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虛擬社群知識分享與知識建立之過程

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1. 報告內容：

1.1. 研究目的

知識分享行為的歷程及情境角色是一個螺旋循環，它會不斷的在個人與組織間重覆發生，而這種循環的過程，可分為社會化、外化、組合化、及內化四個階段 (Nonaka, 1998)，分別表示個人與組織在知識分享行為上扮演不同角色時的情境（參見圖一）。在社會化階段，知識的提供者和接收者都是個人。雙方可以透過會談時的方式，藉由對方的臉部表情、手勢、行為、用詞等傳達知識中所隱含的訊息。在外化階段，知識的提供者是個人，而知識的接受者則是組織。提供者藉由各種格式的資訊載體，將自己所擁有的知識呈現出來後，再分享於組織中的各個成員。在組合化階段，知識的提供者和接收者都是組織。組織利用在前一階段中所產生的各種資訊載體，有系統的去建構屬於組織全體的知識體系。在內化階段，知識的提供者是組織，知識的接受者是個人。組織提供已建構好的知識體系，讓組織成員吸收後運用於工作之中。從知識螺旋模式中，我們可以了解，當個人所分享的知識愈多時，組織所能利用的知識就愈多。而組織所能利用的知識愈多時，也就表示組織更有可能建構較完整的知識地圖，以縮短知識接收者尋找知識的時間，促使下一次知識分享行為的展開。但是如何讓成員相互分享知識與建立知識呢？

而網路群組學習是藉由網路提供一個具有互動機制的教學環境，透過參與者之間彼此互相溝通、學習。在網路的環境中，參與者必須透過與他人的互動來進行知識的分享與建構過程。參與者的角色不再只是被動的資訊接受者，而是轉變為主動、積極的知識建構者。經由參與者之間的相互溝通、討論、辯論，來進行知識的建構，從人際之間的互動內容，轉化為個體內部的知識。

本研究期望透過觀察在網路社群中的知識分享行為，分析討論過程中所共同建構產出的知識，反應參與者對於此議題的認知與瞭解。進一步去比較參與者習得內容的程度，與動機。因此，本研究利用概念圖與問卷，客觀、獨立，且相當於參與者思考過程的特性，繪製以評量參與者的討論品質。此外，觀察參與者在網路群組學習環境之下的討論過程，探討他們在面對問題時的態度，以及如何共同商討出結論的過程。運用內容分析法，歸納並分類學習者在討論過程中的行為模式。

1.2. 文獻探討

1.2.1. 知識建構(Knowledge Construction)

Gunawardena 等學者將遠距教學結合了社會建構主義理論，提出一個知識社群(wisdom communities)的概念。透過學習者間的互動，在此知識社群中可以創造、管理、分享知識，以及使用大家所共同創造出來的知識(Gunawardena et al., 1997)。Veerman 和 Veldhuis-Diermanse(2001)則是認為，透過網路教學環境上的合作學習，能夠讓學習者模擬，當他們在現實環境中在遇到許多不同觀點的複雜問題時，該如何和成員討論協商。如此，便能夠引導學習者主動參與，並且讓學習過程更生動(Veerman & Veldhuis-Diermanse, 2001)。

由上述可得知，知識建構的意義在於如何將「私人知識」轉化成「共構知識」的歷程。如何將自己的知識，有效的傳達給其他成員，或是如何衡量群組內的成員，都同意所共構的產出以及學習到新的知識，概念圖將是一個很好的工具。

1.2.2. 概念圖(Concept Map)

概念圖是透過 Ausubel(1963)學習理論的引導下，由美國康乃爾(Cornell)大學的學者 Joseph D. Novak 及其同僚，所致力研究的一套方便可行的學習方法。可應用於不同領域學科上，作為教學、學習、研究和評量的工具使用。

概念圖表達的是教學的概念和概念間的關係，因此概念圖可當作是評量學生成績及研究學生知識結構的依據。它可以用來幫助學習者學會如何去學(learn how to learn)，並且提供教學者作為衡量學習者的討論品質(Novak & Gowin, 1984)。透過概念圖的模型，來區辨並思考概念與概念間的關係，進而將這些概念有系統、有層次、有組織的統整起來(Novak, 1991)。它不僅可以當成是一種學習監控策略（及後設認知學習），亦可作為檢視既存知識結構組成元素的工具，用來評量及表徵學生的知識結構及變化、增進對書面教材的回憶、改善學生階層化組織知識的能力和運用該知識的能力、促進學生的

問題解決能力(Novak & Gowin, 1984)。

1.3. 研究方法

1.3.1. 概念圖的建置

概念圖的建置除了可以應用在教學或學習的評量之外，更可以作為分析質性資料的一種研究方法(Trochim, 1989)。除此之外，Sutherland 和 Katz (2005)也利用概念圖的建置，作為分析群組學習因素的研究方法。他認為建置概念圖是一有效的方法，能夠讓利益關係人(stakeholders，與議題有高度相關的人員)有能力去瞭解群組的全部討論過程。藉由這項方法，能夠協助教學者或學習者釐清群組在討論中實際的效益及產出。他將學習者在群組討論過程所產生的概念抽出，進而將這些概念繪製成概念圖。之後將概念圖所產生出不同的概念量化後，依照不同分佈狀況，進行多維度分析及分群分析(Sutherland and Katz, 2005)。因此，本研究透過專業的研究員，針對不同組別的線上討論過程，將其討論內容的概念繪製成概念圖，以探討學習者的討論程度，是否對學習成效有所影響。

本研究依據 Novak 與 Gowin (1984)所提出的計分方法為藍本。該書將學習者的概念圖分成四種結構：(1)關係(relationships)：一個有效且有意義的聯結關係，給一分。(2)階層(hierarchies)：每一個有效的階層，給五分。(3)交叉聯結(cross-links)：兩個經過統整後的概念間有效的聯結，因此交叉聯結亦可作為創造力的指標。每一個重要且有效的交叉聯結，給十分，而有效但不能指出相關概念(或命題)所組成的交叉聯結，則給五分。(4)舉例(examples)：若以標明出其概念間的關係，則每一個特定被舉出的事件或物件例子，即給一分。因此，在同一概念圖的評分原則下，得分越高，即代表某學習者的概念結構越系統化、層次化、和組織化。其學習成果越理想，概念學習的精熟程度也越高(Novak & Gowin, 1984)。

1.3.2. 內容分析

Holsti (1969)認為，內容分析是一種推論技巧，推論的由來則是對訊息的特徵做客

觀系統的驗證(Holsti, 1969)。Krippendorff (1980)則認為內容分析是一種研究技術，可由資料與其情境中建立可複製且有效的推論，並推及於其背景意涵(Krippendorff, 1980)。除此此外，內容分析法也適合觀察交談互動方面的研究。為了分析學習者在網路環境中的互動討論過程，並找出學習者認知歷程改變後所產生的影響，本研究採用了內容分析法進行分析。運用科學的方法，針對學習者在網路教學環境中的討論過程，進行資訊的編碼、整理、統計與濃縮，以瞭解學習者討論的概況，作出有效推論。

經過本研究整理發現，Gunawardena 等學者(Gunawardena, Lowe, and Anderson, 1997)所提出的理論架構，對於知識建構過程含括的範圍最完善。因此，本研究將採用 Gunawardena 等學者提出知識建構過程的階段內容，做為內容分析研究的分類項目。分別為第一階段：陳述目前得到的資訊，並且進行資訊的分享或比較。第二階段：找出在議題的觀念、概念、表達上，所產生出來不一致、不協調或意見不同的地方。第三階段：共同針對議題來討論，以建構出新的知識。第四階段：測試及修改大家所提出的意見、綜合的論點。第五階段：同意大家所討論出的表達方式，應用在新知識的建構上。

1.3.3. 樣本描述及程序

針對網路學習虛擬社群的對象，本研究選擇的樣本來自於某大專院校網路群組學習平台的學習者。此網路群組學習平台所使用的是「Wisdom Master 2.4」教學平台。「Wisdom Master 2.4」教學平台是 SCORM 2004 的認證採用者，具有可重複使用、取得容易、互相通用、耐用等特性。教學者與教材提供者可輕易合併教材於其他系統，或其他教學內容，而學習者可以方便的在本地或是遠端讀取課程資訊。教材可在不同平台呈現，或透過不同工具重新編輯，且教材不會因科技進步或標準異動而無法使用。目前在全台灣有將近百家大專院校採用，在市場上擁有六成以上佔有率。此平台提供學習者在網路平台上進行學習，以非同步的授課方式教學，提供學習者將作業上傳，並能夠在線上進行評量測驗、檔案分享、訊息公佈等功能。並於課程進行之後，具備學習者與教學者之間，以導師時間(office hour)互動。教學者透過線上會談，瞭解學習者對於課程上的問題，學習者之間也可藉此進一步的互動討論。此平台可自動記錄師生及學習者間的討論過程，有了這項具有豐富資訊的完整紀錄，便能夠提供研究者深入探討學習

者在互動內容的程度。此外，也能夠研究學習者在面對問題時的討論方式，對學習成效所造成的影響。

針對專業軟體虛擬社群的對象，本研究採用網路問卷的方式來進行資料的收集是可行的方式。在有效樣本中，有 84.3%為男性，而女性佔 15.7%。在成員年齡方面，以 21-25 歲(59.7%)為最多，其次是 26-30 歲(22.9%)，總計 21-30 歲年輕族群佔全部樣本的 82.6%。而在教育程度方面，以大學學歷為最多，達 84.4%，而研究所學歷(10.6%)為次多。職業方面以學生族群(74.6%)為最多，資訊相關產業(7.2%)為次多。從數據而言，發現此類論壇的參與者以男性居大多數，論壇成員的組成方面，多數為 21-30 歲的高學歷年輕族群。

1.4. 結果與討論（含結論與建議）

第一，本研究使用概念圖的方法來探討學習者的互動內容程度，並做出以下幾點結論：(1)大部份的學習者在網路群組學習環境下，採用「階層」及「關係」等縱向聯結的思考模式，較少有發揮聯想力的「舉例」及橫向聯結「交叉聯結」的思考模式。並且透過概念圖得分的比較可觀察出，不同的討論議題與概念圖的得分上，似乎沒有太大的關聯。(2)學習者在網路群組學習環境下的表現變化可分為四種類型，分別為「平均型」：從頭到尾都是按照自己的步調去進行討論，並不會因課程的進行或討論內容的不同，而影響到他們習慣的學習方式。「起伏型」：面對各項任務時，概念圖成績的落差較大。「漸進型」：在概念圖成績的表現上有逐漸成長的趨勢，學習行為上也有漸入佳境的感覺。「疲乏型」：在討論過程的產出上，有每況愈下的趨勢。

第二，本研究使用內容分析法，分析在不同任務類型的議題中，學習者的知識建構過程與學習方式。就知識建構過程而言：以第一階段的討論為多數，顯示出學習者在利用網路群組學習時，多數還是習慣利用網路作為資訊分享、傳遞的媒介，不擅於在網路平台上進行討論。在第二階段意見不同處的討論、第三階段產生共識過程的討論，以及第五階段的總結，學習者在各任務中有著有一定數量的討論。顯示學習者在網路群組討論中，學習者不單只是進行資訊的分享傳遞，也有使用到其他如協商、共識的討論方式。而在第四階段的測試修改共識的討論比例則是最少，顯示此階段活動是網路群組討論所

