行政院國家科學委員會專題研究計畫 成果報告行政院國家科學委員會專題研究計畫 成果報告

質化研究之虛擬情境教育館：發展個群共構的數位自主學習環境
研究成果報告(精簡版)產業內貿易和勞動市場調整—台灣廠商和員工合併資料之研究
研究成果報告(精簡版)

計 畫 類 別 ：個別型個別型
計 畫 編 號 ：NSC 96-2520-S-024-005-NSC 96-2415-H-032-001-
執 行 期 間 ：96 年 08 月 01 日至 97 年 07 月 31 日 96 年 08 月 01 日至 97 年 10 月 31 日
執 行 單 位 ：國立臺南大學數位學習科技學系(所)淡江大學國際貿易學系

計 畫 主 持 人 ：施如齡鄒孟文

計畫參與人員：碩士班研究生-兼任助理人員：鄭印廷
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報告附件：報告 赴大陸地區研究心得報告
附　　件　：出席國際會議研究心得報告及發表論文
出席國際會議研究心得報告及發表論文

中　華　民　國　97 年 09 月 08 日 98 年 05 月 08 日

附件一

行政院國家科學委員會補助專題研究計畫 ■ 成果報告

質化研究之虛擬情境教育館：

發展個群共構的數位自主學習環境

計畫類別：■ 個別型計畫　　□ 整合型計畫
計畫編號：NSC　96－2520－S－024－005－
執行期間：　96　　年　8　月　1　日至　97　　年　7　月　31　日

計畫主持人：施如齡
計畫參與人員：鄭印廷、陳志秉、吳香儀、徐慶宜

成果報告類型(依經費核定清單規定繳交)：■精簡報告　□完整報告

本成果報告包括以下應繳交之附件：
□赴國外出差或研習心得報告一份
■赴大陸地區出差或研習心得報告一份
□出席國際學術會議心得報告及發表之論文各一份
□國際合作研究計畫國外研究報告書一份

處理方式：除產學合作研究計畫、提升產業技術及人才培育研究計畫、列管計畫及下列情形者外，得立即公開查詢
□涉及專利或其他智慧財產權，□一年□二年後可公開查詢

執行單位：台南大學 數位學習科技學系

中　華　民　國　97　年　8　月　10　日

附件二

可供推廣之研發成果資料表

□ 可申請專利　□ 可技術移轉　日期：97 年 9 月 4 日

國科會補助計畫	計畫名稱：質化研究之虛擬情境教育館：發展個群共構的數位自主學習環境 計畫主持人：施如齡 計畫編號：96－2520－S－024－005－ 學門領域：資訊教育-電腦輔助教學
技術/創作名稱	無
發明人/創作人	
技術說明	中文： （100~500 字）
	英文：
可利用之產業及可開發之產品	
技術特點	
推廣及運用的價值	

※ 1.每項研發成果請填寫一式二份，一份隨成果報告送繳本會，一份送　貴單位研發成果推廣單位（如技術移轉中心）。

※ **2.本項研發成果若尚未申請專利，請勿揭露可申請專利之主要內容。**

※ 3.本表若不敷使用，請自行影印使用。

質化研究之虛擬情境教育館：發展個群共構的數位自主學習環境

A Virtual Situation Educational Museum of Qualitative Research: Developing a Co-independent Digital Self-learning Environment

計畫編號：96-2520-S-024-005

執行期限：96 年 8 月1 日至 97 年 7 月31 日

主持人：施如齡（台南大學數位學習科技系）

計畫參與人員：鄭印廷、陳志秉、徐慶宜（台南大學數位學習科技系）、

吳香儀（淡江大學教育科技系）

目錄

摘要

隨著數位學習邁進成熟化的階段，學習環境的建置也相對地更注重教學策略與學習活動的靈活運用。本研究之重點乃在於探索式「虛擬情境教育館」數位學習環境之建置，欲藉由網路系統來提供質化研究初探者一個自我探索與學習的入口。研究者從實體課程的教學經驗中，萃取具有學習成效的教學策略與學習活動，轉變並整合成適用於數位環境的學習模式。此建置歷程，將與實體課程相輔相成，進行實地學習的測試與評估，來獲得學習理論與模式的修正。同時，於研究過程中，藉由實際帶領質化研究初探者進行個別研究，更深入地探索質化研究之理論議題，並將實際範例提供給相關領域研究者，共同進行探究，最終整合成一更爲完備的虛擬教育館。

本研究將問題導向學習的步驟搭配研究流程，形成「研究型問題導向學習」（RPBL）流程，藉由問題的引導進一步瞭解複雜的因果關係和互動情形，針對質性研究裡的田野調查歷程，協助研究者進行實作與探索式的學習。並運用教學支援平台 Life Type 進行製作，呼應每個學習階段規劃相呼應的教學活動與任務，選用客製化工作任務。另外每位學習者皆有類似於「部落格(blog)」的個人空間，方便學習者上傳研究資料、下載檔案、瀏覽進度。使用者得以進行錄音、建檔、進度追蹤等工作，並於上線時上傳至平台。其最主要的目的是將 RPBL 流程搭配質性研究的田野調查，以其教學模式來提升「質性研究課程」的學習成效，除了增加「質性研究課程」管理的便利性外，並促進研究者的研究效率和增進工作內容的彈性。

關鍵字：質化研究、虛擬情境、自主學習、數位環境、個群共構

Abstract

As digital learning is more widely used in this decade, more focus is paid in the implementation of instructional strategies and designs of learning activities for learning environment. This research is to build a co-independent digital self-learning environment for novice in conducting qualitative research. The Virtual Situation Educational Museum (VSEM) of Qualitative Research is a web-based system functioning as a self-exploratory learning space. Researcher extracts instructional strategies and learning activities that are effective in face-to-face classes, and transforms them into appropriate learning model for digital learning. VSEM is to assist learners to the investigation of theoretical issues and practical cases. By sharing independent researches, learners can learn from the social community of peers whose research experiences and results can dedicate to a more complete VSEM.

This research is to take the steps of problem-based learning with research process, and generate Research Problem-Based Learning（RPBL）instructional model. After understands the cause-effect relationship, learners can use it to conduct exploratory learning in field study. This research also develop a Life Type platform to allow customizable instructional tasks. Every learner has a personal blog space in which learners can upload their research data, download files, and browse their research progress. The main purpose is to use the RPBL process to guide students in their qualitative research learning, and to elevate their learning effectiveness.

Keywords：Qualitative Research, Virtual Situation, Self-Learning, Digital Environment, Co-independent Construction

報告內容

前言

質化研究不是新興領域，它的存在從早期哲學現象學延續至現今較爲流行的行動研究；然而，其方法的應用與實踐，甚至是論述發表與接受，不斷面臨科學實證研究典範的挑戰。在科學鼎盛與充斥的當代，人文亦默默地豐富其內涵並建立體系。

因此，教育研究已然重新興起質化研究的思潮，質化研究在教育領域裡的應用正在台灣被廣泛的推廣與逐步地受到重視中。然而，當質化研究漸形重要，質化研究初探者卻明顯地有認知不足的現象。研究初探者（尤其是研究生）在典範轉移的過程中，經常處於矛盾與摸索的階段，對於研究理論概念與實務操作方法兩方面感到困惑，研究法誤用或方法濫用的情形甚爲普遍。

研究目的

本計劃有鑒於質化研究初探者於學習初期尚需有系統的基礎訓練，因此覺得質化研究的推廣與奠基工作首在析理出一套學習計畫，促進學習者的自我成長。在學習過程中，增加研究範例的介紹與評析，透過研究者彼此的分享與互動，可以更釐清研究者的理論概念與實務方法。

因此欲將問題導向學習的步驟應用在研究方法的課程，搭配研究流程，形成「研究型問題導向學習」（RPBL），藉由問題的引導進一步瞭解複雜的因果關係和互動情形，針對質性研究裡的田野調查歷程，協助研究者進行實作與探索式的學習，以進行質性研究的工作。此教學歷程是運用教學支援平台 Life Type 進行製作，介紹 RPBL 的學習流程，並於每個學習階段規劃相呼應的教學活動與任務，並讓學習者能因其研究內容的不同，而客製化工作任務。不同於一般課程，在此平台上，每位學習者皆有類似於「部落格(blog)」的個人空間，方便學習者上傳研究資料、下載檔案、瀏覽進度。Life Type 能支援常見的各種檔案格式，亦可以使用行動載具（如筆記型電腦、Pocket PC 等），讓使用者得以進行錄音、建檔、進度追蹤等工作，並於上線時上傳至平台。其最主要的目的是將 RPBL 流程搭配質性研究的田野調查，以其教學模式來提升「質性研究課程」的學習成效，除了增加「質性研究課程」管理的便利性外，並促進研究者的研究效率和增進工作內容的彈性。

