *development*, *problem*, *life*, *population*, *technology*, *environment*, *Internet*) from their pre-test writing and supplied two concordance sentences for each colligation pattern of the target noun (V+N, N+N, ADJ+N, N+V, N1+of+N2), as shown in Figure 2.

In the following week, students engaged in a *your own choice* activity for 80 minutes, the divergent task at the final stage, in which they used corpus consultation to search for whatever they wanted to know for their post-test writing. The induced patterns and concordances from the three COCA activities were reported on a Google Docs template (see Figures 1 and 2 for an example) as the reference for their post-test writing (see Appendix D for the full procedure of the study).

⁵ <https://corpus.byu.edu/coca/>

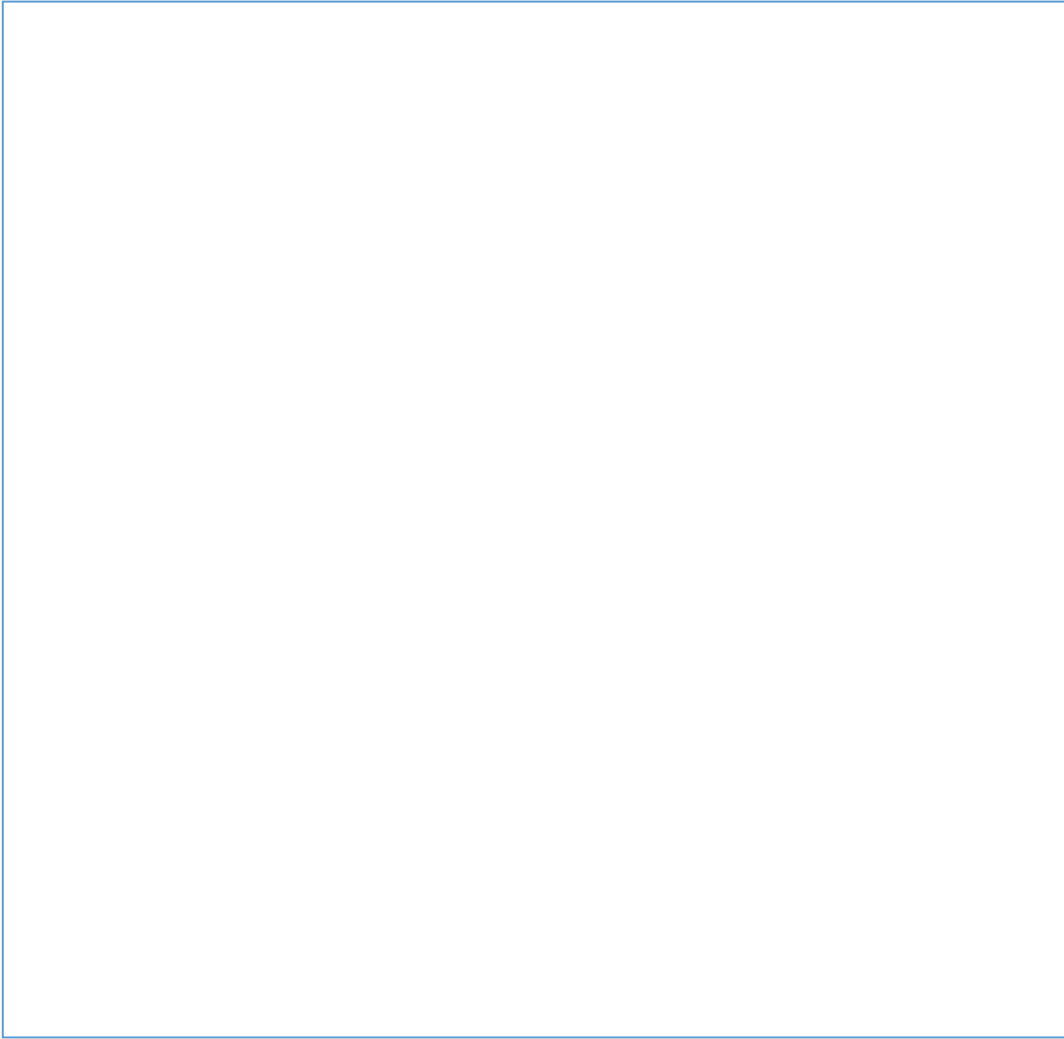


Figure 1. Example of a Student's Notes from Pattern Refining

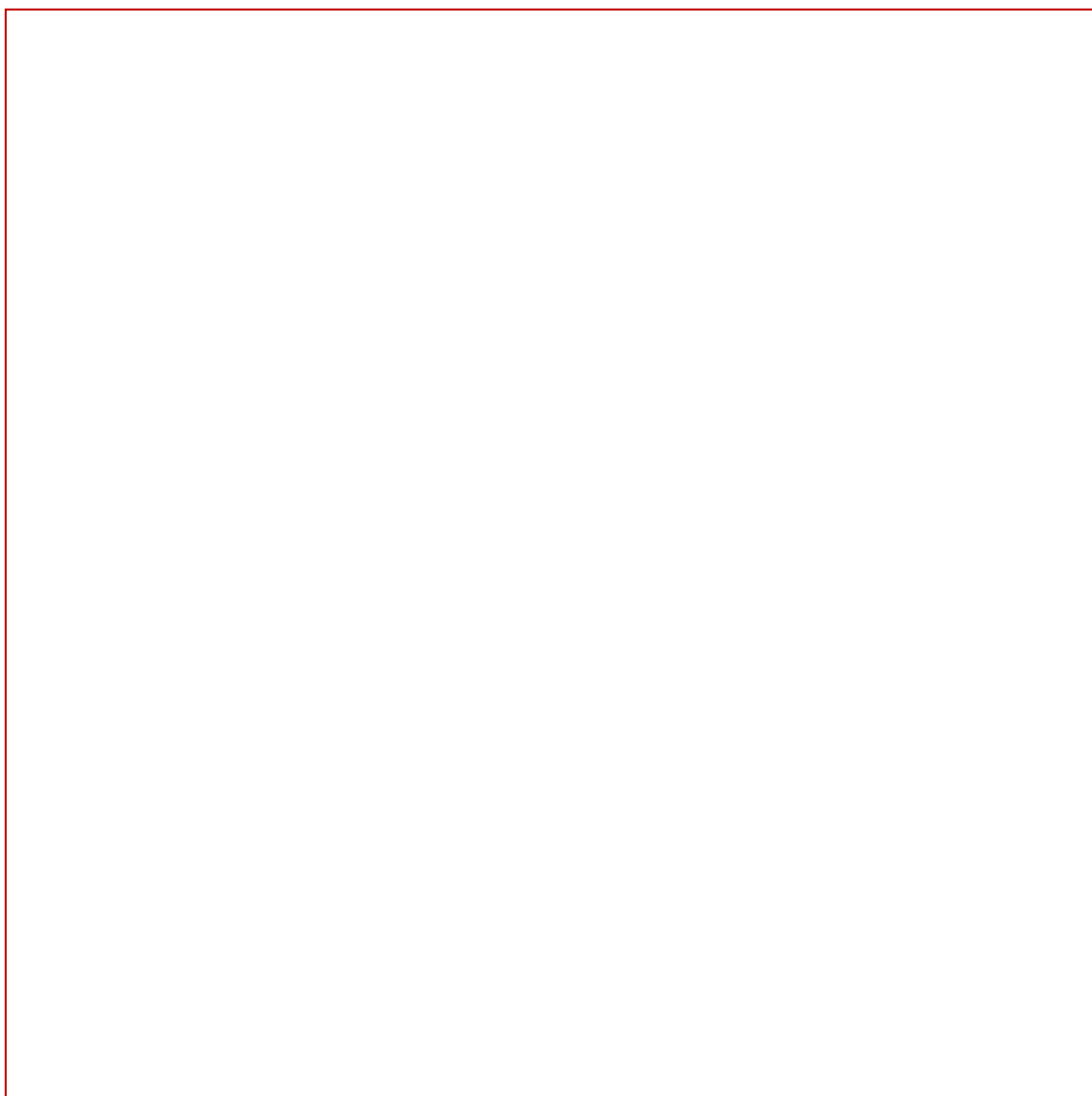


Figure 2. Example of a Student's Notes from Pattern Hunting

Data Analysis

To answer research question one (RQ1) about learners' performance and improvement of collocations in change-of-state verbs before and after the *pattern hunting* and *pattern refining* activities, the scores of the pretest writing, post-test writing and delayed post-test writing were compared to investigate potential differences. The scores were obtained from three native speakers of English who independently rated, on a rating scale of 1–5 (see Appendix E), each borrowed collocation pattern of the change-of-state verbs. The inter-rater reliability reached 0.82. Scores were then analyzed using ANOVA descriptive statistics to determine whether the differences were significant.

To answer RQ2, regarding how learners changed in using collocation patterns and ideas about the topic of “change” in the *pattern hunting* and *pattern refining* process, I examined the learners' three essays and their corpus-consultation notes. Then, I developed two categories: (1) the type of borrowing and (2) the type of usage. Based on each category, I compared the induced patterns incorporated into the learners' posttest essays with the corresponding usages in their pretest essays, determined the relationship between the two