欠缺的，也是日後應該要繼續努力改進的方向。本研究進一步觀察發現：(1)在知識建構第一階段中，學習者主要討論活動出現在「提出個人的意見、看法、或主張」及「藉由參與者之間的問與答來釐清討論問題上的細節」上。(2)在第二階段活動主要在於「參考更多資料之後，進階的爭論或考慮」。(3)在第三階段產生共識過程的討論中，不同類型任務著重的活動也有所不同。(4)第四階段「共識的測試或修改」討論比例則是最少，因此無法作進一步的分析。(5)第五階段討論著重於「總結大家一致的協議」。

第三，專業軟體虛擬社群之成員從事知識分享時，所承擔的成本及利益對分享行為有以下的影響：在成本方面有知識外顯的努力、知識權力的損失、風險的承擔。而在利益方面，研究者在收集相關文獻和專家訪談之後，將利益因素細分為內在和外在利益。內在利益方面有免費資源的取得、論壇獎勵、互惠、形象提昇。外在利益方面有知識的自我效能、助人的喜悅。由此可知，論壇是扮演著促進者的角色，因為論壇鼓勵其成員進行更多分享，而成員在受到論壇獎勵與其他成員的鼓勵下，會去找尋各式各樣、五花八門的資源來分享。

本研究透過分析參與者在網路群組互動環境下的討論，得出了幾點貢獻：本研究對於網路虛擬社群之知識分享，重「質」也重「量」的研究觀察。發現在虛擬社群下，討論內容的「質」與「量」在分享過程中是同樣重要的。

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3. 計畫成果自評：

3.1. 研究內容與原計畫相符程度

原計畫預計分析虛擬社群成員之間的互動記錄，探索知識分享的行為與內容。本次研究的資料收集與分析，完全符合預定的方式。共觀察了兩大虛擬社群，其一是虛擬的教學平台，我們利用內容分析法分析了教學者與學習者的知識分享內容和行為。另一個是觀察專業軟體的虛擬社群，我們發送問卷測試其知識分享行為。以上工作都在計劃時程中，完成資料分析，其初步內容都發表於會議(發表內容請詳附錄)。

3.2. 達成預期目標情況

依照原訂計畫完成

1. 資料收集與分析
2. 訓練學生參與完成計畫與論文寫作
3. 初步研究結果發表於兩個重要學術會議(會議文章請參見附錄)

3.3. 研究成果之學術或應用價值

本研究其中之一是探討網路教學系統中，資訊科技對於學習者學習成效的影響。在學術上，本研究使用概念圖，以結構化的方式收集學習者的學習內容與互動過程，除了了解學習者的學習模式之外，也重新檢視網路教學的優缺點與未來。在實務上，本計畫研究結果有助於教學者使用資訊科技推動網路教學。再者，本研究針對專業軟體社群的分析上，在學術上，有助於探索知識分享的機制與軟體盜版問題的反省。對於實務上的管理者而言，也能藉此了解到實務社群知識分享與平台建制之重要性。

對於參與之工作人員而言，他們學習到內容分析、概念圖之建構、問卷設計與分析等研究方法，除此之外，研究者與被研究者都可以藉此反省，科技對於我們的學習、生活、環境的影響。

3.4. 是否適合在學術期刊發表或申請專利

已經將本研究初步結果分成兩部份，發表於“2008數位落差國際學術研討會”以及“Web2007”。(會議文章請參見附錄)

本研究除了定義並發掘網路教學上參與者的角色之外，也引發後續更多更有趣的研究。例如：透過練習各種不同類型任務的討論，是否能夠發展使用者更多樣的學習技巧？小組由男女混合的成員組成，對於網路群組學習成效顯著，是否可以促進學習上的效果？都是未來值得研究的。也是未來教學與資管期刊所關注的重要議題。

4. 附錄

4.1. 論文發表 1

(黃冠男、游佳萍、張玲星，2008 數位落差國際學術研討會，June 4-5, 2008.)

以概念圖探討電腦輔助合作學習的知識建構過程

The study of knowledge construction process in computer support collaborative learning adopt concept map

| | | |
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摘要

本研究以概念圖與內容分析方法作為分析工具，探討學習者透過網路學習環境的互動過程。利用概念圖可衡量學習者學習成效的特性，分析學習者在知識建構過程中，各階段的互動討論方式。以及透過內容分析方法，探討學習者在知識建構過程中，對於不同任務類型問題上，有什麼樣不同的學習產出。研究結果發現：第一、網路學習是要用「對的方法」做「對的事」。第二、當問題的任務類型不同，學習者會有不同的學習方式。

關鍵詞：網路學習、知識建構過程、概念圖、內容分析

壹 緒論

隨著國際與國內教育機構逐漸重視學習者利用電腦與網路促進學習的這股趨勢，電腦與學習的實踐與理論因此變得更加重要。電腦輔助合作學習(CSCL, Computer Supported Collaborative Learning)【以下統稱「網路學習」】也隨著網路技術的發展，運用有效率的查詢技巧，以增進學習的便利性與學習內容。

網路學習是藉由網路提供一個具有互動機制的教學環境，透過教學者與學習者之間彼此互相溝通、學習。在網路的學習環境中，學習者必須透過與他人的互動來進行知識的分享與建構過程。學習者的角色不再只是被動的資訊接受者，而是轉變為主動、積極的知識建構者。

本研究希望透過學習者在網路互動環境之下的學習，分析討論過程中所共同建構產出的知識，以反應學習者對於此議題的認知與瞭解。進一步去比較學習者習得內容的程度，與最終的評量成績是否有所差異。因此，本研究利用概念圖客觀、獨立、且相當於學習者思考過程的特性，以繪圖之方式，評量學習者的討論品質。此外，觀察學習者在網路互動環境之下的討論過程，探討他們在面對問題時的態度，以及如何共同商討出結論的過程。運用內容分析法，歸納

並分類學習者在討論過程中的行為模式。最後，比較學習者討論內容的程度，與討論方式的類別，兩者間是否有相關性。

因此，本研究的研究問題有以下三點：第一、探討學習者在網路互動環境中討論內容的程度，是否會影響學習成效。第二、探討學習者在網路互動環境中面對問題時的態度以及討論方式，是否會影響學習成效。最後、綜合以上兩點結果的交互影響，是否會影響學習成效。

貳 文獻探討

貳、一 電腦輔助合作學習 (Computer-Supported Collaborative Learning, CSCL)

近年來，網路化的學習方式已逐漸普及與方便，在電腦輔助合作學習(Computer Supported Collaborative Learning, CSCL)環境下，運用學習輔助工具及運用學習策略來幫助學習，已成為現今學校教育所推廣的趨勢。在網路學習環境中，大家可以透過一個共同的平台，進行線上同步或非同步的討論，促進並增加學習者主動參與合作學習與建構知識的機會，因此產生很多支援學習的可能性。

許多研究學者也將研究焦點主要集中在群組學習的研究中，試著從合作知識建構的角度關切群組學習，去探究在合作中，他們的想法、思考方式及邏輯，以及探討他們在建構什麼？學什麼？怎麼學？研究者關切小組成員發揮什麼樣的功能以促成學習、或是研究群組的知識建構是怎樣的歷程、或是探討群組討論後產生什麼可以代表學習等，都是從認知面的角度，去關切群組如何從合作學習中共同建構知識(Henri, 1992；Gunawardena et al., 1997；Weinberger, 2003)。

貳、二 知識建構(Knowledge Construction)

Gunawardena 等學者將遠距教學結合了社會建構主義理論，提出一個知識社群(wisdom communities)的概念。透過學習者間的互動，在此知識社群中可以創造、管理、分享知識，以及使用大家所共同創造出來的知識(Gunawardena et al., 1997)。Veerman 和 Veldhuis-Diermanse(2001)則是認為，透過網路教學環境上的合作學習，能夠讓學習者模擬，當他們在現實環境中在遇到許多不同觀點的複雜問題時，該如何和成員討論協商。如此，便能夠引導學習者主動參與，並且讓學習過程更生動(Veerman & Veldhuis-Diermanse, 2001)。

由上述可得知，知識建構的意義在於如何將「私人知識」轉化成「共構知識」的歷程。如何將自己的知識，有效的傳達給其他成員，或是如何衡量群組內的成員，都同意所共構的產出以及學習到新的知識，概念圖將是一個很好的工具。

貳、三 概念圖(Concept Map)

概念圖是透過 Ausubel(1963)學習理論的引導下，由美國康乃爾(Cornell)大學的學者 Joseph D. Novak 及其同僚，所致力研究的一套方便可行的學習方法。可應用於不同領域學科上，作為教學、學習、研究和評量的工具使用。

概念圖表達的是教學的概念和概念間的關係，因此概念圖可當作是評量學生成績及研究學

生知識結構的依據。它可以用來幫助學習者學會如何去學(learn how to learn)，並且提供教學者作為衡量學習者的討論品質(Novak & Gowin, 1984)。透過概念圖的模型，來區辨並思考概念與概念間的關係，進而將這些概念有系統、有層次、有組織的統整起來(Novak, 1991)。它不僅可以當成是一種學習監控策略(及後設認知學習)，亦可作為檢視既存知識結構組成元素的工具，用來評量及表徵學生的知識結構及變化、增進對書面教材的回憶、改善學生階層化組織知識的能力和運用該知識的能力、促進學生的問題解決能力(Novak & Gowin, 1984)。

參 研究方法

參、一 個案描述與資料蒐集

本研究選擇網路互動環境的樣本來自於某大專院校資管系四年級的學生(以下統稱 A 班)，此課程修課人數為 44 人(表 1)。課程與本研究所需探討網路學習的議題相關，且針對議題做開放性的討論，因此做為此次研究的主要樣本。此門課程開課時間是在 2006 年，因此在課程內容也是較近期最新的資訊。

在早期研究任務類型的影響時，皆是採方便性地任意挑選一、兩種類型任務來實驗。比較嚴謹的就只是取較簡單的二分類方法，如簡單與困難、單純與複雜等，這樣的研究方式大大影響之後群組合作的任務分類發展。McGrath (1984)對於群組合作任務型態的分類研究，綜合起來提出了所謂的任務分類法(Task Circumplex)，並歸納出任務架構。其中，根據 McGrath (1984)的認為，所謂「智力型任務」是具有正確解決答案的任務，執行這個任務的群組成員必需經過構思、選擇或計算的方式，以求得任務解答。而所謂「決策型任務」則是指問題沒有最正確的答案，只有最適當的解。群組成員通常會根據本身的認知判斷，透過與其他成員間互相比較、討論，直到所有成員都能夠得出一個共識，再依據這樣的共識為所面臨的問題做出一個最適當的答案。