文獻探討

1. 質性研究的意義與內涵

質性研究淵源於人類學領域的現場研究，是人類學家長期參與觀察某個社會的文化現象。從社會觀點去描述事件，闡述其共享的文化歷程，是一種描述文化過程的科學。而這個文化分別可從三種面向建立：人們在做什麼？知道些什麼？和製作、使用的東西（黃瑞琴，2005）？所以質性研究者又被稱爲「寫文化」的作者（陳向明，2002），採取不同方式講述故事，在研究中保有自己的位置，並對研究結果做個人化的描述或解釋。Berg(1998)也進一步提出質性研究「質」的五 W，分別是：事件的什麼（What）、對象（Who）、如何（How）、何時（When）、何地（Where），並以此「五 W」去解釋意義與內部過程的多重關係。質性研究者所從事的便是在描述人們在自然現場的互動行爲，與溝通語言並以文字方式呈現，以當事人的內在觀點切入，去瞭解內部心理與外部環境互動的關係。並非在「研究」對象，而是學習「分享」瞭解他們的

文化和知識，從探討事件背後的價值意義，然後進一步掌握研究本質，所關心的是造成現象的「過程」而非「結果」。

有學者指出質性研究像是一把傘和一株大樹，說明了質性研究是包羅萬象，範圍極廣，掩蔭著許多研究方法的分支(Van Maanen, Dabbs & Faulkner, 1982；Wolcott, 1992)。而其研究的過程，又像是一個漏斗，開始時的上端是開放的，直至底端才較爲聚焦和特定（黃瑞琴，2005）。這個漏斗理論強調研究者研究中的主體性，是「由下往上」去看社會，並在瞭解社會之後，提出修正的方法（王雅各，2004）。質性研究最廣義的解釋是：描述人類一切可觀察的行爲，解釋人類的生活，如說的話、寫得字，是一種描述性資料的研究(Strauss & Corbin, 1990；Taylor & Bogdan, 1984)。而就其內涵來說，質性研究是複雜的符號互動歷程，著眼於研究者與被研究者間互動的關係與對意義的理解，語言分析與語意詮釋是用以瞭解客觀世界和主觀價值的媒介（陳伯璋，2000），相信人類行爲的根本是意義與互動，重視的是內部改變的歷程(Bogdan & Biklen, 1998)。

2.問題導向學習與質性研究之相關

（1） 以發現問題爲起始點

質性研究者是帶著一顆開放、行動的心，在研究現場發現問題、瞭解問題(Maxwell, 1996)和 PBL 是以一個令人困惑的問題爲起始點(Wang, Thompson, Shuler & Harvey, 1999)，兩者間有異曲同工之妙。質性研究者在進入研究現場時，並無預設研究的問題，而是根據從場域中得到的經驗，去探索問題。所以如果能在質性研究中運用 PBL 的理論與模式，將有助於質性研究者進入研究現場發現和探索問題。

（2） 學習者主動地建構知識

當學習者在解決問題時，學習就在「做」與「經驗」中發生(Dewey, 1916)。運用於研究中，正是強調研究者必須做到「知行合一」、「從做中學」，不管是從事量化或質性研究，都不是在做紙上談兵的工作，從實做中不斷地修正，從經驗中建構知識，就是一種研究的精神。

（3） 重視事件的歷程

Barrows 和 Tamblyn(1980)強調 PBL 是學習者如何應用所學解決問題，重視其歷程而非結果。而研究生寫研究論文的目的也是如此，教育部明定研究生必須完成論文的寫作才能結業，這是希望研究生能從研究中學習到批判思考和解決問題的能力，而並非要以產生論文爲導向。

（4） 以學習者爲主

在 PBL 中學習者是學習的主體，教師是學習的促發者，提供學習鷹架，並且評量學習者的學習狀態和監控學習進程(Jones, Rasmussen & Moffitt, 1997)。在研究中，指導教授會提供許多資源和鷹架，幫助學生建構知識系統，引導學生進行思考與批判，並聚焦研究問題，但學生還是必須自己完成研究論文的撰寫與設計。

（5） 重視合作學習

從事研究工作絕對無法一人獨自完成，因爲在過程中你會不斷去請教指導教授的意見，也會請教相關領域專家、學者的建議，甚至是與同儕互相討論和分享，學習傾聽他人觀點，增加思考的深度及廣度（王千倖，1999）。另外，和研究對象的溝通、合作，也都是 PBL 強調合作學習的概念。

3. 學習歷程與成效

教學是要營造能讓學習者充分發揮個人特質的環境。因此在 PBL 的學習環境下，教師的目的是協助學習者釐清概念、聚焦問題，運用所得的資源和工具去做整合與分析，因此在教育現場中，學習者已蛻變成知識的主導者。

就學習的層面來說，教學者重視的是學習者的學習歷程，但是如何在教與學互動的過程中，掌握學習者的學習歷程和監控學習成效呢？本研究運用的 PBL 模式，奠基於合作學習理論，在評量上採用多樣性策略，檢視學習成效。教師提供了一個循環、互動的學習機制，以達成團體的學習目標爲宗旨，間接促使學習者完成個人的學習目標，提升學習效果。在過程中，影響學習成效的因素很多，諸如：個體的先備知識、潛藏特質、學習風格、學習方式等，因此本研究中以 Bloom 和 Krathwohl (1956)所歸類的認知、情意、技能三類教育目標，觀察質化研究者在 RPBL 的課程下的學習歷程及成效。

Bloom和Krathwohl(1956)是最早將學習者的行爲做爲教學目標分類的學者，透過分析教育目標和教育目的，於《*Taxonomy of educational objectives*》一書中將教育目標分成認知領域（Cognitive Domain）、情意領域（Affective Domain）和技能領域（Psychomotor Domain）等三大領域。並將教育目標定義爲：教師在一特定的單元或學習課程中，預期學生在思考、情感、行動方面的變化，意指學生在學習後的產出和應具備哪些特徵，而這些「改變」便是教師應該幫助學生實現的。

教育目標分類系統並不是一套測驗工具，是提供教師撰寫學習目標、規畫課程之依據，促使各學科領域達到互相溝通的效果（李宜玫、王逸慧、林世華，2004）。不管是應用在教學、課程設計或評量上，都能發揮深遠的影響力，而且是多數教學者耳熟能詳的內容。Bloom 提出教師撰寫和制定教育目標有三種意義（邱淵、王鋼、夏孝川等譯，1989）：第一，教師在撰寫或挑選明確的、特定的行爲目標去陳述教學目標的過程中，會使教師去認真思考他將要幫助學生實現的改變；第二，能幫助教師識別出不重要的目標和辨認出被遺漏的目標；第三，明確表達目標時，能幫助教師確認學生在學習環境中的位置。這三個要素，闡述了在教學前制定教學目標的重要。

在 Bloom 和 Krathwohl(1956)教育目標的分類中，學習者的行爲是一個有層次的學習歷程，學生是在有了低層次的學習能力後，才能往更高層次邁進，層次的層級是由簡至繁，有順序地呈現。

4.研究型問題導向學習之課程設計

研究本身就是一個問題導向學習的模式，所以在質性研究的課程中融入 PBL 的教學模式，是一件相輔相成的工作，所以在產出 RPBL 模式後，即融入「質性研究」的流程中（圖 1）。一方面幫助學習者提升問題解決的能力和解決問題的技巧，輔助產出論文；另一方面教學者能掌握學習者的進度和瞭解工作狀況，立即發現問題。