corresponding usages, divided them into several sub-categories identified within each category, and counted the number of the patterns in each sub-category.

For RQ3 regarding learners' behaviors and perceptions of borrowing patterns in the *pattern hunting* and *pattern refining* processes, drawing on previous research (Geluso & Yamaguchi, 2014; Kennedy & Miceli, 2017; O'Sullivan & Chambers, 2006), I examined the transcripts of interviews and checked learners' essays and corpus consultation videos that showed learners' behaviors and perceptions in the *pattern hunting* and *pattern refining* process. Later, I identified three themes that emerged as the most significant: (1) learners' type of borrowed patterns (2) learners' purposes of borrowed patterns and (3) learners' difficulties in borrowing patterns, and completed thematic coding (Dörnyei & Taguchi, 2010). These results were then triangulated with the quantitative results to draw broader conclusions.

RESULTS

RQ1: Writing Performance on the Collocation of Change-of-State Verbs over Time

From the seven participants, a total of 93 collocations of change-of-state verbs were identified and rated in the pre-test writing, with 113 in the post-test writing and 102 in the delayed post-test writing. The average word counts in the pre-test, post-test, and delayed post-test writing were 303, 324, and 336 words, respectively. Figure 3 presents an overview of the learners' collocation performance using change-of-state verbs in the three writings (out of the total=5.00). Their performance improved from the pre-test writing in week seven (mean=3.48, sd=1.2) to the post-test writing in week 15 (mean=3.91, sd=1.08) and remained in the delayed post-test writing in week 27 with a slightly higher score (mean= 4.05, sd=1.17).