表 1：A 班之分組、成員性別統計表

| 課程名稱 | 管理資訊系統 | |
|------|--------|-----|
| | 小組成員性別 | |
| 組別 | 男生 | 女生 |
| 第一組 | 3 人 | 2 人 |
| 第二組 | 4 人 | 1 人 |
| 第三組 | 0 人 | 5 人 |
| 第四組 | 5 人 | 0 人 |
| 第五組 | 0 人 | 5 人 |
| 第六組 | 2 人 | 3 人 |
| 第七組 | 0 人 | 4 人 |

| | | |
|------|------|------|
| 第八組 | 2 人 | 3 人 |
| 第九組 | 0 人 | 5 人 |
| 人數總計 | 16 人 | 28 人 |

而本研究目的在於分析此二類型任務的問題，因此教學者將課程設計安排成「智力型任務」以及「決策型任務」的相關議題（表 2）。教學者所安排的課程議題，皆是需經過成員互相合作討論的過程，以及經過看法不一的意見衝突過程，透過群組協商討論才能夠得出解答的概念性問題。前三章節所討論的內容中，因為具有一定的定義與解答，故屬於智力型任務（以下簡稱為 IT1、IT2、IT3）。而後兩章節所討論的內容，屬於整體規劃面的考量，也許每個人對於每個企業的看法不同、需求不同、定位不同等，所需採用的策略亦不同，這是需要透過成員間的討論，才能得出一個共識或解答，故分類為決策型任務（以下簡稱為 DT1、DT2）。

表 2：課程章節名稱及任務分類

| 任務分類 | 代號 | 章節名稱 |
|-------|-----|-----------------------|
| 智力型任務 | IT1 | 企業供應鍊管理系統與協同商務 |
| | IT2 | 顧客關係管理與夥伴關係管理 |
| | IT3 | 知識管理與資訊科技 |
| 決策型任務 | DT1 | 企業資訊系統與企業 e 化轉型的策略性規劃 |
| | DT2 | 資訊系統開發方法論 |

參、二 概念圖的建置

概念圖的建置除了可以應用在教學或學習的評量之外，更可以作為分析質性資料的一種研究方法(Trochim, 1989)。除此之外，Sutherland 和 Katz (2005)也利用概念圖的建置，作為分析群組學習因素的研究方法。他認為建置概念圖是一有效的方法，能夠讓利益關係人（stakeholders，與議題有高度相關的人員）有能力去瞭解群組的全部討論過程。藉由這項方法，能夠協助教學者或學習者釐清群組在討論中實際的效益及產出。他將學習者在群組討論過程所產生的概念抽出，進而將這些概念繪製成概念圖。之後將概念圖所產生出不同的概念量化後，依照不同分佈狀況，進行多維度分析及分群分析(Sutherland and Katz, 2005)。因此，本研究透過專業的研究員，針對不同組別的線上討論過程，將其討論內容的概念繪製成概念圖，以探討學習者的討論程度，是否對學習成效有所影響。

本研究依據 Novak 與 Gowin (1984)所提出的計分方法為藍本。該書將學習者的概念圖分成四種結構：(1)關係(relationships)：一個有效且有意義的聯結關係，給一分。(2)階層(hierarchies)：每一個有效的階層，給五分。(3)交叉聯結(cross-links)：兩個經過統整後的概念

間有效的聯結，因此交叉聯結亦可作為創造力的指標。每一個重要且有效的交叉聯結，給十分，而有效但不能指出相關概念（或命題）所組成的交叉聯結，則給五分。(4)舉例(examples)：若以標明出其概念間的關係，則每一個特定被舉出的事件或物件例子，即給一分。因此，在同一概念圖的評分原則下，得分越高，即代表某學習者的概念結構越系統化、層次化、和組織化。其學習成果越理想，概念學習的精熟程度也越高(Novak & Gowin, 1984)。

參、三 內容分析

Holsti (1969)認為，內容分析是一種推論技巧，推論的由來則是對訊息的特徵做客觀系統的驗證(Holsti, 1969)。Krippendorff (1980)則認為內容分析是一種研究技術，可由資料與其情境中建立可複製且有效的推論，並推及於其背景意涵(Krippendorff, 1980)。除此此外，內容分析法也適合觀察交談互動方面的研究。為了分析學習者在網路環境中的互動討論過程，並找出學習者認知歷程改變後所產生的影響，本研究採用了內容分析法進行分析。運用科學的方法，針對學習者在網路教學環境中的討論過程，進行資訊的編碼、整理、統計與濃縮，以瞭解學習者討論的概況，作出有效推論。

經過本研究整理發現，Gunawardena 等學者(Gunawardena, Lowe, and Anderson, 1997)所提出的理論架構，對於知識建構過程含括的範圍最完善。因此，本研究將採用 Gunawardenan 等學者提出知識建構過程的階段內容，做為內容分析研究的分類項目。分別為第一階段：陳述目前得到的資訊，並且進行資訊的分享或比較。第二階段：找出在議題的觀念、概念、表達上，所產生出來不一致、不協調或意見不同的地方。第三階段：共同針對議題來討論，以建構出新的知識。第四階段：測試及修改大家所提出的意見、綜合的論點。第五階段：同意大家所討論出的表達方式，應用在新知識的建構上。

肆 研究發現與討論

肆、一 概念圖的建構

分析結果發現：學習者在對於新議題的認知過程中，偏好使用「階層」與「關係」來描述，這顯示出學習者比較習慣縱向思考。此外，各組在概念圖上各項目得分的統計可觀察出，各組在不同的討論章節與概念圖的得分上，似乎沒有太大的關聯。顯示出大多數學習者的討論方式與技巧，並沒有因為隨著教學課程的進行而有明顯的改變。

其中：(1)「關係」的表現：部份組別在智力型任務的章節的概念上有明顯的聯結關係，反而討論決策型任務議題時，在一般性概念之間的聯結反而變少了。不過部份組別在討論的概念關係比例恰好相反，這也顯示出這幾組在互動討論上，對於議題的概念聯結有明顯的進步。(2)「階層」的表現：各組各章節的階層得分皆介於 15 分~25 分之間（亦在 3 層到 5 層之間），表示學習的方式並沒有隨著章節的演進而學習到更深度的研究。(3)「交叉聯結」的表現：大多數的組別皆著重屬於「智力型任務」的前三章，而屬於「決策型任務」的後兩章則較少有交叉聯結的概念產生。(4)「舉例」的表現：由於樣本討論量不多，無法明顯看出學習者會不會因為每章節的討論或任務不一樣，或是學習時間的多寡，而對這項學習技巧上有所改變。

之後，將各組在各章節的得分之平均予以比較，藉由整個學期討論分數的起伏，將各組的學習歷程做分類。因此，本研究將各組學習的表現變化，分為四種類型：平均型、起伏型、漸進型、和疲乏型。

類型 I (圖 1：第 1、2 組) 為「平均型」：在討論過程的概念圖成績及曲線走向差不多，成績的起伏也較為一致。在起初 IT1 和 IT2 的討論時，概念圖成績的表現上平平，等到 IT3 的討論便有明顯的成長，成績更是在平均之上。但到後期的 DT1 及 DT2，小組討論上的品質有稍微降低。整體而言，此類型的學習者從頭到尾都是按照自己的步調去進行討論，並不會因為課程的進行，而在概念的學習上有進一步的改變。這也表示仍有部分的學習者，不會因課程的進行或討論內容的不同而影響到他們習慣的學習方式。

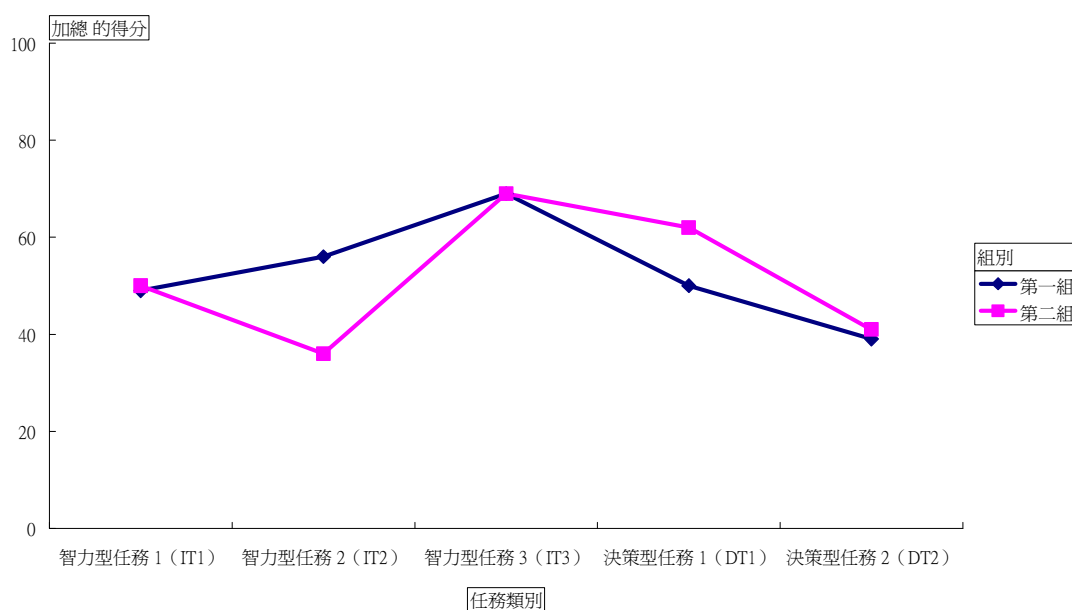


圖 1：長期圖表變化 類型 I：「平均型」

類型 II (圖 2：第 5、6、7 組) 為「起伏型」：「起伏型」與「平均型」在概念圖成績曲線走向差不多，只是成績的起伏落差較大。在前三章的討論，概念圖得分有逐漸成長的情況，且得分大部分在概念圖平均成績之上。但是到了討論的後兩章，成績卻明顯的降低，且皆低於概念圖平均成績。也許是因為學習者在決策型任務的討論中，每個概念所包含的內容也較廣泛，因此產出的概念數相較智力型任務來的少，並不代表此類型的學習者學習上的表現行為不佳。