RPBL 模式共有七大步驟分別是：提出問題、辨別問題、定義問題、探索、解決方法、討論、評鑑。RPBL 模式奠基於 PBL 的理論，在理論的運用上實際做法如下：一、採用實用主義讓學習者置於真實的環境中，透過 PBL 的循環過程從做中學，讓學習者實際解決一個擬真的問題，且問題必須是一個令人困惑的問題，讓學習者運用批判性思考解決問題；二、藉著建構主義打造一個自主學習的環境，不同於傳統的教育環境，RPBL 是一個以學生爲中心的學習環境，老師只需提供輔助和鷹架；三、透過情境學習，營造問題解決的情境，在豐富的學習資源下進行探索，經驗真實的問題；四、利用合作學習的功用，讓學習者以達到團體目標爲目的，間接

完成個人學習目標。

RPBL 的七大步驟配合質性研究流程，說明如下：

（1） 提出問題：依照不同的主題，尋找同儕。合作學習是幫助檢視題目的適切性，在進行分組過程中，藉由分析文獻資料，從不同角度去思考解決問題。

（2） 辨別問題：針對提出的問題，尋找相關資料，進一步確認題目的定義並濃縮研究範圍，針對欲探討的問題，審慎思考相關事宜。

（3） 定義問題：藉著蒐集資料，不斷修正問題，使之逐漸明確，此階段務必將主題範圍聚焦，再次檢驗資料的實用性，確認研究假設的可行性。

（4） 探索：進入田野，尋找可用的資源，將蒐集得來的資料重新組織，分析資料的可用性和精確性，找出解決問題可能的答案和途徑。

（5） 解決方法：列出分析的結果並嘗試呈現，從呈現的過程中，檢視想法中有無概念不清之處。

（6） 討論：針對結果分享意見和針對需要改進之處，提出建議。

（7） 評鑑：藉著同儕互評或自評的方式進行概念的澄清，並給予小組成員回饋和意見，從中修正研究中含混不清處。

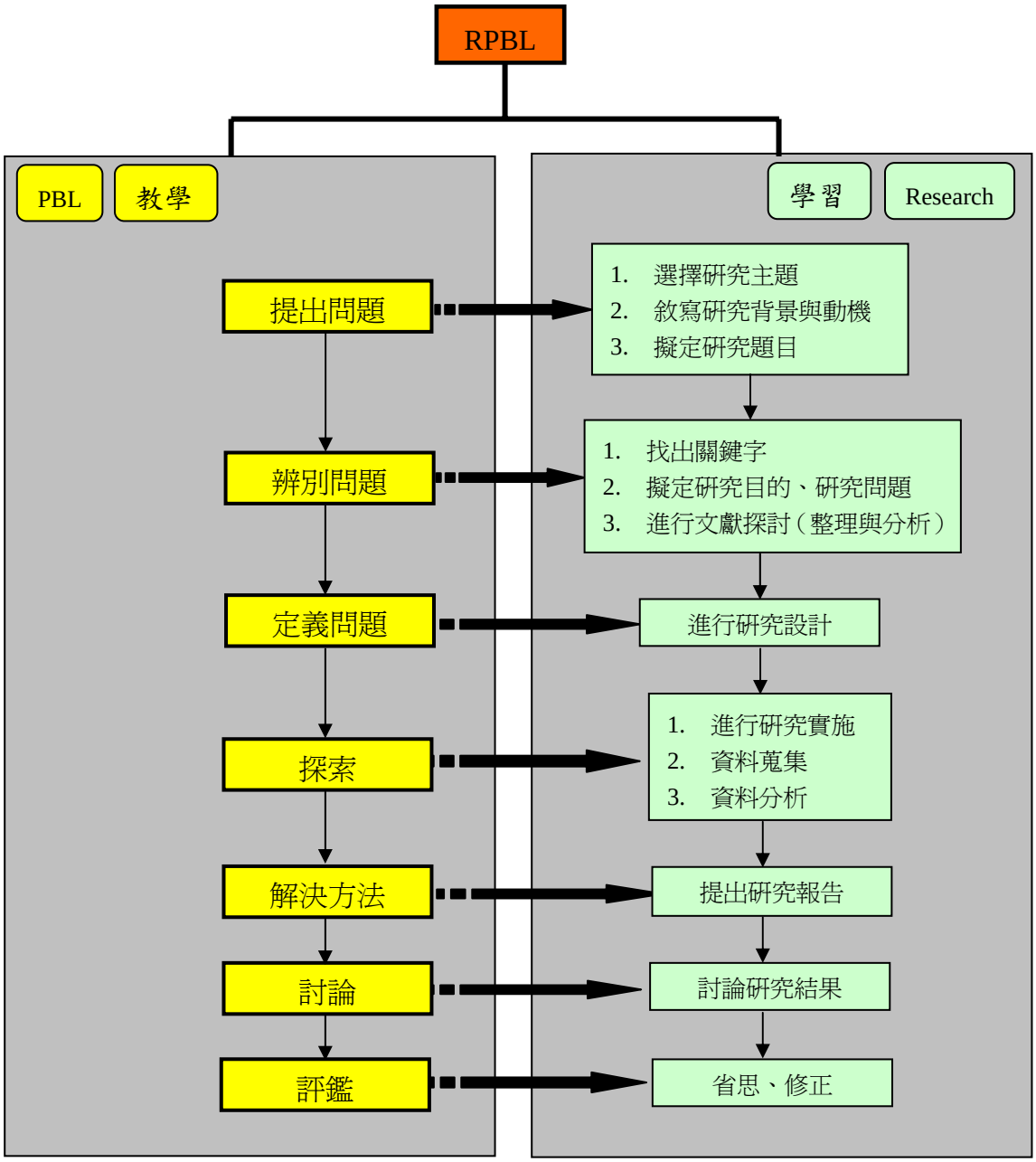

圖 1「研究型問題導向學習」對應圖(Shih, 2007)

有了 RPBL 的課程設計，研究者根據 RPBL 七個單元爲橫軸，再依據 Bloom 和 Krathwohl(1956)認知領域、Krathwohl、Bloom 及 Masia(1964)情意領域、Simpson(1972)技能領域之目標層次爲縱軸，對應 RPBL 七個單元的學習目標，設計 RPBL 雙向細目表，如下（表 1）所示。

設計雙向細目表的目的，是爲得知學習者在每個單元的教學實施後，其認知、情意、技能上的改變，用以瞭解學習者的學習歷程及成效。而爲了讓評量焦點可以聚焦，是以學習者在每個單元學習的關鍵任務做爲勾選原則，希望學習者在單元學習後，能具有下列的改變。

表 1 RPBL 之雙向細目表

單元 / 階層		一 提出問題	二 辨別問題	三 定義問題	四 探索	五 解決方法	六 討論	七 評鑑
認知領域	知識	認識研究問題						
	理解		瞭解如何擬定研究目的與研究問題					
	應用			應用研究流程各要素進行研究設計				
	分析				分析並管理蒐集的資料			
	綜合					綜合、歸納研究結果並提出研究報告		
	評鑑						經由討論方式判斷研究設計的適切性	評鑑同儕的研究內容，並提出具體建議。
情意領域	接受	對自己的研究方向有興趣						
	反應		針對研究方向主動蒐集相關文獻	樂意與人分享研究設計				
	評價				在田野調查中積極蒐集資料	清楚自己的研究內容並取得他人的認同。		
	組織						組織自己的想法和別人的想法形成有組織的系統	
	內化							從評鑑的過程中進行省思，修正個人的研究內容
技能領域	知覺作用							
	心向作用							
	引導反應	選擇研究主題、擬定題目						
	機械反應		正確運用 APA 格式，處理文獻					
	複雜反應			視研究情境進行研究設計	運用不同資料蒐集的技術，獲得資訊	應用書寫報告的技巧		
	技能調適						吸收不同的建議，修正研究內容	

	創作表現							在研究中運用不同研究工具，創作個人研究內容

研究方法

本研究目的旨在將問題導向學習的過程融入於「質性研究」的課程，形成「研究型問題導向學習模式」(RPBL)。讓研究者在步驟化的流程中，進行資料蒐集與分析。爲了能確實地瞭解學習者的研究歷程，選擇以「質性研究」作爲研究方法的學習者爲研究對象，透過參與觀察、訪談以及文件分析等方法，協助學習者建構研究脈絡，瞭解學習者在研究中運用問題導向學習的研究過程。