Repeated-Measures ANOVA was conducted to compare the effect of time on their writing performance. A statistically significant effect of time on the scores after corpus use was found ($F(2, 20) = 5.807, p = 0.017$). The results showed a significant change in the scores of the seven subjects on the three tests ($p=0.017$), which was confirmed by the ⁶Eta-square effect size analysis as showing a ⁷large effect size (partial $\eta^2 = 0.49$). A paired *t*-test for pairwise comparison showed a statistically significant difference in scores between the pre-test writing and the post-test writing ($p=0.081$) and between the pre-test writing and the delayed post-test writing ($p=.016$), although no statistically significant difference between the post-test writing and the delayed post-test writing ($p=0.24$) was found. These results indicate that the corpus activities improved and sustained the learners' collocation use of change-of-state verbs.

⁶ Partial η^2 was used because we wanted to know the percentage of variance in the mean scores of three tests (i.e., pretest, posttest, delayed posttest). Cohen's *d* was not used as it can only indicate the size of the difference between the mean scores of two tests as a pair (e.g., pretest & posttest, posttest & delayed posttest, pretest & delayed posttest) rather than the percentage of variance in the mean scores of three tests.

⁷ According to Cohen (1988), a partial η^2 value over 0.14 indicates a large effect size.

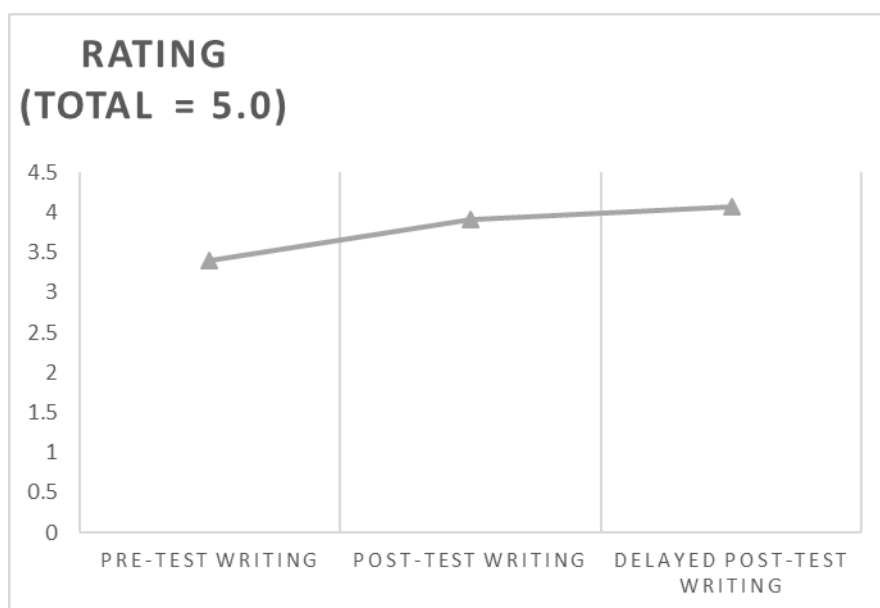


Figure 3. An Overview of Learners' Collocation Performance of Change-of-State Verbs Over Time

RQ2: Learners' Use of Collocation Patterns and Ideas about "Change"

Among all the collocation patterns borrowed into learners' post-test writing (n=105), 54 items (51%) were collocations of change-of-state verbs, and 51 (49%) were collocations with no change-of-state verbs. Two aspects were examined to understand the process: **the type of borrowing** and **the type of usage**.

First, regarding the type of borrowing, single two-word collocation borrowing was the most common (frequency = 71 items, 68%), followed by longer phrase/clause borrowing (24 items, 23%) and longer sentence(s) borrowing (10 items, 9%).

Second, regarding the type of usage incorporated in the post-test writing, I identified three types, in which change-of-state verbs and eight nouns designated in the *pattern-hunting* activity were taken as the node words. **Same usage** refers to the formulaic patterns of node words incorporated into the post-test writing that shared the main collocate (noun when examining change-of-state verbs and verb when investigating eight nouns) with the ones in the pre-test writing, such as *financial economy shrinks* in the post-test writing and *the world economy shrinks* in the pre-test. **New usage** refers to a different main collocate used in the pre-test and post-test writings of the same node words, such as *industry loses benefits* in the post-test writing and *people lose their health* in the pre-test. **Change of transitivity** refers to a collocation pattern of the same node word and main collocates in both writings, but the transitivity was changed, such as *slashes spending* and **spending slashes*.

Among 105 borrowed items that appeared in the post-test writing, 84 items also showed up in the pre-test writing. Of those 84 items, more than half (57 items, 54%) of the patterns were new usages, compared to 23% (24 items) that were the same usages that appeared in their pre-test writing. Only 3% (three items) of the change involved a change of transitivity.

RQ3: Learners' Behaviors and Perceptions in the *Pattern Hunting* and *Pattern Refining* process

In examining learners' behaviors and perceptions in the pattern hunting and pattern refining process, three dimensions emerged as the most significant: **learners' type of borrowed patterns**, **learners'**

purposes of borrowed patterns and learners' difficulty in borrowing patterns

3. Learners' type of borrowed patterns

First, learners differed in the type of pattern borrowed, contingent on their preferences for the novelty of induced patterns, the familiarity of vocabulary constituents, and their efforts to map meaning. Their choice of patterns could be divided into three types: (1) familiar patterns with familiar vocabulary constituents, (2) novel patterns with familiar vocabulary constituents, and (3) novel patterns with unfamiliar vocabulary constituents.