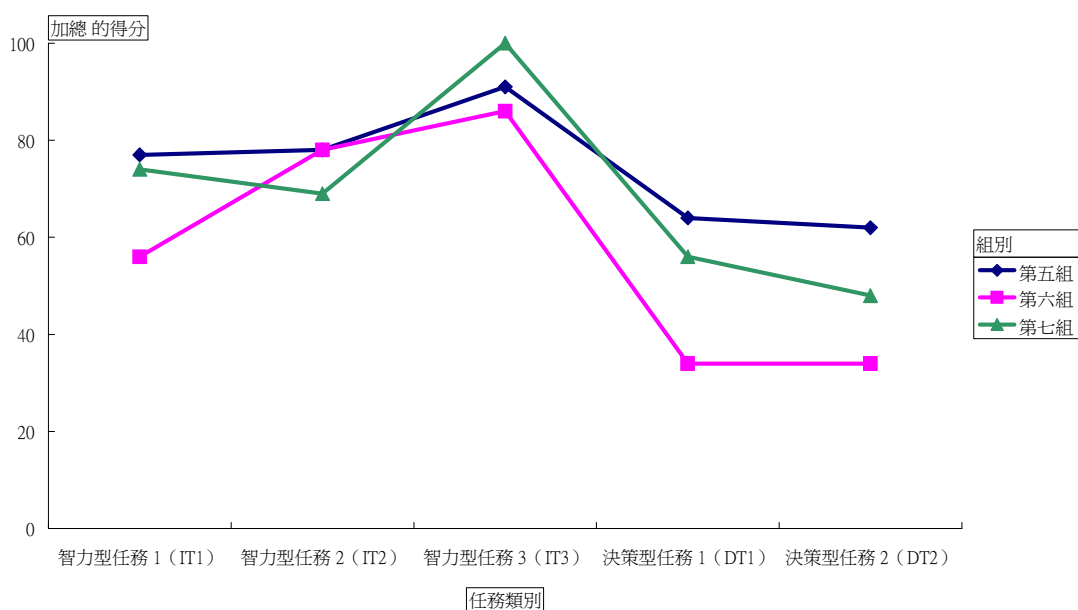


圖 2：長期圖表變化 類型 II：「起伏型」

類型 III (圖 3：第 3、9 組) 為「漸進型」：在整個學習歷程中，可以看見討論的成績有明顯進步，後面幾次的討論成績皆在平均值之上。這類型的小組概念圖成績的表現上有逐漸成長的趨勢，在學習行為上有漸入佳境的感覺。此類型的學習者有抓到網路討論中的技巧，也漸漸得心應手，才得以更多的內容去描述決策型任務的議題。

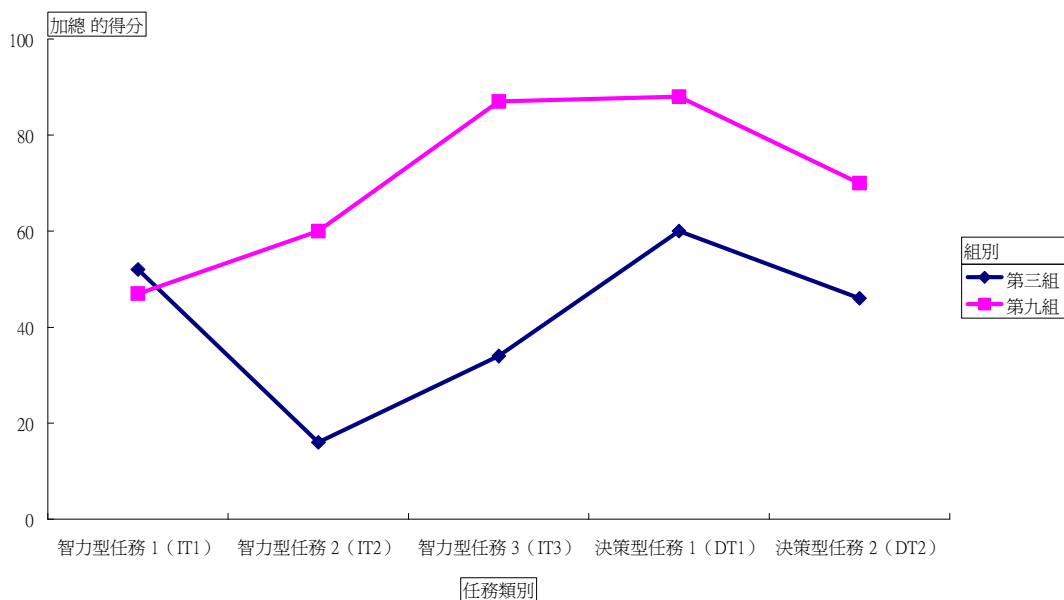


圖 3：長期圖表變化 類型 III：「漸進型」

類型 IV (圖 4：第 4、8 組) 為「疲乏型」：在討論的過程的產出上，有每況愈下的趨勢。在智力型任務中，起初在討論上成績還算理想，但隨著課程的演進，成員間的討論可能趨於制式化，只是為了應付討論而討論，因此討論品質也每況愈下。使得在議題轉變為決策型任務時，還是無法彰顯學習者討論內容的效益。不過也有可能是因為任務別的不同，學習者在決策型任務的討論內容本來就比較少。

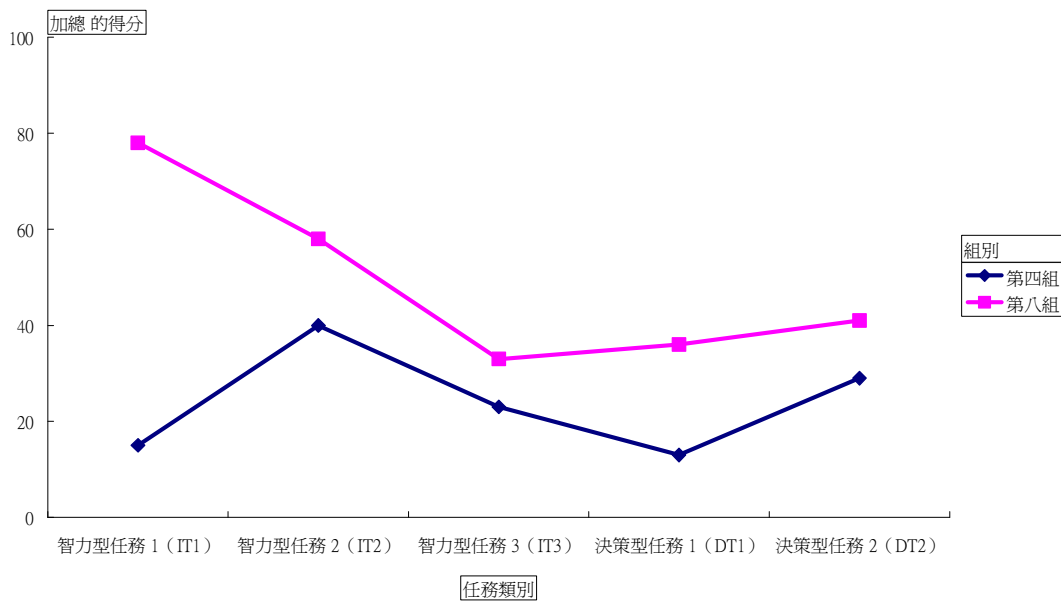


圖 4：長期圖表變化 類型 IV：「疲乏型」

透過圖 5，將各組概念圖的成績標準化後予以比較發現：整體成績而言成員皆為女生的組別概念圖成績最好，成員的組成皆為男生的第 4 組概念圖成績最差，而其他男女生混合組的成績，則剛好介於兩者中間。同性別組員之間的討論，有可能因為默契好，使得討論進行順利，也有可能因為太要好，反而不重視討論這個行為。

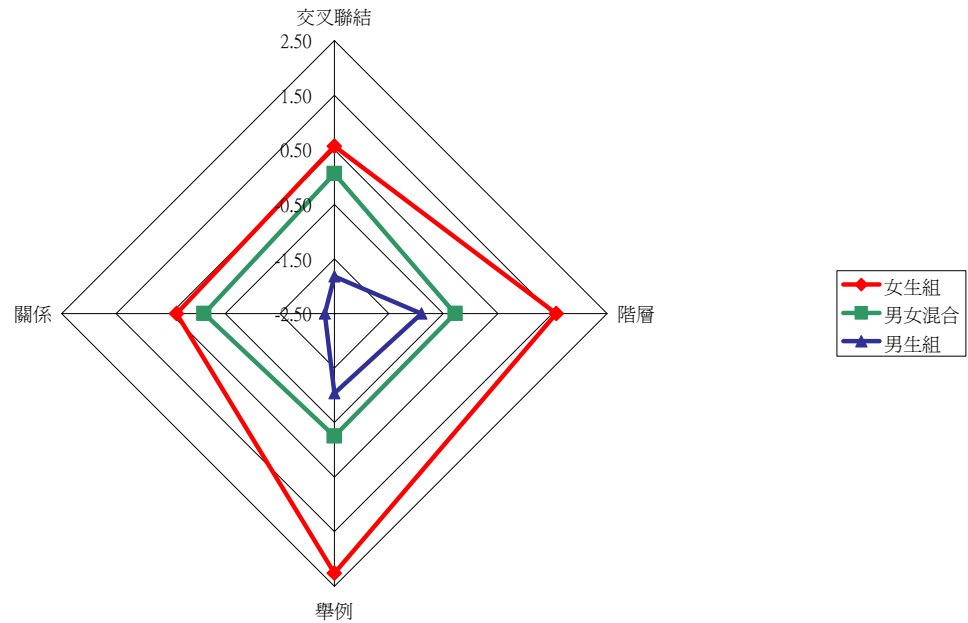


圖 5：概念圖成績標準化後的性別差異比較

肆、二 內容分析結果

圖 6 是將全班共九組在智力型任務與決策型任務中，將討論所產生的編碼加總之後，以百分比的方式做比較，並且以知識建構階段為分類，總共分為五個階段，本研究發現；(1)學習者在一開始屬於智力型任務的討論中，大多都是第一階段的資訊分享或比較，之後各階段的討論數明顯的降低很多。顯示出學習者在一開始接觸網路教學時，他們還是習慣利用網路作為資訊分享、傳遞的工具，還不善於在網路平台上進行討論。(2)進入決策型任務的討論時，第一階段的資訊分享有稍微減少，反倒是第二階段對於議題上意見不同所產生的討論，有明顯的增加。在產生共識的第三階段也有些微的增加。

以上結果顯示學習者在透過前面幾個章節的學習與討論之後，在討論的方式上確實有明顯的進步。網路互動環境下的討論，對他們而言不光只是在做資料蒐集與分享而已，而是利用網路在資料蒐集的便捷性與快速性，提升討論的效率。學習者在決策型任務的討論中，不再對網路所蒐集的資料百分之百的相信，大部分的組別會對網路上的資料產生存疑，更有少數組別會如同第四階段提到，進一步的探究網路上的資料是否正確、是否過時、使否需要更新，來做進一步的測試與修改。最後，第五階段的總結，在此兩章節的討論都維持著差不多的次數。