除了依循上述方法外，本研究的目的是爲了瞭解在「質性課程」輔以 RPBL 模式進行教學，學習者在認知、情意、技能的改變，其資料分析的實施方式分敘如下：

（1） 認知領域：搭配每單元的學習單分析，在進行課程規劃與教案設計時，已將每單元的評量重點與學習任務融入學習單中，因此學習單的內容已是各單元的學習重點。以學習單分析學習者在每單元的認知能力，輔以觀察紀錄、錄音、拍照、省思日誌等文件資料，交叉驗證學習者的學習歷程。

（2） 情意領域：情意的部分是以學習者和教學者的訪談資料和課堂的觀察紀錄、錄音、拍照、省思日誌爲主，因爲是著重於學習者情意的改變，所以不著重於學習單的分析，而是希望以訪談的方式讓學習者在一個自然舒適的環境下，侃侃而談地說出自己對課程的回饋。另外，課後教師的訪談資料也是另一項檢核的重點，用以分析學習者在本單元的學習表現，是否已經達到情意層級的提升。

（3） 技能領域：技能的分析的主要資料來源亦是使用每單元的學習單，但不同於認知能力的評量方式，「技能領域」著重於學習者完成這個學習任務運用的技能是否使用正確；而「認知領域」是以學習者是否瞭解本單元的學習內涵作爲分析重點。最後再輔以觀察紀錄、錄音、拍照、省思日誌等文件資料做交叉驗證。

結果與討論

質化研究過程中，研究者必定進入資料蒐集的階段，而資料蒐集過後，還需整理資料，轉換檔案，才能進行資料分析。然而，這對研究者與指導教授而言，是個繁複的程序，亦能從中追蹤研究進度，和豐富田野調查的廣度與深度。因此，運用教學支援平台 Life Type 製作 RPBL 的學習課程系統，除了用於學習課程中，讓教師追蹤學生進度，也能成爲教授與研究生於課程之外的溝通管道，排除固有的課程時效性，讓學習真正地延伸到課堂之外，對教與學雙方面帶來許多便利，其實施結果分敘如下：

1. 教學面的互動歷程

（1） 學習者爲中心

學習與教學的最好情況就是要能達成「教學相長」，在教與學相輔相成的情況下，絕不可能只有一方受慧。就如「傳球」的原理一樣，一人負責投球一人負責接球，才能一次一次將球傳遞下去，要是中途有人棄權，這場比賽就無法繼續。教學者在一開始是扮演著「投球者」的角色，先給予學習任務，等學習者接收任務，經過咀嚼、消化後，再投出不同的「變

化球」，此時教學者會視學習者的情況、能力，改變球路和攻勢。在一來一往的投球與接球過程中，教學者不斷在變，變的是教學的策略與手段，而學習者也在變，變的是學習態度和學習方式。在課程設計中，教學者視學習者的「研究需求」安排不同的學習任務，以任務起始的問題爲誘因，讓學習者學會獨立解決問題，並產出成品。教學者有時又扮演著球隊的教練，幫助訓練球員「打好球」必備的技能，安排不同的情境供其練習，當球員的表現出現瓶頸時，再適時提供楷模示範、給予鷹架輔助，但是最終上場打好球的仍是球隊中的每位球員。

（2） 觸類旁通—感官的刺激：

一個質性的研究者須具備聽、說、讀、寫的能力。也就是要能「聽」其言辨其行，「說」得令人信服，言之鑿鑿；閱「讀」相關文獻，奠基於理論；「寫」出引人共鳴發人省思的文章。爲了提升學習者這四種能力，在教學設計上，從刺激學習者在眼、耳、口、手、心的知覺。眼到是指觀察的能力、不只要能「由小見大，從大見小」還能「見山非山，見水非水」。在田野調查時，訓練學習者不只由「部分見整體，亦能從整體見部分」；耳到是指讓學習者不只「聽」的仔細、還要能聽出「絃外之音」，進行訪談時，訪談對象是否話中有話，需要有技巧才能獲得想要的答案；口到是指能否互相批判、闡述個人論述。學習者對個人的研究要能瞭若指掌，也要能從評鑑人的研究中學習批判和反省；手到是指書寫技巧，文字的基本功，在研究報告中，APA的格式書寫的流暢度，都是影響閱讀研究報告的主要關鍵；心到是這五到中最重要的，學習者必須要能熱衷個人的研究，才能專心致志有所獲得。課程的設計秉持著「給魚吃不如教授釣魚技巧」的原則，讓學習者學習釣魚的技巧，並運用在實際的研究現場中進行資料的蒐集，撰寫個人的研究報告。

2. 學習面的互動歷程

（1） 課程適應

對於學習任務的安排，學習者初期在心理上其實是害怕、懵懂、甚至抗拒的心態，「害怕」的是無法達成這個學習任務；「懵懂」的是不知如何著手；而「抗拒」的是平時作業都足以忙得焦頭爛額，更遑論聽來艱鉅、費時的學習任務。

至課程實施之後隨著學習者對課程的設計與提供的工具越來越多，越能瞭解如何進行「質性研究」時，在心態上也因爲知道從何著手，而漸漸發現自己能完成「學習任務」，進而降低對學習任務的排斥感與未知性。俗諺說：「凡事起頭難」，這是說做一件事時，剛開始的打地基與事前基本功的培養是最難，但是如果撐過了這個過渡期，願意敞開心胸去做改變，那麼就會收到不可意料的收穫。在期末進行訪談時，有許多學習者提到最後產出的學習任務感覺自己像完成了一件「不可能的任務」在學習的過程中，很樂於見到學習者對自己學習成效的肯定，而「學習」也就是從這樣多次的認知失衡中調節得來的。

（2） 學習改變

RPBL的課程設計是爲了讓學習者瞭解如何在彈性的質性研究設計下，有步驟的解決個人的研究問題，讓學習者瞭解研究中部分與整體的互動關係。「壓力」是助力而不是阻力，任務的編排是要讓學習者從「做」中學，研究不只是在「紙上談兵」更要能將事前的規劃實際運用在戰場上。RPBL的課程實施上，提供了許多「範例」、「工具」、「練習」，「範例」是爲了降低學習者在執行上的茫然；「工具」能解決學習者研究的問題；「練習」是讓學習者爲未來的研究預演與準備。而最重要的是提供一個可以「操作的流程」，因爲「質性研究」對許多研究的初探者來說，是未知、彈性的，如果沒有一個可操作的流程，會讓學習者不知從

何下手，所以這個課程的目的是希望學習者能實際練習一遍，實際去操作，印象會比較深刻，幫助也比較大。

3. 學習者 KAS 的學習成效

（1） 認知領域

認知的歷程是學習者在接受新知識洗禮時的一種過程。爲了取得認知平衡，一開始當然不可能像海綿一樣馬上吸收，而是從不斷思考與付出中慢慢獲得。「從做中學」是一個重要的教學策略，在RPBL的課程中也不例外，當學習者還未真正進入研究現場時，所知道與運用的知識十分有限，而爲了能讓學習者在真實的情境中將所學的知識學以致用，許多的課程安排幾乎都是以活動爲導向。而學習者的認知歷程也隨著課程的深入更爲顯著的成長，一開始研究的問題學習者大多無法將範圍聚焦，且因爲還未真正進入研究現場蒐集資料，因此都欠缺「可行性」與「操作性」。直至進入研究設計的步驟，則慢慢能以不同角度去檢視各種問題，並採用適當的工具解決問題。雖然仍會因資料蒐集的不全，而產生信效度的質疑，但是學習者也經由互相檢視和自我省思的過程中產出一個趨於完整的研究報告。

（2） 情意領域

研究的對象是選定以修讀九十六學年度上學期施如齡老師開設的「質化研究入門」課程之學習者，因爲本課程爲選修科目，所以學習者在排除了必修課程的必須性，選修本課程的學習者在一開始的學習興趣便是濃厚的。且許多學習者因爲其碩士論文是以質性研究作爲資料蒐集的方式，所以心態上是抱著「必須使用而不得不學會」的學習態度。但是當學習者在面對一連串的學習任務時，他的學習興趣也跟著學習任務所能執行的難易程度而增減，學習者在學習歷程上的情意與認知歷程是相輔相成的，當學習者處於認知平衡的狀態，其學習興趣是正向提昇；而當學習者認知失衡時，其學習興趣則是負向消減。在學習過程中所有的不安與徬徨，大多源自於對知識的「未知」，但隨著學習者對「質性研究」的熟悉與深入和對課程的瞭解，那些未知都蛻變成一種驅使學習者前進的「動力」。