Learners such as Yen and Hao borrowed mainly familiar patterns with familiar vocabulary constituents derived from the pretest and modified through corpus consultation. They paid little attention to new and unfamiliar usages and were suspicious of borrowing new patterns in their essays because “those items beyond my mastery of vocabulary are too risky to use...more errors could be made accordingly” (Hao, final interview). For example, Hao searched the corpus to modify the chunk *accelerate the speed of aging population* in his pre-test writing. He corrected the pattern and changed it to *a rapid aging population* in his post-test writing, which is the pattern he reported knowing but forgetting in the pre-test writing.

Learners such as Wei and Chun preferred finding “novel combinations” of familiar vocabulary constituents, although they also avoided choosing patterns with unfamiliar vocabulary and rarely spent time with other reference resources. For example, Wei elicited the pattern “*undergo a sex change*” in the concordance “*teenager who killed himself when his parents objected to his desire to undergo a sex change*” and incorporated it into the topic of “gay pride” in his post-test writing. He described the unexpected finding as “the excitement of learning something new effortlessly from something old” because he knew the meaning of each constituent of this newly induced pattern.

Three learners, Ting, Yue, and Xin, favored the last type: choosing novel patterns with unfamiliar vocabulary constituents. These learners viewed corpus practice as “a precious learning opportunity” (Xin, final interview) and devoted time to consulting other reference resources to clarify the meanings of patterns. They tended to incorporate unfamiliar patterns with difficult vocabulary into their post-test writing (e.g., *population dwindled* in Table 2) and favored longer clauses or complete concordance lines (e.g., *villages disappear as the value of coastal land skyrocketed* in Table 4).

4. Learners' purposes of borrowed patterns

Additionally, learners also displayed a wide array of **purposes** identified as enhancing collocation accuracy, collocation complexity, and enrichment of content ideas in borrowing collocation patterns when borrowing patterns into writings.

(2) Collocation accuracy

First, all learners expressed positive evaluations of how the corpus helped them to find accurate collocations. Most learners' corpus consultations reflected their high awareness of transitivity and precise collocates, as many learners alternated their observations of “left” or “right” of the searched verb to elicit the use of verbs as transitive or intransitive. Table 1 illustrates how Wei's wrong use of *slash* as an intransitive verb in the pre-test writing was corrected through corpus consultation, and it remained correct in the delayed post-test writing.

Table 1. Example of Wei's Correction of Transitivity

Pre-test writing	The garbage worldwide will dramatically slash ...
Post-test writing	The price plunges with the costs being slashed ...
Delayed post-test writing	To slash their costs , business owner tend to ...

(2) Collocation complexity

The learners also stated that the corpus tool informed them of advanced patterns or longer phrases with greater sophistication, as evident in their post-test writing. Table 2 shows how Yue's use of change-of-state verbs to describe *population* improved in both accuracy and complexity after the corpus use, as she not only corrected a wrong usage but also used the advanced change-of-state verbs (*accelerate*, *dwindle*) to collocate with *population*.

Table 2. Example of Yue's Sentences with "Population"

Pre-test writing	Corresponding sentences in post-test writing
1. Although the population will slowly reduce ...	1...many animals have diminishing habitat and their population dwindled to 10% .
2... the growing of the population will gradually drop down	2. As the growth of population accelerate on the earth II...

(3) Enrichment of content ideas

Some learners found that induced patterns helped them to generate new ideas for writing. Table 3 shows how Chun was inspired to incorporate a new topic about "the Internet" in the post-test writing, after consulting COCA on the use of "gain" and finding concordances about "the hackers," which was evident by her note "I can write about hackers" that she left for herself. She expressed her gratitude by saying, "COCA is like a magic wand which activates my imagination... I have many new thoughts now to be included in my writing" (Chun, first interview).

Table 3. Example of Chun's Enrichment of Content Ideas

Pre-test writing	In order to gain more resource and expand their occupation...
Concordance lines and note	The FBI is warning that hackers may try to gain control of a cockpit's navigation system ... (可以寫到 hackers!) (<i>Translation of the note: I can write about hackers!</i>)
Post-test writing	The hackers are like soldiers at that time, hackers may try to gain control of other country by hacking other country's internet system. If one control the internet, the probability he wins the world will significantly climb.

After their corpus use, the learners also used more precise and advanced language embodying a fuller, more sophisticated description of their life experiences. Table 4 shows the change in Xin’s depiction of her hometown. In the pre-test writing, her depiction was micro-oriented, plainly describing her experience of buying bread in a convenience store as an analogy of rising prices and changes in society. In the post-test writing, she elevated her depiction to a macro-oriented, societal level by using newly induced patterns borrowed from concordances, which included “*religious life*” and “*villages disappear*” and “*the value of coastal land skyrocketed*.” She indicated that borrowed patterns made her “feel empowered as a university student” who could write sentences of “higher level of complexity and sophistication” (Xin, first interview).

Table 4. Example of Xin’s Enrichment of Content Ideas

Pre-test writing	When she walked into the store, clerks didn’t say “hello” to the customer, the warm and love images in Ann’s mind toward the convenience store slashed . As she looked the products on the shelf, she couldn’t believe what she saw. Compared to the past, the prices skyrocketed because no one wanted to be a farmer in villages .
Concordances	(1) Religious life has passed through far more difficult days than the present (2) He had seen shrimping villages disappear as the value of coastal land skyrocketed .
Post-test writing	Traditional religious life is going not to exist anymore, and the village , which full of versatile villagers and good images, shrinks <u>rapidly</u> . The most depressing truth is that the village disappears as the value of coastal land considerably skyrocketed and they even don’t gain any attractions.