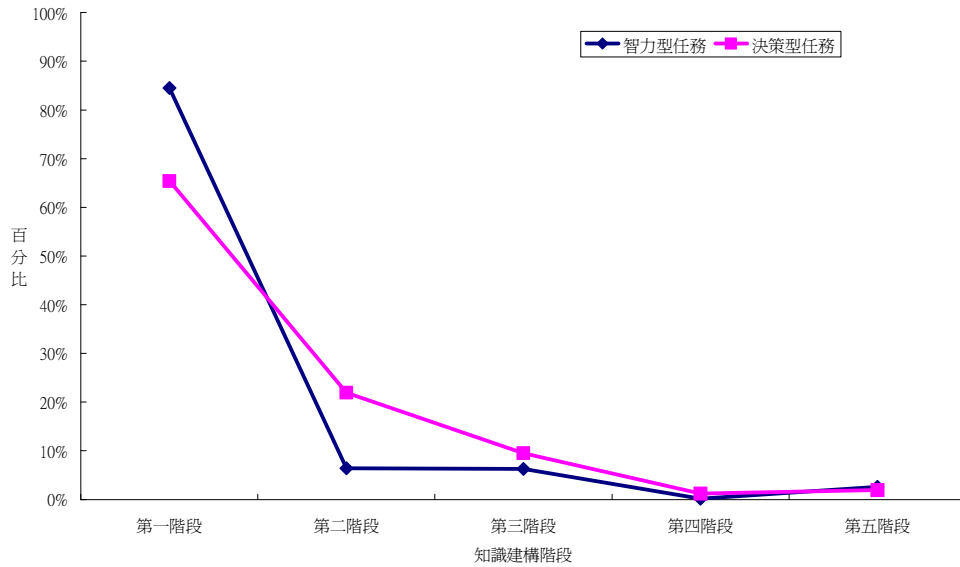


圖 6：知識建構階段各類任務的編碼數百分比之比較

圖 7 則是將男生組、女生組及男女混合組別，在智力型任務中知識建構過程的比較。由下圖可觀察出，不論是男、女組或男女混合組，在智力型任務的知識建構各階段幾乎相似。顯示出在智力型任務的討論中，學習者的性別不論男女，在討論的方式及態度上幾乎相同，都是著重於資訊分享的行為。

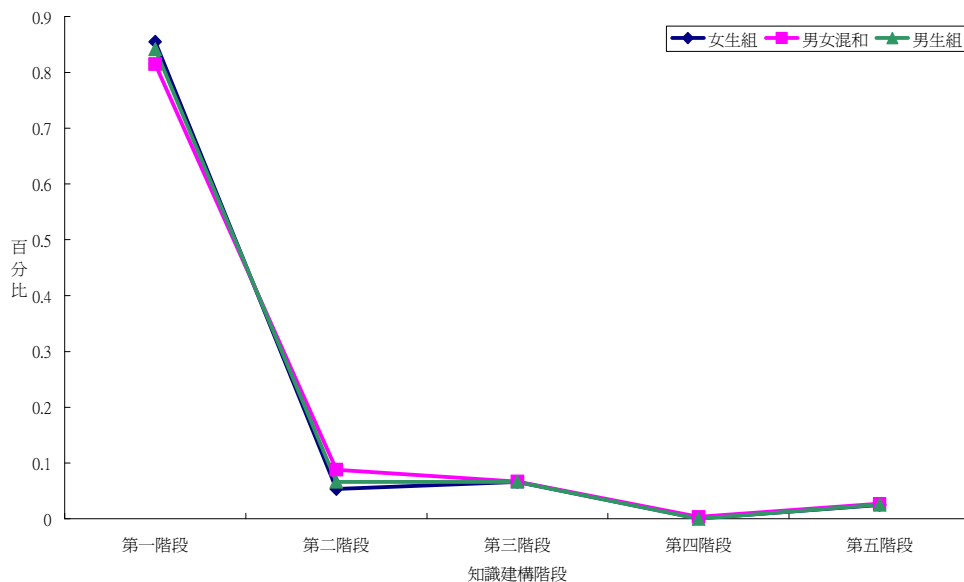


圖 7：智力型任務的編碼數性別差異之比較

圖 8 則是將男生組、女生組及男女混合組別，在決策型任務中知識建構過程的比較。可明顯觀察出與智力型任務的差異，在知識建構第一階段的資訊分享上相對減少，且女生組與男女混合組在討論上的比例較智力型任務少許多。各組都有增加著重在第二階段的協商上。而女生

組與男女混合組在知識建構第三階段的討論也有稍微的增加，且男女混合組的比例上又多於女生組，而男生組在此階段卻沒有討論行為。而之後的第四階段與第五階段，則是和智力型任務的比例相去不遠。整體而言，男生組對於智力型任務或是決策型任務的討論上，態度及方式並無太大的不同。而男女混合組則有較大的改變，在決策型任務中有較多的討論互動行為，顯示出男女生在同一組，有助於協商討論及產生共識上的互動。

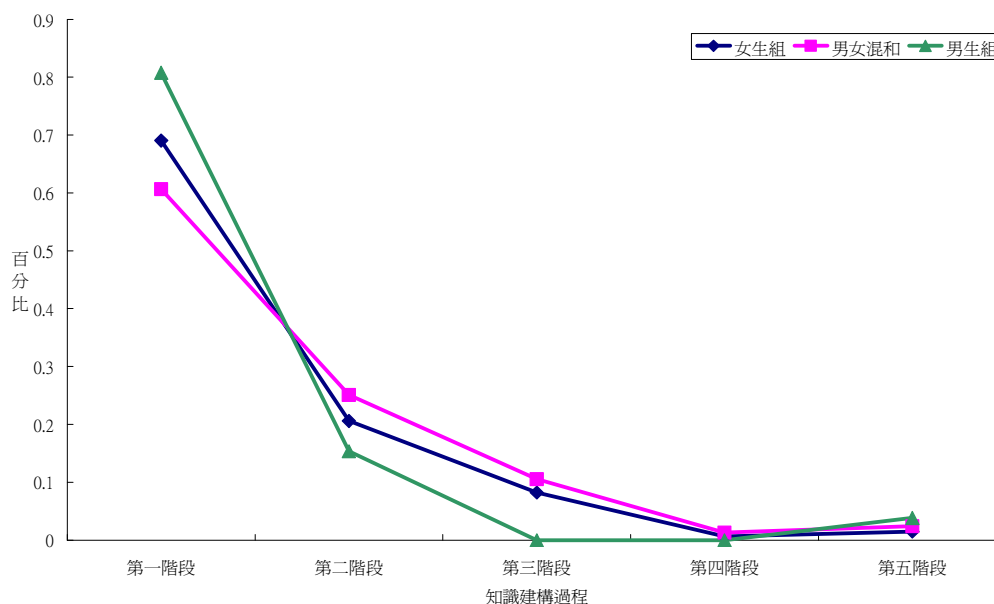


圖 8：決策型任務的編碼數性別差異之比較

伍 結論

本研究主要的研究問題有二：第一、探討學習者在網路互動環境中討論內容的程度，是否會影響學習成效。第二、探討學習者在網路互動環境中面對問題時的討論方式，是否會影響學習成效。

在第一個研究問題中，本研究使用概念圖的方法來探討學習者的互動內容程度。並得知學習者在對於新議題的認知過程中，偏好使用「階層」與「關係」來描述，這也顯示出大部份的學習者採用「階層」及「關係」等縱向聯結的思考模式，較少採用橫向聯結思考模式的「交叉聯結」，而發揮聯想力在議題的「舉例」上則是最少。本研究將各組學習的表現變化，依其成績起伏分為四種類型。「平均型」的學習者從頭到尾都是按照自己的步調去進行討論，並不會因課程的進行或討論內容的不同，而影響到他們習慣的學習方式。此類型的學習者在面對不同類型任務時的表現都差不多，因此建議教學者可以嘗試增加其他類型的學習任務，以豐富學習的內容，進而增加更多學習的可能性。「起伏型」的學習者與在面對智力型任務與決策型任務時，概念圖的成績落差較大。此類型學習者較專注於智力型任務的回答，因此建議教學者可在講授課程時，加強決策型任務議題上的教學，以提升學習者所欠缺的部分。「漸進型」的學習者在概念圖成績的表現上有逐漸成長的趨勢，學習行為上也有漸入佳境的感覺。這是一個很好的學習典範，建議教學者可以鼓勵其他同學參考此類型學習者的學習方法。「疲乏型」的學習者討論的過程的產出上，有每況愈下的趨勢。建議教學者多留意此類型的學習者，在學習上是否有什麼樣的困難或障礙，進一步給予輔導或建議。

在第二個研究問題中，本研究使用內容分析法，分析在不同任務類型的議題中，學習者的

知識建構過程與學習方式。各組在討論智力型任務時，學習者大多著重於知識建構第一階段的資訊傳遞與分享，或是提出個人意見看法及提出其他參考資料，較少有需要協議共識或是權衡不同類型論點的時候。顯示網路環境對於解決智力型任務時，扮演著資訊搜尋的角色。而決策型任務在知識建構過程中，學習者著重於知識建構第二階段的意見不同處協商，顯示出在決策型任務的討論上，需要透過參與者積極的溝通。經由分析結果發現，網路群組學習大多只能輔助到知識建構的前兩階段，而知識建構過程的後三階段行為較為欠缺，這也許就是網路群組學習所欠缺的，也是日後應該要繼續努力改進的方向。由於網路是一個開放性的平台，很難確保在網路上所搜尋到的資料是正確、可靠的，因此要透過成員間的討論以建立共識，以釐清並權衡不同的觀點。即使大家討論出一個共識，但又不能確保此共識是正確答案，因此還要進一步去測試與修改大家所提出的意見。最後，才能夠總結大家一致的共識與結論，並且應用在新知識的建構上。這也就是為什麼本研究建議網路群組學習需要繼續改進的原因。

男女生混合的小組，概念圖成績則剛好介於純男生組與純女生組之間，概念的發展上各方面都相當平均。且男女生混合的小組在智力型任務中著重於資訊的分享，在決策型任務中則有較多的討論互動行為，會因應不同任務類型的議題有明顯不同的討論方式。成員皆為女生的組別概念圖成績最好，且都有某幾種特別擅長的學習行為。對於不同任務議題的討論方式，女生組剛好介於男女混合的組別與純男生的組別中間。而成員的組成皆為男生的組別概念圖成績最差，成績的表現皆不盡理想。且在此兩項任務類型的討論中，所使用的討論方式差不多，都只著重於第一階段的資訊分享。從性別上來看，成員由男女混合的小組在學習成效上較佳，表示不同性別學習者的組成可能可以帶來比較多的互動，因此可以推論由男女生混合組成的組別，有助於討論議題時的多樣性，以及引起學習者對於各方面議題的興趣。因此本研究建議教學者可以安排性別混合的小組，避免單一性別成員或性質相似的成員組成，藉此提升學習者更多樣的討論互動的方式，以期望共同提升全班的學習產出。而小組成員的性別對於學習成效的影響，將對於日後研究有的重要參考價值。

根據初步的資料，本研究可提供以下幾點貢獻：第一、網路學習的討論過程，在於重「質」而不重「量」。在網路上的討論，並不是花的討論時間長，找的參考資料多，在學習成效上就能夠有成績。

第二、討論的任務類型不同，有不同的討論方式。學習產出及解決問題能力良好的學習者，在面對不同類型的問題時，並不是用同一種方式去面對，而是以不同的觀點去解決不同的問題。反之，學習成效不佳的學習者，都是企望能同一種學習態度就能夠面對所有問題。

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4.2. 論文發表 2

An Empirical Investigation of Internet Pirate Copying Behavior in Virtual Community Sharing: The Social Exchange Perspective

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Abstract

The social life of an Internet-based forum is complex and hard to control with respect to sharing among virtual community members. In particular, as software pirating behavior is linked to virtual community members' knowledge sharing enactments, illicit software or products can be widely diffused, representing a serious economic problem on a global scale. In this research, we seek to identify the cost and benefit factors that virtual community members perceive while involved in sharing that can lead to illicit software/file piracy. Furthermore, the identified factors serve as the basis for furthering the theoretical development of Internet pirate copying behavior in virtual community sharing from the perspective of social behavior as exchange. Our findings, which answer the fundamental question of why individuals pirate software/files when sharing knowledge in the virtual community, have important theoretical and managerial implications.