（3） 技能領域

技能是學習者在獲得知識後所展現出形於外的技能表現，這種展現是不同於學習者形於內的情意表現，所以技能展現常被教學者用來評定學習者學習成效的一項標準。PRBL的課程中，學習者經常會受到「可行性」與「操作性」的質疑，課程雖然是模擬真實情境中會出現的問題，但是因爲學習者未真正進入研究現場，其思考的面向仍是十分有限，雖然研究報告的產出的品質沒有完全達到標準，但亦如授課教師的教學宗旨：「我並不是一定要他們產出一個高水準的質性研究報告，這堂課重視的是學習者能在學習過程中，清楚地知道什麼「時候」該「如何」用什麼「工具」去解決「問題」（PV-970120-T）。」而多數的學習者做到了，雖然研究內容的連結度與關聯性仍不夠緊密，但學習者已能善用手邊的工具與資源蒐集資料並回答問題。

結論

研究結果發現學習者在KSA方面：以活動爲導向的課程使學習者的認知歷程隨著課程深入有顯著地成長；學習者的情意表現從一開始對學習任務的抗拒與排斥，至最後能夠適應並創作出個人的研究內容；學習者在技能表現上，已能善用手邊的工具與資源蒐集資料並回答研究問題。這充分展現RPBL模式的教學有其教學成效。

期末進行訪談時，一位學習者有感而發的說：「研究最大的阻礙是你知道它太困難，但你不想去面對它。可是當它變得比較標準化或概念清楚有步驟時，那就會很好操作，就覺得不會這麼困難而願意去做，每次上完課最大改變就是都會有新東西刺激我思考，而老師又給得很清楚，就會有更多的意願去面對自己的研究（GV-970107-ADIT）」。每個人都曾身為一個學習者，對學習任務的心態上大略可以區分成兩種層次，一種是「必須去做」、另一種是「願意去做」。「必須去做」的學習者通常是基於學業成績的壓力，不願意背負著重修的危險，雖然知道這是做為一個學習者應該有的責任，但是卻只想「應付了事」，而「願意去做」的學習者則是在「享受」賦予的任務，尋求突破在經驗中得到自我滿足，找到學習興趣，建立自我價值。

參考文獻

1. 與本計畫相關之著作列表

吳香儀（2008）。**運用問題導向學習模式於「質性研究課程」之學習歷程與成效**。淡江大學教育科技研究所碩士論文，未出版，台北。

施如齡、吳香儀(2007)。數位學習時代的高等教育教學觀。**教育資料與研究雙月刊**，**78**。第 41-60 頁。台北：國立教育資料館。

莊茜雯、施如齡、黃國禎(2008)。**行動載具應用於古蹟探索之合作學習活動設計**。第三屆行動與無所不在數位學習研討會，2008 年 5 月 30 日。臺南：國立台南大學。(國科會專題研究計畫編號：NSC 96-2520-S-032 -002 and NSC 96-2422-H-024 -002)

Shih, Ju-Ling & Su, Hui-Yu (2008). *Analyzing Children's Cognitive Activities in Digital Problem-solving Learning Games "William Adventure": An In-depth Case Study*. The 16th International Conference on Computers in Education (ICCE 2008). Oct. 27-31, 2008. Taipei: National Science and Technology Program of eLearning. (國科會專題研究計畫編號：NSC 96-2520-S-032 -002 and NSC 96-2422-H-024 -002)

Shih, Ju-Ling. (2008). *The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies*. The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008), March 23-26, 2008. Beijing: Beijing Normal University. (國科會專題研究計畫編號：96-2520-S-032-002)

2. 與本文相關之參考文獻

王千悻（1999）。「合作學習」和「問題導向學習」培養教師及學生的科學創造力。**教育資料與研究，28**，31-39。

王雅各（2004）。質性研究導論。載於謝臥龍（主編），**質性研究**（頁 1-56）。台北：心理。

李宜玫、王逸慧、林世華（2004）。社會學習領域分段能力指標之解讀－由Bloom教育目標分類系統（修訂版）析之。**國立臺北師範學院，17**（2），1-34。

邱淵、王鋼、夏孝川等譯（1989）。Bloom B. S.著。教學評量。台北：心理。

陳向明（2002）。**社會科學質的研究**。台北：五南。

陳伯璋（2000）。質性研究方法的理論基礎。載於中正大學教育研究所（主編），**質的研究方法**（頁 25-49）。高雄：麗文。

黃瑞琴（2005）。**質的教育研究方法（第二版）**。台北：心理。

Barrows, H. S. & Tamblyn, R. H. (1980). *Problem based learning: An approach to medical education*. New York: Springer Publishing Company Press.

Berg,, B. L. (1998). *Qualitative research methods for the social science*. Boston: Allyn & Bacon Press.

Bloom, B. S. & Krathwohl D.R. (Eds.) (1956). *Taxonomy of educational objectives. Handbook I: Cognitive domain.* New York: Mckay Press.

Bogdan, R. C. & Biklen S. K. (1998). *Qualitative Research for education: An intoducation to theory and methods(3nd ed.).* Boston: Allyn & Bacon Press.

Dewey, J. (1916). *Democracy and education*. New York: The Free Press.

Jones, B. F., Rasmussen C. M., & Moffitt M. C.(1997). *Real-life problem solving: A collaborative approach to interdisciplinary learning*. WA: American Psychological Association.

Krathwohl, D. R., Bloom, B. S., & Masia, B. B. (1964). *Taxonomy of educational objective. The classification of educational goals, Handbook II: Affective Domain*. NY: Longman Press.

Maxwell, J. A. (1996). *Qualitative research design: an interactive approach.* London: Sage Publications Press.

Shih, J.-L. (2007). *The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies*. The 5th International Conference on Wireless,Mobile and Ubiquitous Technologies in Education (WMUTE2008), March 23-26, 2008. Beijing: Beijing Normal University.

Simpson, E. J. (1972). T*he classification of educational objectives: Psychomotor domain.* Urbana, II: University of Illiois Press.

Strauss, A. & Corbin, J. (1990). *Basics of qualitative research: grounded theory procedures and techniques*. Newbury Park: Sage Press.

Taylor, S. J. & Bogdan, R. (1984). *Introduction to qualitative research methods: The search for meanings*. New York: John Wiley & Sons Press.

Van Maanen, J., Dabbs, JM Jr., & Faulkner, RR. (1982). Varieties of qualitative research. Beverly Hills, CA: Sage Press.

Wang, H. C. A., Thompson, P., Shuler, C., & Harvey, L. (1999). *Problem-based learning approach for science teachers' professional development.* (ERIC Document Reproduction Service No. ED 431607)

Wolcott, H. F. (1992). Posturing in qualitative inquiry. In Margaret D. L., Wendy L. M., & Judith P. *The handbook of qualitative research in education.* New York: Academic.

計畫成果自評

依據原計畫的規劃是欲藉由網路系統來提供「質性研究初探者」一個自我探索與學習的入口，因此本計畫實施之重點在於探索式「虛擬情境教育館」數位學習環境之建置。其運用教學支援平台 Life Type 製作 RPBL 的課程學習系統。除了結合虛擬課程的學習任務和實體課程的教學策略，進行課程的規劃外，並將問題導向學習的步驟應用在研究方法的課程，搭配研究流程，形成「研究型問題導向學習」，協助研究者進行實作與探索式的學習。

在學術方面：面對質性研究初探者的自學需求，本計劃不用慣用的數位教學平台、討論版、

電子白板的互動，創造虛擬情境教育館，發展一個具有個人探索與社群分享互動的學習空間，提供研究者自我探索。

教學方面：析理出一套學習計畫，促進學習者的自我成長，在學習過程中，增加研究範例的介紹與評析，透過研究者彼此的分享與互動，釐清研究者的理論概念與實務方法。

學習方面：學習者的個人研究歷程中，是按照 RPBL 的歷程進行研究調查，並於各個步驟再與指導教授溝通，隨時增減研究任務，規劃每個學習階段和搭配相呼應的教學活動與任務內容，再經由問題解決的程序，使研究者清楚研究的進程，方便資料的蒐集。