While learners unanimously praised corpus use for enhancing their collocation accuracy, their attitudes varied regarding whether the corpus helped with collocation complexity and idea development. Learners such as Xin, Yue, and Ting explored “advanced and unfamiliar patterns” in the corpus to enhance their essays and incorporated complex and advanced patterns (Table 2), new topics inspired by the induced patterns (Table 3), and greater sophistication in depiction (Table 4), but learners such as Yen and Hao mostly consulted the corpus to check the accuracy of old usages in their pre-test writing or their assumptions about collocations.

3. Learners’ difficulties in borrowing patterns

Although the learners differed in terms of their preferences for borrowed patterns and their purposes of borrowing patterns varied, their perception of borrowing patterns was similar: borrowing patterns was easy and familiar because of their experiences of incorporating patterns into their essays from a collection of “good usages” provided by instructors in their English classrooms. Nevertheless, when examining the longer clause(s), sentence(s) or paragraph(s) where borrowed chunks were incorporated into their essays, numerous pitfalls were found.

First, the learners might have induced the patterns correctly, but when they extended the induced collocation patterns into longer and holistic units, the extended collocations were problematic. Example (1) in Table 5 shows that although Wei successfully induced the pattern “*diminish the value*” from (1a), his implementation of the pattern with the extended collocation phrase *diminish “humane” value* in (1b) was incorrect.

Second, the learners failed in “making the patterns their (learners) own” (Kennedy & Miceli, 2017, p. 5) by recontextualizing the corpus concordances in their writings. Several patterns in the post-test writings were borrowed without appropriate adaptation, such as reorienting the pronouns and verb tenses of the borrowed clauses to the sentences they were writing. Example (2b1) in Table 5 shows that the learners failed to change the past tense in the concordances into the future tense that their writing required. Likewise, the learners failed to provide clear pronoun referents when they resituated the addressee of the induced patterns into those suitable for the sentences they wrote, as Example (2b2) shows.

Third, although some longer sentence(s) borrowings were carefully adapted and incorporated into the learners’ essays, some borrowing beyond the sentence level was characterized by inappropriate textual borrowing, including lack of elaboration and plagiarism (Li & Casanave, 2012). Example (3) in Table 5 demonstrates that Xin presented a “laundry list” of items in her writing (3b), with patterns directly copied from the concordances (3a). She did not elaborate on any of the items in her sentences, nor did she provide logical or temporal connectives to explicitly blend the borrowed sentence into the sentence she generated.

Finally, the inappropriate textual borrowing also resulted in another serious issue, plagiarism, which raises ethical concerns. Example 4 in Table 5 illustrates how Xin’s use of the pattern in her sentence (4b) included copying the whole paragraph of the concordance line from the corpus in (4a). Nevertheless, Xin was shocked to learn that her copying of sentences, which she had learned from all her English teachers was a “model of good usage,” was now viewed as misbehavior with serious consequences: “... Plagiarism was copy and paste of others’ assignment...but not modeling on good usages like what I did” (Xin, the final interview).

Table 5. *Examples of Learners’ Difficulties in Incorporating Patterns*

Types of difficulty	Student name	Examples (b) Excerpt(s) of text found, with searched word(s) and patterns used for borrowing in bold (b) Use in student’s post-test writing, with implemented patterns in bold
1. Errors in extended collocation	Wei	(1a) Supporters of the law said the phonies diminish the value of the prestigious awards. (1b) Robots diminish humane value
2. Failure to recontextualize the	Yue	(2a1) As of 2012, 82 percent of U.S. households had access to high-speed Internet...

concordances		<p>(2b1) Third, households had access to high-speed internet, so there's no need to worry about the slow rate.</p> <p>(2a2) Therefore, the social constructivist environment includes activities where students experience their level of understanding and seek assistance to get to the next level.</p> <p>(2b2) Parents love to send their children to schools which can allow them to experience their level of understanding and seek assistance to get to the next level.</p>
5. Insufficient elaboration	Xin	<p>(3a) Psychological needs often include issues of crisis intervention, personal hygiene, mental health, substance abuse, self-esteem, and a lifestyle allowing for safe living.</p> <p>(3b) And, some groups emphasize on the mental health. They deal with issues of crisis intervention, personal hygiene, mental health, substance abuse, self-esteem, and a lifestyle allowing for safe living. Besides, some even notice the severity of the significantly steep population.</p>
6. Plagiarism	Xin	<p>(4a) Many congregations and nongovernmental organizations are at the cutting edge of creative social engagement: developing community projects focused on sustainable agriculture and water quality.</p> <p>(4b) Although the government is noticeably poor at addressing difficulties. Fortunately, many nongovernmental organizations are at the cutting edge of creative social engagement developing community projects focused on sustainable agriculture and water quality.</p>

DISCUSSION

This study investigated whether the combination of *pattern hunting* and *pattern refining* helped learners to draft their academic writings. Through data triangulation that connected learners' writing performance in three time frames, video files of corpus-use behavior, and learners' perceptions through questionnaires and follow-up interviews, the study provided an in-depth picture of how learners' behaviors and perceptions in *pattern hunting* and *pattern refining*, focused on discovering collocations of change-of-state verbs, was associated with their immediate and sustained improvement in writing. It also shed light on how learners prepared and collected collocation patterns to describe "changes" in this process. The study complements the findings of Kennedy and Miceli (2017) by addressing their methodological restriction, as they failed to map learners' perceptions, writing performance, and corpus use.