Keywords: software/files piracy, social exchange theory, virtual community, knowledge sharing

1. Introduction

The Internet-based forum provides a virtual space where individuals with the same interest can group together to share their knowledge, generate innovative ideas,

and broaden their social connections with each other (Carver, 1999; Hagel and Armstrong, 1997; Adler and Christopher, 1999). These interactions shape a new form of social life (DeSanctis and Gallupe, 1987; Alavi and Keen, 1989) which is complex and can be hard to control in terms of what community members share. In particular, when the virtual community guarantees anonymity for its members, community members are free to post and download what they consider to be good and valuable for group members and themselves. As the information shared that lies beyond personal experiences and knowledge may or may not be authorized intellectual property or public domain software, it is easy for virtual community members' sharing enactments to fall into the trap of files piracy.

As Lenhart et al. (2004) report, over 40% of U.S. Internet users have posted or downloaded audio and video files, artwork, articles and individual lived-experiences to or from the online world for sharing. However, many of these users neither know nor even care about the copyright status of the contents they share. According to the Business Software Alliance (BSA) and International Digital Corporation (IDC) report (2006), in 2005, the worldwide software piracy rate averaged at 35% worldwide, amounting to nearly \$40 billion in global losses. Particularly worrying is the fact that illegally duplicated software is rampant and rapidly increasing due largely to the introduction of peer-to-peer networks (P2PNs) to facilitate Internet file downloading among Internet-based community members (IDC, 2003). Typically, Internet-based community members categorize various resources into systemized items and post them onto the forum of the virtual community. This permits other community members to download the resources of interest via the P2PNs file sharing system. In fact, copyrighted software and intellectual property are protected by law, rendering those who breach the law as committers of an offence. Paradoxically, virtual community members duplicate whatever is shared among group members on the Internet forum, regardless of its legality and the consequences. This is the backdrop against which pirate copying research has arisen.

Many researchers have perceived pirate copying behavior as an individual enactment relating to an individual's sense of morality about (Jaffee and Hyde 2000; Morres and Chang, 2006), intention toward (Hunt and Vitell, 1986; Thong and Yap 1998; Vallerand et al, 1992; Soloman and O'Brien, 1991), and self-control with respect to (Higgins, 2005) performing piracy behavior. However, as individuals are involved in

sharing and duplicating illicit resources among community members, such illicit sharing behavior in the Internet-based community may be perceived as a social exchange behavior where community members transfer their (legal and illegal) resources voluntarily among multiple members (Cook, 1977) via their social exchange relationships. The social exchange relationship may be understood as “actions contingent on rewarding reactions from others” (Blau, 1964, P.91). Here, the rewarding reactions can be the return of material and non-material goods from other group members (Homans, 1958). The conducting of sharing behavior in the virtual community forum can be costly to the individual (with respect to the risk of being reported for files piracy). In addition, members attempt to seek as much (reward) from others as they give to them, imposing pressure on those who receive to give back. This influence process leads to an exchange equilibrium (Homans, 1958). Thus, the seeking of maximum profit and balance in the exchange becomes the tacit and unspoken consensus among community members in their collective sharing enactments.

In this study, we seek to identify the cost and benefit factors that virtual community members perceive while they are involved in sharing that can lead to the illicit behavior of file piracy. Furthermore, these identified factors will serve as the basis for furthering the theoretical development of Internet pirate copying behavior in virtual community sharing from the perspective of social behavior as exchange. It is hoped that our research findings will help to advance the understanding of collective tacit and unspoken consensus as the motivation for the performing of illicit sharing by virtual community members in terms of costs and benefits.

2. Theoretical Framing

2.1 Internet Pirate Copying Behavior

Internet piracy has triggered a war between Internet users and the producers of intellectual goods. File-sharing of all sorts has grown from less than 10 percent of total Internet traffic in 1999 to nearly 60 percent in 2007. In particular, the expansion of broadband, along with new technologies (such as P2PNs), enables the rapid sharing of huge files (Quirk, 2007). Much Internet piracy behavior takes advantage of these new technologies in spreading books, movies, DVDs, and software, causing enormous revenue to be lost worldwide. In addition to the issue of advanced

technologies that facilitate file sharing, another important issue regarding Internet pirate copying is the young age of the population involved in such activity (Riley, 2005; BSA-IDC, 2006). The following question must be asked: why should this population, which has weak economic consumer power, be prepared to take the risk of being charged with a crime or being fined for pirating files?

A significant body of literature adopts the perspectives of the individual's sense of morality (Jaffee and Hyde 2000; Morres and Chang, 2006), intention (Hunt and Vitell, 1986; Thong and Yap 1998; Vallerand et al, 1992; Soloman and O'Brien, 1991), and self-control (Higgins, 2005) to further the understanding of motivations for file piracy behavior. Beyond focusing on the individual's constructs, few of these studies have focused on the interplay of social features (peer norms, social cognition) and an individual's constructs in file pirating (Christensen and Eining 1991; Thompson and Logsdon, 1992; LaRose and Kim, 2007).

These approaches fail to answer the fundamental question: why do young adults pirate files of different kinds? In Cheng et al. empirical study (1997), they identified 9 important reasons for the pirating of files by young people: "software too expensive, want to try out the software, can't afford the software, only use it for a short time, it's easy to copy software, new version is coming up, little chance of being caught, most people I know copy software, and software license too restrictive" (p.56). Cheng et al.'s (1997) research findings progress our understanding by demonstrating that in comparing the economic gains/benefits (free software) with the cost (being caught), the cost of performing piracy behavior is less important for young adults. However, as file piracy occurs in the Internet-based communities with the help of advanced technologies (e.g. P2PNs), such behavior is no longer an individual act, but is social and a feature of the cyber life of young adults.

2.2 Knowledge and Resource Sharing as Social Exchange Behavior

The theory of social exchange was developed to explain the social behavior of humans in economic activity (Hormans, 1958). The core concept of this theory is that the exchange relationship among specific actors as actions is dependent on social rewarding reactions from others (Blau, 1964). This differs from the economic exchange theory, which views actors as dealing with a market but not with other actors (Emerson, 1987).

Social behavior is an exchange of goods, which can be material goods such as money, and non-material goods such as the symbols of prestige or approval (Hormans, 1958). As actors interact with others, there result numerous eventualities that prompt the actors to modify their resources upon each others' expectations. In addition, social exchange assumes the existence of relatively long-term relationships of interest as opposed to short-term exchanges (Molm, 1997). Actors do others favors with the broad expectation of some future return but no clear expectation of exact future return.

Knowledge and resource sharing via the virtual community forum can be seen as a form of social exchange (Fulk et al. 1996) in which many members participate and where reciprocal dependence is indirect, with the virtual community forum serving as the mediator between knowledge/resource contributors and seekers. Knowledge/resource contributors share their knowledge/resources without exact expectation of future return, and work on the relatively longer-term relationships of interest.

The costs in social exchange can be a form of opportunity costs and actual loss of knowledge or resources (Molm, 1997). For example, the time and effort required for the knowledge/resource contributor to prepare the knowledge/resource may exclude him from accruing other rewards, which is known as the opportunity cost. As the contributor loses his power by giving away knowledge/resource, this loss may be regarded as actual loss of knowledge/resource. The benefits in social exchange can be the motivators for participants to exchange knowledge/resources (Vallerand, 1997). For example, resource contributors may receive credit from the forum owner for his sharing, through which higher authority in accessing the resources can be obtained. From the interpretative framework of social exchange theory, the participants in knowledge/resource sharing seek to find ways of maximizing their benefits and minimizing their costs (Molm, 1997) in the social exchange process.

3. The Research Model and Hypotheses

We adopt the social exchange theory as the research model and identify the cost and benefit factors by two means: firstly, by reviewing the literature on knowledge/resource sharing and social exchange literatures; secondly, by conducting context-specific interviews with the key members who have joined resource/knowledge sharing activities in the virtual community to validate and

supplement the findings of previous literature. With respect to research ethics, the virtual community under study has been given the pseudonym “GoodShare”.

3.1 Costs

Codification Effort

The enactment of knowledge and resource contribution to the virtual community requires an individual’s time and effort to explicate and codify her/his lived-experiences, such as skill in resolving software bugs, know-how in using particular software, and ideas derived from watching movies, listening to music, and playing games. The expense of time and effort in codifying these experiences is costly for the individual and can prevent them from sharing (Goodman and Darr, 1998; Markus, 2001; Kankanhalli et al., 2005) in the virtual community. Hypothesis H1 can therefore be formulated as follows:

H1: Codification effort is negatively related to the individual’s knowledge/resource sharing behavior.

Loss of Knowledge Power

The loss of power due to the contributing of knowledge can be an obstacle to knowledge sharing (Davenport and Prusak, 1998, Michailova and Husted, 2003; Chennamaneni, 2006). Since knowledge is perceived as a source of power, knowledge contributors may fear losing their power or value if others know what they know (Gray 2001; Michailova and Husted, 2003; Chennamaneni, 2006). Consequently, potential knowledge contributors may keep themselves out of a knowledge exchange if they feel they can benefit more by hoarding their knowledge rather than by sharing it (Davenport and Prusak, 1998; Chennamaneni, 2006). Thus, the following hypothesis can be formulated:

H2: Loss of knowledge power is negatively related to the individual’s knowledge/resource sharing behavior.

Yoke of Risk

To develop an integrative understanding of the risks influencing individuals in exchanging what they have in the virtual community, we conducted a context-specific interview with the key members of “GoodShare”. A total of 30 participants, consisting of 7 workshop owners and 23 community members were interviewed via e-mail and MSN. Their main concerns about the risks with regard to pirate copying of

intellectual property or software while they conducted knowledge/resource sharing emerged from the “GoodShare” members’ interviews. Participants also worried about catching viruses while downloading resources from the forum. Therefore, the following hypothesis can be formulated:

H3: The yoke of risks with regard to pirate copying of intellectual property or software is negatively related to the individual’s knowledge/resource sharing behavior.

3.2 Benefits

Reciprocity

From the perspective of social exchange theory, reciprocity is a benefit for individuals who engage in the acts of social exchange (Blau, 1964; Molm, 2007). Knowledge sharing literature reviews also show that individuals who conduct knowledge sharing in online communities believe in reciprocity (Wasko and Faraj, 2000; Kankanhalli et al., 2005; Chiu et al., 2006). As individuals contribute their knowledge or resources to the community, they expect future return from the other members in return for their giving. Hypothesis H4 can therefore be formulated as follows:

H4: Reciprocity is positively related to the knowledge/resource sharing behavior of knowledge contributors.