「研究型問題導向學習」之課程設計輔以觀察、拍照、紀錄，學習單、課後訪談資料，以深入瞭解課堂師生互動情形和學習者的反應，呈現學生的學習成效與學習歷程。研究結果發現學習者在 KSA 方面：以活動爲導向的課程使學習者的認知歷程隨著課程深入有顯著地成長；學習者的情意表現從一開始對學習任務的抗拒與排斥，至最後能夠適應並創作出個人的研究內容；學習者在技能表現上，已能善用手邊的工具與資源蒐集資料並回答研究問題。這充分展現 RPBL 模式的教學有其教學成效。

在研究實施的場域「質化研究入門」的課程中，隨著學習者個人先備知識的不一，其學習成效也有所不同，這堂課的授課宗旨強調的不是學習結果而是學習的過程，學習者能夠在極有限著時間內獲得顯著的成長，亦是教學者與研究者的目的。

出席國際學術會議心得報告

計畫編號	NSC 96-2520-S-024-005-
計畫名稱	質化研究之虛擬情境教育館：發展個群共構的數位自主學習環境
出國人員姓名 服務機關及職稱	施如齡 國立臺南大學數位學習科技學系 副教授
會議時間地點	會議地點：北京師範大學(Beijing Normal University) 會議時間：2008 年 3 月 23 日至 3 月 26 日
會議名稱	第五屆無線網路、行動與無所不在學習科技教育應用研討會 (The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008)
發表論文題目	Shih, Ju-Ling. (2008). The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies. The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008), March 23-26, 2008. Beijing: Beijing Normal University.

一、 參加會議經過

第五屆無線網路、行動與無所不在學習科技教育應用研討會(The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008)，會議日期自 97 年 3 月 23 日至 3 月 26 日，召開地點則為北京師範大學英東學術會堂。本會議目的在於發展國際間的行動與無所不在學習主題研究群(MULE SIG, Special Interesting Group)，促進亞洲地區該主題研究的交流合作。

本研討會由希臘 Piraeus 大學的 Prof. Demetrios G. Sampson、臺灣中央大學的陳德懷教授、日本東京大學(University of Tokyo)的 Prof. Masanori Sugimoto 及英國諾丁漢大學(University of Nottingham)的 Prof. Claire O'Malley 規劃；北京師範大學黃榮懷教授主辦，並由 IEEE Computer Society Technical Committee on Learning Technology (LTTC)協辦而成。會議目的在於促進各國學者針對行動與無所不在學習及技術進行更深入交流及合作。

個人在 WMUTE 研討會中完成幾項工作：(一)、於 3 月 23 日參加 1 對 1 學習國際合作協調會，即 WMUTE 的會前研討會。並於會後與其他國家學者交流研究心得與經驗。(二)、於 3 月 24 日下午 1:50-3:20 Poster Session 發表 “The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies” 論文，與現場學者互動並進行意見交流。(三)、會議中及晚宴與各國學者交流，並互相分享研究狀況；(四)、參與 3 月 27 日及 3 月 28 日的參訪行程，本次會議由中央大學陳德懷教授帶領，共計參訪北京四所大學，包括北京大學、清華大學、北京師範大學及首都師範大學，在參訪行程中獲得不少知識，瞭解大陸地區移動學習的研究近況，並建立未來合作的基石。

二、 研討會議程

1 對 1 學習國際合作協調會

– 時間：2008 年 3 月 23 日(Pre-Conference)

– 地點：北京師範大學英東學術會堂三層第三演講廳

– 聯繫人：黃國禎教授

時間	主題	主講人	主持人
8:30~8:50	One-to-one technology enhanced learning: An opportunity for global research collaboration	陳德懷教授	張國恩教授
8:50~9:10	一對一環境下的學習變革	祝智庭教授	
9:10-9:30	Intel 公司一對一學習方案介紹	薑濤	
9:30~10:10	Panel: 臺灣 1:1 學習觀點	宋曜廷教授 林秋斌教授 劉晨鐘教授	黃國禎教授
10:10~10:30	茶歇		
10:30~10:50	移動學習中的教學策略語義模型及學習資源動態生成	崔光佐教授	祝智庭教授
10:50~11:10	數位學習研究的未來發展	張國恩教授	
11:10~11:30	掌上型設備在學科教學中應用研究	余勝泉教授	
11:30~11:50	諾亞舟公司移動學習方案展示	周智尚	

The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008)

– 時間：2008 年 3 月 24 日至 3 月 26 日

– 地點：北京師範大學英東學術會堂三層第三演講廳

Programs

	24th Mar (Mon)	25th Mar (Tue)	26th Mar (Wed)
9:00	opening (9:00-9:30)		
	keynote 1 (9:30-10:30) Ulrich Hoppe	keynote 2 (9:30-10:30) Hiroaki Ogata	keynote 4 (9:30-10:30) Chen-Chung Liu
10:00	break (10:30 -11:00)	break (10:30 -11:00)	break (10:30 -11:00)
11:00	paper 1 (11:00-12:20)	paper 3 (11:00-12:20)	paper5 (11:00-12:40)
12:00			
13:00	lunch (12:30-13:50)	lunch (12:20-13:50)	lunch (12:40-14:10)
14:00	poster 1 (13:50-15:20)	keynote 3 (1 3:50-14:50) Yvonne Rogers	paper6 (14:10-15:30)
15:00	break (15:20 -15:50)	paper 4 (14:50-16:00)	closing (15:30-16:00)
16:00	paper 2 (15:50-17:10)	break (16:00 -16:30)	
17:00		poster 2 (16:30-18:00)	

18:00		break (18:00 -18:30)	
19:00		banquet (18:30-20:30)	
20:00			

Section List (Elicit List)

Poster 1		
	COLLAGE - The Carnuntum Scenario	Mag. Manfred Lohr, Dr. Elisabeth Wallinger
	A Comprehensive Information based Variable-size Model for Intelligent Tutoring Systems	Xing Jin
	Collaborative Learning in a Mobile Technology Supported Environment: A Case Study on Analyzing the Interactions	Siu Cheung, KONG
	A Mobile-Device-Supported Brain-Friendly Reading System	Yu-Ju Lan, Yao-Ting Sung, Kuo-En Chang
	The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies	Ju-Ling Shih
	RFID-based Ubiquitous Learning Environment for School Student	Jiangtao Yin, Xudong Yang

Accepted papers (Elicit List)

Poster Papers		BACK
Paper ID	Title	Author List
1	Implementation of Platform for Human Geographic recognition to Mobile Mapping in LBS	Jin-suk Kang, Younghee Sung, Mee Young Sung
2	COLLAGE - The Carnuntum Scenario	Mag. Manfred Lohr, Dr. Elisabeth Wallinger
6	A Comprehensive Information based Variable-size Model for Intelligent Tutoring Systems	Xing Jin
8	Collaborative Learning in a Mobile Technology Supported Environment	Siu Cheung, KONG
9	A Mobile-Device-Supported Brain-Friendly Reading System	Yu-Ju Lan, Yao-Ting Sung, Kuo-En Chang
10	The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL)	Ju-Ling Shih

三、 與會心得

本次除發表論文之外，尚參與臺灣的行動與無所不在研究群與國外進行學者進行交流。未來預計積極參加其他會議，與本次出訪所認識的國際學者互動與交流，並藉以發展臺灣的行動與無所不在學習，融入其他國家學者的心得與技術經驗。

個人非常感謝國科會及學校給予經費支持，使本次研討會得以成行，對將來的研究也產生相當正面的影響，期望將來能再有機會出國發表論文及研究狀況。

附件：發表之論文海報、發表之論文內容、主題研討會邀請函

發表之論文海報

The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies

Ju-Ling Shih
Dept. of Information and Learning Technology,National University of Tainan
juling@mail.nutn.edu.tw

1. Introduction

Qualitative research (QR) is originated from the social science paradigm and emphasizes on discovering the reasons behind human behaviors and to observe intrinsic human changes. Using participant observation and in-depth interviews, qualitative researchers investigate into human cultures by looking at the "how" and "why" of a phenomenon instead of "what" and "how much" of it. Therefore, QR course is offered in graduate schools of arts and humanity as well as education to prepare learners with basic qualitative research competence, both theoretically and practically.