Pattern Refining and Pattern Hunting for Learning Change-of-State Verbs and Other Collocations about “Change”

First, through a rating measurement on change-of-state verbs in writing exercises conducted over three time frames, the statistically significant results of this study demonstrate how *pattern hunting* and *pattern refining* enhanced students' collocation use in academic writing, compared with prior studies that did not include pre-tests for comparison (Geluso and Yamaguchi, 2014; Kennedy and Miceli, 2001, 2010, 2017). The learners in this study differentiated the collocation use of near-synonyms (Laufer & Waldman, 2011) in change-of-state verbs and incorporated correct collocations with a higher level of complexity (Huang, 2014). These findings demonstrate learners' heightened awareness of the “idiom principle” (Sinclair, 1991) and “chunk-aware mentality” (Kennedy and Miceli, 2017, p. 14) in language production.

Second, the learners in this study not only autonomously consulted corpora to draft their writing without having obtained prior feedback (e.g., Cresswell, 2007; Geluso, 2013; Park, 2012; Li, 2017; Yoon, 2008; Yoon & Hirvela, 2004), but by inducing and selecting patterns for possible future use, the learners were also “proactive” by exploiting the corpus to *prepare* and *collect* language patterns and content ideas *prior* to their actual production, as evident in the unusual post-test writing results. For example, 30% of the textual borrowing went beyond “two-word collocation,” and the learners incorporated two times more new usages than old usages, compared with their pre-test writing. This result contrasts with those of prior studies in which learners mostly confirmed assumptions and rarely elicited new usages (e.g., Yoon, 2008).

Thirdly, the learners in this study did not merely copy and paste induced patterns into their writing for language accuracy *per se*; they further “transferred” the patterns originally addressing collocation errors to develop and enrich the ideas in their writings, as evident in Chun's “hackers may try to gain control of other country.” This indicates that the learners not only showed the “observe and borrow chunks” mentality used by effective learners in Kennedy and Miceli's (2017) study; they further transferred chunks to fulfill multiple affordances of corpora and demonstrated an “observe, borrow and transfer chunks” mentality.

Finally, the learners in this study not only improved their collocation use of change-of-state verbs in the immediate post-test writing, but their performance improved slightly in the delayed post-test writing. The improvement reflected the noticing hypothesis of Schmidt (2001), such that the learners' conscious attention to linguistic input enhanced their acquisition of input. In the study, the input from the concordances was enhanced through “noticing” (Flowerdew, 2015), i.e., learners' active attention to recurrent phrases in concordances in the three COCA activities, including conscious comparison of the corpus input and the learners' output (Li, 2017), exploration of the lexical and grammatical environments of collocations (Thomas, 2015), and learners' implementation of induced patterns in their post-test writings. Those practices entailed deep, thoughtful mental processing of language input, which ultimately manifested as “linguistically longer-term benefits of DDL” (Boulton, 2011) through the learners' intake (Schmidt, 2001) of collocation patterns of change-of-state verbs in the delayed post-test writing three months after the treatment.

Learners' Various Uses and Perceptions of the *Multiple Affordances* of the Corpora

Learners' **type** of borrowed patterns varied significantly, as evident in their various preferences toward the novelty of induced patterns, the familiarity of vocabulary constituents, and their efforts to map meaning. Moreover, their distinct choices derived from various **purposes** of borrowed patterns: *enhancing collocation*

accuracy, collocation complexity, and enrichment of content ideas, identified as multiple affordances of corpus (Leńko-Szymańska & Boulton, 2015). These results demonstrate not only the learners' autonomy in corpus use but also the new dimensions of individual differences in DDL. First, while learners differed in their correction rates when they implemented induced patterns to self-correct writing errors (e.g., Tono et al., 2014, Wu, 2016), their preferences of the types of patterns borrowed also varied. Furthermore, learners not only differed in their corpus-consultation behavior (e.g., Yoon, 2016) in their individual "reference-resource-using style" (Kennedy & Miceli, 2010), their use of corpora in relation to other reference resources (e.g., Lai & Chen, 2015), and their evaluations of corpus use (e.g., Lee & Swales, 2006), they also displayed diverse perceptions and actualizations of the multiple affordances offered by corpora (Hafner and Candlin, 2007; Yoon, 2016).

Learners' Lack of Awareness of Pitfalls in Borrowing Patterns

Finally, the results illustrate that the learners lacked awareness of some of the pitfalls of borrowing patterns into their essays. Contrary to findings from prior studies (e.g., Geluso & Yamaguchi, 2014; Park, 2012), the learners in this study did not find borrowing patterns difficult because "modeling good usages" from authoritative sources was a familiar literary practice in English classrooms (Li & Casanave, 2012). **Nevertheless, the learners still encountered some difficulties incorporating patterns into their writings, including inappropriate textual borrowing, erroneous extended collocation, no recontextualization of concordances, and plagiarism.** This indicates that they were not fully capable of "authenticating the corpus data" (Mishan, 2004) by making the use of the patterns they induced in *pattern hunting* and *pattern refining* in their own essay writings. The results, which enumerated specific types of pitfalls in borrowing patterns, also shed light on the gap between learners' perceptions and their actual use of a corpus (Wu, 2015). Specifically, learners showed much higher awareness of the difficulty in inducing patterns from a corpus than incorporating patterns into their essays, but they encountered more difficulties in the latter.