Image

The social exchange theory hypothesizes that people who engage in social interaction do so on the basis of the expectation that it will, in some way, lead to social rewards such as approval, status, and respect (Blau, 1964). Therefore, as individuals actively participate in social interaction such as knowledge and resource sharing, they are able potentially to acquire a good reputation (Constant et al., 1996; Wasko and Faraj, 2005) from his/her social network. Reputation as the image of self is vitally important in influencing individual position within a group (Jones et al., 1997). Constant et al. (1996) finds that an individual who intends to improve his/her reputation in the community will be more strongly motivated to participate in collective action. Accordingly, Hypothesis H5 is stated as follows:

H5: Image is positively related to the knowledge/resource sharing behavior of knowledge contributors.

Community's Reward

Knowledge sharing literature indicates that individuals expect to receive reward from their organizations in response to their knowledge contribution (Beer and Nohria 2000). At the same time, organizations provide various forms of incentive (salary rise, bonus, promotion, etc.) to motivate their subordinates to adopt knowledge sharing behavior (Ba et al. 2001; Beer and Nohria 2000). For knowledge/resource sharing practices in virtual communities, the manager of such communities also establishes various incentive mechanisms to reward those members actively involved in sharing. On the basis of our context-specific interviews, we identify several forms of incentive: increasing contributor's resource accessibility; granting a leadership role to the contributor; elevating the contributor's social position in the community; rewarding the contributor publicly in the community; and offering virtual money to the contributor. Thus, Hypothesis H6 can be formulated as follows:

H6: The virtual community's reward is positively related to the knowledge/resource sharing behavior of knowledge contributors.

Free Resources

Free resources are identified from the context-specific interviews of "GoodShare" members. These free resources include tryout versions of movies, MP3s, cartoons, games, e-books, software. Generally, the "GoodShare" community members perceive these free resources as the most important benefit of sharing. Hypothesis H7 can therefore be formulated as follows:

H7: Access to free resources is positively related to the individual's knowledge/resource sharing behavior.

Knowledge Self-efficacy

Self-efficacy refers to people's judgment of their capability to organize and execute a course of action required to attain designated types of performance (Bandura, 1986). It may be built through goal attainment, vicarious observation, and supportive feedback. The stronger the individual's perceived self-efficacy that he/she can meet his/her standard (goal), the more the individual will intensify his/her effort (Bandura, 1986, pp. 470-71).

Knowledge self-efficacy is a key intrinsic motivator in explaining individual knowledge sharing intentions (Lee et al., 2006; Lin, 2007). It is apparent in the form of people judging that their knowledge can help to solve work-related problems

(Constant et al., 1996), make a difference to their organization (Wasko and Faraj, 2000), or advance work efficiency (Ba et al., 2001). It also has a significant impact on the extent to which individuals share their knowledge with others (Kankanhalli et al., 2005; Lin, 2007). Therefore, Hypothesis H8 can be formulated as follows:

H8: Knowledge self-efficacy is positively related to the knowledge/resource sharing behavior of knowledge contributors.

Enjoyment in Helping Others

The concept of enjoyment in helping others is derived from the idea of Altruism. From the Altruism perspective, individuals receive intrinsic enjoyment when they help others without expecting anything in return (Krebs, 1975; Smith, 1981). Enjoyment in helping others is an important intrinsic motivator in explaining individual knowledge sharing intentions (Lee et al., 2006; Lin, 2007). Davenport and Prusak (1998) indicate that knowledge contributors can be motivated by altruism based on their desire to help others. In addition, Wasko and Faraj (2000) indicate that individuals are motivated intrinsically to share their knowledge with others since engaging in problem resolving is challenging and enjoyable for them. Accordingly, Hypothesis H9 can be formulated as follows:

H9: Enjoyment in helping others is positively related to the knowledge/resource sharing behavior of knowledge contributors.

On the basis of the previous literature review, Figure 1 depicts our social exchange-based research model.

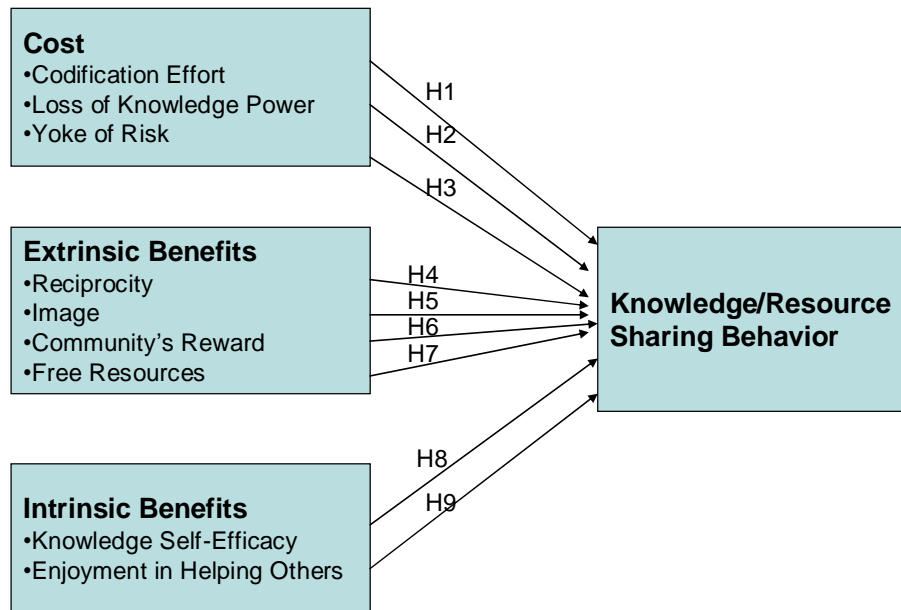


Figure1. The Research Model

4. Research Design

This study used a structured questionnaire to collect data. To include subjects who were members of the underground virtual community, we announced a link to the survey in the bulletin board system of the underground virtual community. Qualified subjects were invited to respond to the questionnaire online. Data were collected via a close-ended questionnaire. The seven-point Likert scale was used by subjects to respond to the questionnaire, where 1 represented 'totally disagree' and 7 represented 'totally agree' for each item.

4.1 Subjects

In Taiwan, the issue of software pirating is a serious problem. As the BSA-IDC reports (2006), the software piracy rate in Taiwan for the four years leading up to 2005 was around 40%, which is above the world average rate of 35%. In this research, we observed an Internet-based community whose members were actively involved in sharing. Sharing consisted of: individual's knowledge, lived-experience and reviews of articles, pictures, music, DVDs, computer games, software packages, and software

bug resolving. All of these sharing enactments go hand-in-hand, to a greater or lesser extent, with pirate copying behaviors.

A total of 623 individuals responded to the questionnaire, with 134 incomplete questionnaires being discarded. While 84.3% of the subjects were male, only 15.7% were female. A total of 74.6% of the subjects were students, 7.2% were in the information technology industry, and 3.7% were in manufacturing. Most of the subjects were well educated: 80.4% were college students and 10.6% were undergraduate students. Most of the subjects were 21~25 years old. The detailed demographics of the study subjects can be found in Table 1 below.

Table 1. Demographics of study subjects

| Gender | | Education | |
|---------------------------------|-------|--------------------|-------|
| Male | 84.3% | Senior high school | 2.5 % |
| Female | 15.1% | Vocational school | 6.5% |
| | | College | 80.4% |
| | | Undergraduate | 10.6% |
| Industry | | Age | |
| Students | 74.6% | Under 20 years old | 12.9% |
| Information technology industry | 7.2 % | 20~25 years old | 59.7% |
| Manufacturing | 3.7 % | 25~30 years old | 22.9% |
| Service industry | 3.5 % | 30~40 years old | 4.1 % |
| The farming industry | 1.6 % | Over 40 years old | 0.4 % |
| Unemployed | 1.0 % | | |
| Public service | 0.8 % | | |
| Finance and insurance industry | 5.9 % | | |
| Other | | | |

4.2 Measurements

The questionnaires in this study comprised ten parts, each of which was scored on a Likert-type 7-point scale: codification effort, loss of knowledge power, yoke of risk, reciprocity, image, community’s reward, free resources, knowledge self-efficacy,

enjoyment in helping others and knowledge sharing. The codification variable was measured using a questionnaire developed by Ba et al. (2001) and Markus (2001). The loss of knowledge power variable included 3 items, as proposed by Gray (2001) and Thibaut and Kelley (1986). The yoke of risk variable was measured using a questionnaire developed from the interview in this study. We applied the measurement developed by Wasko and Faraj (2000) and Yamagishi and Cook (1993) for the reciprocity variable. The image variable measurement was that proposed by Kalman (1999) and Moore and Benbasat (1991), while the questionnaire pertaining to the community's reward was that proposed by Huang (2002). The free resources measurement was developed from the interview in this study. Kalman (1999) provided the knowledge self-efficacy measurement, and Wasko and Faraj (2000) the enjoyment in helping others measurement. Finally, we applied the measurement developed by Igarria et al. (1986) and Davis (1989) for the knowledge sharing variable.

The questionnaire completed by the respondents contained multiple measurement items relating to each of the constructs in the research model. To attain acceptable reliability, the Cronbach alpha of each construct should be over 0.7 (Bearden et al., 1993). In this study, we adopted principal component factor analysis with varimax to assess validity. In the codification effort questionnaire, the Cronbach alpha was over 0.83 and the factor loading was over 0.5, indicating an acceptable level of internal consistency and reliability of the codification effort questionnaire. In the loss of knowledge power questionnaire, the Cronbach alpha of seven items was over 0.96. After deleting the inappropriate items, the final questionnaire of yoke of risk contained three items, and the Cronbach alpha was 0.90. In the reciprocity questionnaire, the Cronbach alpha was 0.93. In the image, community's reward, free resources, knowledge self-efficacy, enjoyment in helping others and knowledge sharing, the Cronbach alphas were 0.89, 0.94, 0.94, 0.90, 0.95, and 0.91 respectively.

4.3 Hypothesis Testing

We used regression analysis to predict the relationship between codification effort, loss of knowledge power, yoke of risk, reciprocity, image, community's reward, free resources, knowledge self-efficacy, enjoyment in helping others and knowledge sharing. The results of this analysis are presented in Table 2.

Most of the independent variables had non-significant effects on knowledge sharing in the underground virtual community. The first regression equation is $\text{knowledge sharing} = -0.005 \times \text{codification effort}$, for which the p-value of the regression coefficients is 0.886. That indicates a negative and non-significant relationship between knowledge sharing and the codification effort, thus not supporting hypothesis H1. The equation for the influence of yoke of risk to sharing knowledge can be formulated as $\text{knowledge sharing} = 0.030 \times \text{yoke of risk}$, for which the p-value of the regression coefficients is 0.4. The equations for the influence of image, knowledge self-efficacy, enjoyment in helping others to share knowledge are: $\text{knowledge sharing} = 0.072 \times \text{image}$ (p-value=0.06), $\text{knowledge sharing} = 0.009 \times \text{knowledge self-efficacy}$ (p-value=0.82), $\text{knowledge sharing} = -0.034 \times \text{enjoyment in helping others}$ (p-value=0.42). Thus hypotheses H1, H3, H5, H8 and H9 are not supported.