To most QR learners, field study is an unfamiliar and interesting part of the course. For data collection, they would need to go outside of classrooms and laboratories into the "field" which might be academic institutions, classroomsor labs, hospitals, museums, governmental organizations, communities, and villages, just list a few. To reach research effectiveness while being outdoors, students need to access to course materials, check their research progress, and search existing data. It might also be convenient for researchers to access digital learning system which facilitate them to upload and store data in various forms such as texts, graphics, audio and video clips, for documentation and tracing purposes.

Current researches on ubiquitous learning (U-Learning) are largely focused on the technological development, small-screen interface design,standardized data transmission implementation, and information managements, but far less in the instructional design aspect. The objective of this research is to implement pedagogical models on the digital learning system to create an adaptive environment to suffice students' individual learning needs outside of campus for QR course.

2. Literature Review

2.1 U-Learning in the Field and on the Web

Weiser [1] introduces the notion of mobile computing, context-aware pervasive computing, and ubiquitous computing models indicating learning to be longer limited to our desktops but in and around our lives. Hull, Reid, and Geelhoed [2] also suggest that the value of the application of ubiquitous computing is the delivery of situated experiences via digital technology which enhance users' physical locations. This research, first, situate students in both the real world and the virtual world to extend students' learning experience; second, design educational activities between fields and digital system to demonstrates the practices of ubiquitous learning which emphasizes learning to happen in the right time right place. Third, develop digital system to facilitate students' field study.

2.2 PBL for Research Purposes

Problem-based learning (PBL) is a learning model based on constructivist framework , and emphasizes on the practice of situated learning and collaborative learning [3, 4]. Different from traditional education, PBL is a student-centered pedagogy where teachers only provide necessary support.Students have to create self-directed learning, actively explore in the rich learning resources, experience real life problems, and search for solutions through careful investigation [5, 6].There is no pre-determined set of lectures, and no repeated tests and assignments. It places attention on the advancement of skills and enhancement of attitudes. Conclude from researcher's personal teaching experience, a PBL procedure is created to fulfill the teaching and learning objectives. (see Figure 1)

3. RPBL System

3.1 Purpose of RPBL System

In the process of implementation, we found the process of PBL and research correspond to each other that we draw a graphic (see Figure 2) to demonstrate their associations, for which we entitled it as "Research Problem-based Learning", in short RPBL.

3.2 Architecture of RPBL System

The architecture of the system include two parts, the teacher end and student end (see Figure 3). In the teacher end, teachers can assign tasks following the RPBL steps. In every step, there are preset tasks determined by theories, assigned tasks assigned by teachers to individual students accordingly,and adaptive tasks decided by students themselves in accordance with their research requirements. On the student end, each student has one individual space where they can download or upload data, and track their research progress by browsing their complete or incomplete tasks.

3.3. Functions of RPBL System

The RPBL system serves as several different mechanisms. Its functions include: (1) Course platform: Students can browse RPBL lesson plans andexplanations and download assignment instructions. (2) Assignment portal: Students can upload their research data in all kinds of forms as attachments according to the task list. (3) Data collection tool: Students can collect graphic, audio and video data from participant observation, focus groups and in-depth interviews while conducting field research. (4) Electronic Journals: Students can write fieldnotes, reflections, and research memos on the system, not only exchange thoughts but also openly share their views using discussion boards. (5) Remote agent: Students can use mobile devices to connect to the system so toextend their learning to outside of classroom. It allows them to access the same materials while in the field.(6) Communication medium: Students can use the platform as peer collaboration or idea sharing tool. (7) E-portfolio: Students can use it as personal electronic portfolio which has all learning and research documents. They can traceback to their conceptual growth and make self-reflection.

4. Evaluation Results

Two stage formative evaluations are conducted to collect users' feedbacks. The first stage is heuristic evaluation, focusing on knowing the flaws of system's interface design; and the second stage is focus group interviews, aiming to gather suggestions about system's functionalities and uses.

Three users were asked to inspect the system with 25 heuristics in five aspects. The formative evaluation cycles that led to adjustments were continued until the design was sufficiently mature for official implementation. A brief review reports, (1) In appearance aspect, items such "appealing interface", "aesthetic and minimalist design", "readability", "intuitiveness of label functions", "consistency in visual presentation", and "consistency of the site with other conventions", are evaluated highly.(2) In language aspect, "clarity of terminologies and symbols", "consistency in terminology usage", and "availability of descriptive information" have almost no adjustments to be made. (3) In functionality aspect, "options availability", "tracingability", "display progress indicators", and "backup memory" are verywelcomed to users. However,"anticipation" is scored very low becauseusers desire the system to suffice higher level individual needs, such as research task alert.(4) In structure aspect,"hierarchical organization of information" and "indication of user locationwithin the site" are reported to be well designed. (5) In assistance aspect, "intelligent and customizable defaults", "procedural assistance", "mistake solving support", "plain language for assistance", as well as "reporting website modifications" are score lower than other items, which indicates a need to provide more online guidelines and task instructions.

The advantages of RPBL system include, (1) Amalgamation of group knowledge:Students share their research progress and results, and incorporate individual knowledge into a more complete entirety. (2) Full user experience: Students put theories into practice by bring their classroom thinking into the field, and then bring their field experience onto the web. (3) Quick response:The system allows students and teachers to quickly search through data and add functions according to individual needs. (4) All-way interaction: Students can interact with teacher and peers using online discussion facilities, as well as using their personal blogs to present and share ideas.

On the other hand, interviewees give several future development suggestions, include (1) Mobility enhancement: Use mobile devices to make learning more ubiquitous. Small screen design and connection problems need to be solved. (2) Knowledge management:Integrate devices for handwriting, audio, and video recording to make field documentation easier. (3) Social interaction: Peer collaboration and interaction mechanism is not fully developed. (4) Geographical notation: Allow users to draw maps and attach textual or visual notes. (5) Online support: Need more instructional guideline to tasks and field practices.

5. Conclusion

Digital learning technology redefines human's spatial and temporal relationships, and creates new culture, social, and psychological sphere. It compels changes of knowledge transmission and human communication in terms of means, patterns, speed, and authorities. It has impacted all facets of human life, including education. Digital technology has made learning to become more dynamic that students can access,retrieve, submit, display, exchange learning materials beyond the school boundaries of time and space. The research proved that digital learning systems designed in correspondence to instructional theories can more appropriately provide suitable services to students to enhance their academic researches and collaborative interaction.

Acknowledgements

This research was supported by National Science Committee in Taiwan, and is a part of the result of the project number (NSC-96-2520-S-032-002). Special thanksare owed to the research team in Tamkang University and National University of Tainan.

Reference

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Note: The author was originally affiliated with Dept. of Educational Technology, Tamkang University

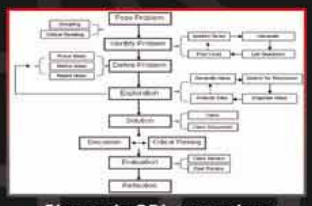

Figure 1: PBL procedure.

Figure 2: RPBL Model.

Figure 3: Architecture of RPBL system.

Figure 4:Mark up interface

The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies

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Abstract

This paper describes the design and development of an ubiquitous learning system for students who are initiating educational qualitative studies. The learning system aims to enhance the mobility of field research that it allows students to access teaching and learning assets when they are in the field, and traces learners' research progress on the web.

Therefore, the paper proposes a research problem-based learning (RPBL) model as the system structure in order to lead students through a systematic pedagogical process, but at the same time makes adaptive learning possibilities available through the customizable task list.

The preliminary formative evaluation suggests minor modification of the system and provides positive feedbacks to its instructional use and development.