CONCLUSION

The findings suggest that in the *pattern hunting* and *pattern refining* activities, learners not only autonomously consulted corpora without prior feedback (e.g., Yoon, 2008), they were "proactive" in exploiting corpora to *prepare and collect* language patterns and ideas about "changes" in preparation for writings, although learners differed in their perceptions and actualization of multiple affordances of corpora (Leńko-Szymańska & Boulton, 2015). An examination of the learners' writings revealed that, although they encountered some difficulties in incorporating induced patterns into essays (e.g., Geluso & Yamaguchi, 2014), their collocation use in writing improved in terms of both accuracy (Li, 2017) and complexity (Huang, 2014), which showed their heightened awareness of the "idiom principle" (Sinclair, 1991) and "chunk-aware mentality" (Kennedy and Miceli, 2017). Specifically, learners differentiated the collocation use of near-synonyms (Laufer & Waldman, 2011) in change-of-state verbs in both the posttest and delayed posttest. This finding provides support for Schmidt's (2001) theoretical construct of "noticing," as it indicates that *pattern hunting* and *pattern refining* enhanced learners' "noticing" of input about collocations of change-of-state verbs from concordances and helped them to "intake" (Schmidt, 2001) it, as the improvement was sustained three months later. These findings, as well as those of prior studies, show that suggestions regarding appropriate learner training and guidance are needed to entail positive learning

effects.

The first pedagogical implication of this study echoes Kennedy and Miceli's (2001, 2010, 2017) warning that *pattern hunting* for content and idea development should not be peripheral to *pattern refining* for linguistic accuracy. In the study, learners' top concern in correcting linguistic errors drove some of them to explore the corpora only to address linguistic accuracy. Thus, it is suggested that their possible negligence of corpus affordances of enhancing language complexity and content ideas should be preempted. Learners need to be taught and guided to exploit the full array of the multiple affordances of a corpus, including enhancing *linguistic accuracy*, *linguistic complexity*, and *content enrichment*. Secondly, learners should also be encouraged to actively exploit the potential of induced patterns, because induced patterns originally used to address errors could further spark the development of ideas.

Finally, given that scholars have emphasized the importance of learner training in pattern induction (e.g., Han and Shin, 2017), this study further advocates learner guidance for incorporating patterns into writing, such as useful strategies and pitfalls to avoid, as shown in this study. Specifically, for undergraduate non-English majors, even those with intermediate proficiency like the learners in this study, insufficient training in academic writing could result in numerous pitfalls in incorporating induced patterns.

Although the study shed some new light on the under-researched approach of DDL, *pattern hunting* and *pattern refining* (Boulton, 2017), there were **some limitations which lead to** suggestions for future research. First, although the learners demonstrated that they could “prepare and collect” language patterns and content ideas in *pattern hunting* and *pattern refining* activities and ultimately incorporated the patterns into their essays, we do not know if the corpus literacy developed in those activities was transferrable to new tasks. It would be intriguing to investigate whether the same group of participants could apply the skills they learned about consulting a corpus for both language patterns and content ideas in this task to another new writing task with similar writing prompts. Second, since this study focuses on how learners consulted corpora in *pattern hunting* and *pattern refining* activities in the drafting stage of writing, it would be useful for future research to explore the process and learning effects of *pattern hunting* and *pattern refining* activities in different stages of the writing process, such as the revising stage of writing.

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APPENDICES

APPENDIX A: Participant Profiles

	Yen	Hao	Yue	Xin	Ting	Chun	Wei
Gender	Female	Male	Female	Female	Female	Female	Male
Age	19	20	19	19	18	19	19
Degree pursued field of study	BS, Physical therapy	BS, Pharmacy	BS, Physical therapy	BS, Nursing	BS, Physical therapy	BS, Physical therapy	BS, Occupational Therapy
Understanding of collocation & resource used	Yes/none	Yes/none	None /none	Yes/ <i>Longman Dictionary of Collocation</i>	None /none	None /none	Yes/none
Prior experience with corpora	None	None	None	None	None	None	None

Note. All participant names are pseudonyms

APPENDIX B: Instruction for the Pre-writing “Fifteen Changes in a Century”

- (1) Please write an essay about the changes that you think will happen in a century. You can be very creative and include things that are not likely to happen.
- (2) Make sure you have provided enough elaboration of each “change” you incorporated. Also, coherence is important. Remember, this is not a “list of sentence-making” but a comprehensive essay.
- (3) Please choose **fifteen change-of-state verbs** out of the **thirty change-of-state verbs** listed in the table.

1. accelerate 加快，增長，增加	16. lower 放下，降下，減低，減弱
2. climb 爬，攀登，上升，向上爬	17. multiply 成倍地增加，繁殖
3. contract 縮小，收縮	18. peak 達到高峰
4. decline 下降，下跌；減少，衰退	19. plunge 下降，急降，下傾
5. diminish, drop, enlarge, escalate 減少，縮減，被貶低	20. proliferate 增殖，激增，擴散
6. drop 下降，變弱，滴下，掉下	21. raise 增加，提出，引起，豎起
7. enlarge 擴大，擴展，放大	22. reduce 減少，變弱，減輕，降級
8. escalate 逐步上升，增強，擴大，升級	23. rise 上升，上漲，高聳，起立
9. expand 展開，張開，膨脹，擴大	24. skyrocket 往上衝，猛漲，高升
10. extend 延長，延伸，擴大，擴展	25. shrink 收縮，縮短，變小，變少
11. fall 落下，下降，減少，陷落	26. sink 下沉，衰弱，滲透，降低
12. gain 得到，獲得，贏得，增添	27. slash 大幅度削減，減低，減少
13. grow 成長，增大，成熟	28. spread 伸展，散布，分布
14. intensify 增強，強化，變激烈	29. swell 腫起，增長，增大，高漲
15. lose 輸掉，失敗，丟失	30. soar 猛增，暴漲，飛騰，昂揚