Indeed, loss of knowledge power, reciprocity, community's reward and free resources were the important predictors of knowledge sharing, while this regression equation explained 50.4% of the variance in these variables for knowledge sharing. The results pertaining to loss of knowledge power, reciprocity, community's reward and free resources on knowledge sharing ($\beta = -0.215$, $p < 0.01$; $\beta = 0.120$, $p < 0.05$; $\beta = 0.288$, $p < 0.01$; $\beta = 0.279$, $p < 0.01$; respectively) suggest that participants are more likely to share their knowledge when there is a lower loss of knowledge power, stronger reciprocal relations, and more community reward and free resources. Therefore, hypotheses H2, H4, H6, and H7 are supported.

Table 2. Variables Used in the Regression Equations

| Variable | Standardized regression coefficient (β) | t | p-value |
|--------------------------|---|--------|---------|
| Codification effort | -0.005 | -0.144 | .886 |
| Loss of knowledge power* | -0.215 | -5.464 | .000 |
| Yoke of risk | 0.030 | 0.843 | .400 |
| Reciprocity* | 0.120 | 2.713 | .007 |
| Image | 0.072 | 1.883 | .060 |
| Community's reward* | 0.288 | 6.077 | .000 |
| Free resources* | 0.279 | 6.943 | .000 |

| | | | |
|-----------------------------|--------|--------|------|
| Knowledge self-efficacy | 0.009 | 0.223 | .823 |
| Enjoyment in helping others | -0.034 | -0.803 | .422 |

$R^2 = 0.504$

*Significant

In summary, Hypotheses 2, H4, H6, and H7 are supported, while Hypotheses H1 H3, H5, H8 and H9 are not supported. These results are shown in Table 3.

Table 3. Result of. Hypothesis Test

| Hypothesis | Result |
|--|---------------|
| <i>H1: Codification effort is negatively related to the individual's knowledge/resource sharing behavior.</i> | Not Supported |
| <i>H2: Loss of knowledge power is negatively related to the individual's knowledge/resource sharing behavior.</i> | Supported |
| <i>H3: The yoke of risks with regard to pirate copying of intellectual property or software is negatively related to the individual's knowledge/resource sharing behavior.</i> | Not Supported |
| <i>H4: Reciprocity is positively related to the knowledge/resource sharing behavior of knowledge contributors.</i> | Supported |
| <i>H5: Image is positively related to the knowledge/resource sharing behavior of knowledge contributors.</i> | Not Supported |
| <i>H6: The virtual community's reward is positively related to the knowledge/resource sharing behavior of knowledge contributors.</i> | Supported |
| <i>H7: Access to free resources is positively related to the individual's knowledge/resource sharing behavior.</i> | Supported |
| <i>H8: Knowledge self-efficacy is positively related to the knowledge/resource sharing behavior of knowledge contributors.</i> | Not Supported |
| <i>H9: Enjoyment in helping others is positively related to the knowledge/resource sharing behavior of knowledge contributors.</i> | Not Supported |

5. Discussion

5.1 Self-Accomplishment versus the Risk of Software/Files Piracy

The reward mechanism in “GoodShare” is linked to the hierarchical social structure of the virtual community. When an individual joins “GoodShare”, (s)he is placed at the lowest position of the hierarchical social structure of the community, where no virtual money is given and the lowest level of resource access permission is granted. When the individual continuously shares valuable knowledge and resources with community members, her (his) virtual money and permission to access resources increases commensurately. Therefore, the more resources and valuable knowledge an individual shares, the higher up the social ladder in the virtual community (s)he will climb. Moreover, the higher the social position an individual occupies, the more returns from the community can be expected.

These returns include both tangible and intangible benefits. With respect to tangible benefits, the individual benefits from the lived-experiences of others such as skills in resolving software bugs, know-how in using particular software, and movie, music, and game reviews. In particular, the expensive types of software shared by other community members are the greatest benefits for these young adults, who own less consumer power. Gaining access to free resources, in return, provide these youngsters with an equal opportunity to enjoy resources, regardless of their weak economic power. In terms of intangible benefits, the individual can earn others’ respect through their valuable contributions to the community. This is an important motivation for those young adults who are college students or office juniors who tend to feel less accomplished in the physical world. In this respect, the virtual world provides an alternative means for developing a sense of achievement.

Although youngsters are the majority consumers of software and various sorts of media products (e.g. movies and music), their social status and consumer power prohibits them from acquiring the expensive software and media products on the market. They would rather take the risk of being caught pirating software than lose their equal opportunity in consuming these products. Thus, as they have the chance of enjoying these products in the virtual forum, they make every effort to gain these resources in exchange. This is an important finding that should be taken into consideration by managers involved in product pricing strategies, as it can assist in

bringing about a solution which creates a win-win situation for both product producers and youngsters.

5.2 The Role of the Virtual Community in Product Innovation and Circulation

Virtual communities like “GoodShare” can speed up the diffusion of products. Participants do not have to wait for vendors to release patches and security upgrades, since the virtual community members possess the ability to maintain these efforts. They are able easily to identify product bugs and security problems, and to fix them in much shorter cycles than product producers can do. If the product producers can take advantage of these “GoodShare”-type virtual communities, they will be able to develop more reliable products through the sharing and collaboration of virtual community members. Community members can also satisfy technical support functions and provide helpful support.

In addition, the “GoodShare” community establishes a self-sustaining system to overlook the development and improvement of software and various sorts of media products on the market. With this self-sustaining system, the products could be continuously improved to replicate the features that are already included in the competitors’ product, or even surpass them. This would lead to constant pressure being placed on the competition to innovate new features with minimum resource allocation for the vendors and product producers. In light of this, there is potential for the features of “GoodShare”-type communities to help reduce the costs of the product development process and new idea innovation.

Members of “GoodShare” can also contribute to design innovation and improve product customization, as this virtual forum provides a good vehicle for customer relationship management. By improving the quality of the software, the customized software can attract more customers to the market. With network effects, better software leads to a larger community, which, in turn, makes the software even better. This cycle accelerates the adoption rate of the software. At the same time, by involving the customers in the development process, companies are able to establish closer relations with customers.

6. Conclusion

In this study, we have sought to identify the cost and benefit factors that virtual

community members perceive when they are involved in sharing, which can be regarded as the illicit behavior of software piracy. Our research findings show that young adults with good levels of education are the main population of the “GoodShare” community. They perceive “GoodShare” as a place where they can share their knowledge and all-sorts of lived-experiences; in particular, their reviews and experiences of articles, pictures, music, DVDs, computer games, software packages, and software bug solutions. Nevertheless, sharing in the community can lead to the illicit pirate copying of files.

Although these youngsters are aware of the risk or cost of piracy, they still do it so as to gain expensive, yet, free resources during community members’ sharing. They also realize that by sharing more, they gain greater rewards from the community, which include: increasing their privileges with respect to resource accessibility; moving up the community’s leadership hierarchy, receiving public reward, and gaining more virtual money. All these community rewards, together with the free resources shared from other members, are the benefits that strongly motivate these young adults to participate in Internet piracy behavior.

In fighting Internet piracy, various ideas and discussions have been proposed, such as making new laws to end Internet pirate copying, or introducing advanced technology to protect digital content (Bach, 2004). However, these ideas represent defensive strategies against piracy and give the producers the upper-hand in driving the market. Understanding the benefits and costs that these youngsters perceive when involved in Internet piracy is important in forming a strategy that solves Internet piracy without infringing on basic consumer rights. In particular, Internet piracy can seriously endanger the world economy, thanks to the power of the Internet and the sharing enactments of community members.

In addition, we observed that youngsters are able to resolve software bug problems and break the key protection of software licenses through community member interactions. In such behavior, not only do they demonstrate their talents, but also their determination to win the recognition of other members of the community. In light of this, product producers and strategy makers would be wise to consider how best to harness the knowledge and skills of these young adults to improve the quality of products (e.g. solving program bugs) through the social reward of the virtual community.

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Due to page limitation, the completed references can be provided via request.

4.3. 出席國際學術會議心得報告

2007 年 12 月中揭幕的是資管界一年一度的國際盛會 ICIS，會前會有包括專們討論質性研究的 OASIS、討論電子商務的 Web、討論科技的 WITS 等。這些會議的文章大多由美國、台灣、香港、韓國、新加坡、澳洲、日本、法國的學者提出，許多重要的國際期刊編審委員，逐年增派人員積極投入此一大會邀請會中文章投稿。此外，大會中安排精彩的與談人、評論者參加整個討論發表的過程，這使得發表人與觀眾多受益良多。台灣學者可以藉由參加此一類大會，增加國際交流，提升台灣學者的研究參與度。同時，建議台灣應該主動積極爭取主辦這一類的學術會議，增加學術的研究品質與能見度。

WEB2007 會議共有四場 session 以及兩個 Panel discussion，每一時段有 5~6 個分項議程同時研討(Session)，與會者可以參加任一個 Session 或 Panel discussion。Session 主席通常會分配每一篇文章的研討時間，研討的方式是由文章的作者發表著作並進行問答，發表及問答通常會交錯進行，參加的人員可以自由向作者提問，或逕行互相討論。文章的討論都非常踴躍，此處頗值得國內學術會議效法。由於這是一個國際性的會議，參加者都極度關注各國的學術發展，因此鼓勵大家參加此一研討會將有助於增加台灣學術在國際上的地位，這將對研究品質有所裨益。

我的題目是 “An Empirical Investigation of Internet Pirate Copying Behavior in Virtual Community Sharing: The Social Exchange Perspective”，首先由作者發表簡短的研究中的論文約為 10 分鐘，再由在場的資深學者來指導研究方向共 20 分鐘，經由充分討論與溝通，作為日後研究修正的依據。與會的學者大都對於研究方法有十分的興趣與接觸，因此在發表後，不但收到許多的迴響與指導，也進一步認識了這一個領域中其他研究者的想法。除此之外，這次的 session 是由來自不同的三個國家的作品，我們也都很高興能分享不同文化下，對不同研究的想法，並有意於會後再以 Email 連絡與討論。

今年與會的人士除了今年美國的各大學學者之外、也邀請了許多重要的國際期刊編審人員，實在是一個學術交流的重要場合。可喜的是，大會中的台灣學者表現耀眼，不

但是 WEB 大會的主要推動者，發表的文章也受到與會的其他學者的肯定，例如今年的最佳論文就是由台灣學者掄元。然而，令人擔憂的是，台灣的研究學者在此一重要會議中往年人數很多，每壹年都會出席參與的中山大學師生、政治大學老師、中央大學老師、清華、交通大學老師，今年雖然也都列席並主持各項大會重要的討論，但是人數已經有明顯減少。而大陸學人，參加的人潮逐年增加，他們的英文流利態度積極、企圖心強，實在值得台灣警惕與學習。

最後，目前國內學術界瀰漫著 SSCI, SCI, IE...期刊的狂熱，而參與國際會議相較之下顯得沒有任何效益，甚至還要自掏腰包或是面臨補課、調課的不便，因此參加的情況並不踴躍。但是，參加國際會議是台灣學者了解研究趨勢、建立研究諮詢管道、保持研究靈敏度，所必要的活動。因此，建議國內學者應該更積極參與國際會議，提升英文能力與研究的深度。而研究機構與指導單位，應該給於參加國際會議更大的支持與鼓勵。

(發表之論文請參閱附件二)