APPENDIX C: Second Questionnaire

⁸(Note: Three out of the six questions in part 1, 12 out of the 15 questions in part 2 and five out of seven questions in part 3 were included due to having the greatest relevance to the aim of the study of seven learners)

(1) Positive aspects of COCA use

1. Do you think corpus searching helps you improve the collocation accuracy in your writing? (As in, turning incorrect into correct collocations) Why or why not? Please give me examples from your essay.
2. Do you think corpus searching helps you enhance the collocation complexities in your writing? (As in,

⁸ The questionnaire was administered in the larger study with 35 students; therefore, only questions related to the current study of seven students were analyzed here. In part 1 regarding “the positive aspects of COCA use,” three questions about how COCA use helped this essay writing were analyzed, while the other three questions addressing how COCA helped their learning in general were not included. In part 2 about “difficulty in COCA use,” only difficulties applicable to these seven learners were included; questions about “the availability of computers, the Internet, and learners’ computer skills” were not included as they were not applicable to those seven learners. In part 3 regarding “incorporating patterns and write-ups,” only the five questions about their “current use” of incorporating patterns into this essay writing were included, while the other two questions about their “possible future use” of incorporating patterns were excluded.

changing correct into advanced collocations) Why or why not? Please give me examples from your essay.
 3. Do you think corpus searching helps you increase the content ideas in your writing? Why or why not?
 Please give me examples from your essay.

(2) Difficulty in COCA use

Please identify the following difficulties when you used COCA by clicking

__ 1 strongly disagree __ 2 disagree __ 3 neutral __ 4 agree __ 5 strongly agree

- 1.I had difficulty using COCA because the interface was complicated 1 2 3 4 5
- 2.I had difficulty using COCA because it took a long time to find one pattern 1 2 3 4 5
- 3.I had difficulty using COCA because there were too many concordances 1 2 3 4 5
- 4.I had difficulty using COCA because there were too few concordances 1 2 3 4 5
- 5.I had difficulty using COCA because of unknown cultural contexts 1 2 3 4 5
- 6.I had difficulty using COCA because of unknown professional knowledge 1 2 3 4 5
- 7.I had difficulty using COCA because the query itself was difficult 1 2 3 4 5
- 8.I had difficulty using COCA because of the cut-off sentences 1 2 3 4 5
- 9.I had difficulty using COCA because of unfamiliar vocabulary 1 2 3 4 5
10. I had difficulty using COCA because I needed to induce patterns by myself 1 2 3 4 5
- 11.I had difficulty using COCA because of strong uncertainty 1 2 3 4 5
- 12.I had difficulty using COCA because I was not sure what I would use in my future writing 1 2 3 4 5

(3) Incorporating patterns and write-ups

1. How did you organize your writing?
2. How did you select patterns induced from COCA activities into your writing?
 Did you find it difficult? Why or why not?
3. How did you incorporate patterns into your writing? Did you find it difficult? Why
 or why not?
4. How did you like finding the patterns as preparation for your writing?
5. Please write down any other difficulties you have encountered in the process.

APPENDIX D: Procedure of the Study

Time	Objectives
I. Pre-test writing (Week 7)	(1) Background and technology understanding questionnaire (2) Pre-test writing titled as “fifteen changes in a century”
II. Preparation (Week 8 –9)	(1) Change-of-State verbs basic instruction

	(2) Dictionary use workshop
	(3) Awareness raising of collocation and DDL
	(4) Corpus consultation workshop (COCA)
III. Pattern Refining (Week 10-11)	(1) Students were required to consult COCA to collect collocation patterns of eight change of the state verbs chosen from their pre-test writing
IV. Pattern Hunting (Week 12-13)	(1) Students were required to discover the collocation patterns of eight most frequently-used nouns in their pre-test writing (<i>change, development, problem, life, population, technology, Internet environment</i>) via consulting COCA
V. Your own Choice (Week 14)	(1) Students were allowed to search for anything they wanted to know from COCA
VI. Post-test Writing (Week 15) Interviews (Week 16)	(1) Students were required to incorporate at least ten patterns from their corpus activities into their post-test writing titled as “fifteen changes in a century” (2) Evaluation questionnaire + interview probe-up (3) Stimulated recall session interview
VII. Delayed Post-test Writing (Week 27)	(1) Students were required to write the delayed post-test writing titled as “fifteen changes in Asia in two centuries”

APPENDIX E: Rating Scale for Collocations of Change-of-State Verbs

Scale	Category	Description
5	Correct collocation & appropriate embedment	The collocation is perfectly correct, and it is appropriately embedded in the sentence, e.g., <i>sea level will rise</i> .
4	Correct collocation & problematic embedment	The collocation is perfectly correct, but it can have multiple interpretations because of insufficient elaboration or clarification, e.g., <i>raise people's awareness to solve this problem</i> .
3	Correct collocation & problematic transitivity	Correct collocate, but it has problems in the use of transitive and intransitive,

- e.g., *The spending slashes*
- 2 Incorrect collocation, but it is intelligible with some guesswork e.g., *20% of the land will diminish.*
- 1 Incorrect collocation, and it is unintelligible e.g., *the competition in Taiwan will drop.*
-