Keywords: digital learning system, problem-based learning, qualitative research, ubiquitous learning

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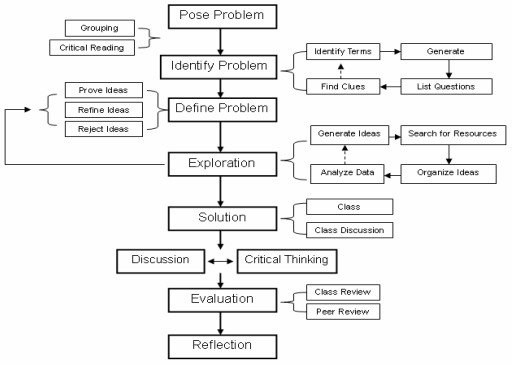

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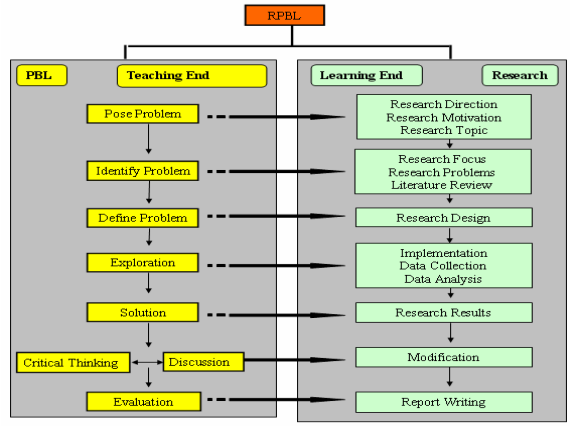

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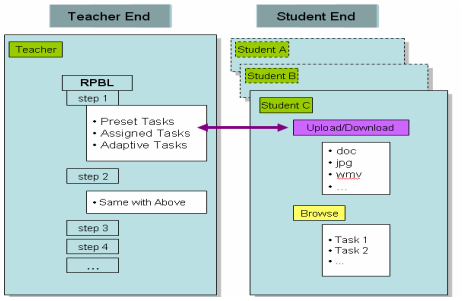

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全球華人計算機教育應用學會
Global Chinese Society for Computers in Education

數位學習主題研討會邀請函

尊敬的施如齡教授：

爲加強兩岸數位學習主題研究的交流與合作，推動電腦教育應用研究的深入發展，本學會擬於 2008 年 3 月在北京舉辦“數位學習主題研究群研討會”。鑒於您在本研究領域的深厚造詣和所取得的豐碩成果，特邀請您出席會議，共同研討今後兩岸數位學習主題合作研究的新趨勢、新思路與新方法，建立兩岸學者的共同研究社群。

會議有關事項通告如下：

主辦單位：全球華人電腦應用學會

協辦單位：北京大學、北京師範大學、清華大學、首都師範大學

會議主題：數位學習主題研討會

會議時間：2008 年 3 月 27 日—3 月 28 日

會議地點：北京大學

全球華人電腦教育應用學會

學會主席　陳德懷教授 敬邀

2008 年 3 月 6 日

出席國際學術會議心得報告

計畫編號	NSC 96-2520-S-024-005-
計畫名稱	質化研究之虛擬情境教育館：發展個群共構的數位自主學習環境
出國人員姓名 服務機關及職稱	施如齡 國立臺南大學數位學習科技學系 副教授
會議時間地點	會議地點：北京師範大學(Beijing Normal University) 會議時間：2008 年 3 月 23 日至 3 月 26 日
會議名稱	第五屆無線網路、行動與無所不在學習科技教育應用研討會 (The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008)
發表論文題目	Shih, Ju-Ling. (2008). The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies. The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008), March 23-26, 2008. Beijing: Beijing Normal University.

一、 參加會議經過

第五屆無線網路、行動與無所不在學習科技教育應用研討會(The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008)，會議日期自 97 年 3 月 23 日至 3 月 26 日，召開地點則為北京師範大學英東學術會堂。本會議目的在於發展國際間的行動與無所不在學習主題研究群(MULE SIG, Special Interesting Group)，促進亞洲地區該主題研究的交流合作。

本研討會由希臘 Piraeus 大學的 Prof. Demetrios G. Sampson、臺灣中央大學的陳德懷教授、日本東京大學(University of Tokyo)的 Prof. Masanori Sugimoto 及英國諾丁漢大學(University of Nottingham)的 Prof. Claire O'Malley 規劃；北京師範大學黃榮懷教授主辦，並由 IEEE Computer Society Technical Committee on Learning Technology (LTTC)協辦而成。會議目的在於促進各國學者針對行動與無所不在學習及技術進行更深入交流及合作。

個人在 WMUTE 研討會中完成幾項工作：(一)、於 3 月 23 日參加 1 對 1 學習國際合作協調會，即 WMUTE 的會前研討會。並於會後與其他國家學者交流研究心得與經驗。(二)、於 3 月 24 日下午 1:50-3:20 Poster Session 發表 “The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies” 論文，與現場學者互動並進行意見交流。(三)、會議中及晚宴與各國學者交流，並互相分享研究狀況；(四)、參與 3 月 27 日及 3 月 28 日的參訪行程，本次會議由中央大學陳德懷教授帶領，共計參訪北京四所大學，包括北京大學、清華大學、北京師範大學及首都師範大學，在參訪行程中獲得不少知識，瞭解大陸地區移動學習的研究近況，並建立未來合作的基石。

二、 研討會議程

1 對 1 學習國際合作協調會

– 時間：2008 年 3 月 23 日(Pre-Conference)

– 地點：北京師範大學英東學術會堂三層第三演講廳

– 聯繫人：黃國禎教授

時間	主題	主講人	主持人
8:30~8:50	One-to-one technology enhanced learning: An opportunity for global research collaboration	陳德懷教授	張國恩教授
8:50~9:10	一對一環境下的學習變革	祝智庭教授	
9:10-9:30	Intel 公司一對一學習方案介紹	薑濤	
9:30~10:10	Panel: 臺灣 1:1 學習觀點	宋曜廷教授 林秋斌教授 劉晨鐘教授	黃國禎教授
10:10~10:30	茶歇		
10:30~10:50	移動學習中的教學策略語義模型及學習資源動態生成	崔光佐教授	祝智庭教授
10:50~11:10	數位學習研究的未來發展	張國恩教授	
11:10~11:30	掌上型設備在學科教學中應用研究	余勝泉教授	
11:30~11:50	諾亞舟公司移動學習方案展示	周智尚	

The 5th International Conference on Wireless, Mobile and Ubiquitous Technologies in Education (WMUTE2008)

– 時間：2008 年 3 月 24 日至 3 月 26 日

– 地點：北京師範大學英東學術會堂三層第三演講廳

Programs

	24th Mar (Mon)	25th Mar (Tue)	26th Mar (Wed)
9:00	opening (9:00-9:30)		
	keynote 1 (9:30-10:30) Ulrich Hoppe	keynote 2 (9:30-10:30) Hiroaki Ogata	keynote 4 (9:30-10:30) Chen-Chung Liu
10:00	break (10:30 -11:00)	break (10:30 -11:00)	break (10:30 -11:00)
11:00	paper 1 (11:00-12:20)	paper 3 (11:00-12:20)	paper5 (11:00-12:40)
12:00			
13:00	lunch (12:30-13:50)	lunch (12:20-13:50)	lunch (12:40-14:10)
14:00	poster 1 (13:50-15:20)	keynote 3 (1 3:50-14:50) Yvonne Rogers	paper6 (14:10-15:30)
15:00	break (15:20 -15:50)	paper 4 (14:50-16:00)	closing (15:30-16:00)
16:00	paper 2 (15:50-17:10)	break (16:00 -16:30)	
17:00		poster 2 (16:30-18:00)	

18:00		break (18:00 -18:30)	
19:00		banquet (18:30-20:30)	
20:00			

Section List (Elicit List)

Poster 1		
	COLLAGE - The Carnuntum Scenario	Mag. Manfred Lohr, Dr. Elisabeth Wallinger
	A Comprehensive Information based Variable-size Model for Intelligent Tutoring Systems	Xing Jin
	Collaborative Learning in a Mobile Technology Supported Environment: A Case Study on Analyzing the Interactions	Siu Cheung, KONG
	A Mobile-Device-Supported Brain-Friendly Reading System	Yu-Ju Lan, Yao-Ting Sung, Kuo-En Chang
	The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies	Ju-Ling Shih
	RFID-based Ubiquitous Learning Environment for School Student	Jiangtao Yin, Xudong Yang

Accepted papers (Elicit List)

Poster Papers		BACK
Paper ID	Title	Author List
1	Implementation of Platform for Human Geographic recognition to Mobile Mapping in LBS	Jin-suk Kang, Younghee Sung, Mee Young Sung
2	COLLAGE - The Carnuntum Scenario	Mag. Manfred Lohr, Dr. Elisabeth Wallinger
6	A Comprehensive Information based Variable-size Model for Intelligent Tutoring Systems	Xing Jin
8	Collaborative Learning in a Mobile Technology Supported Environment	Siu Cheung, KONG
9	A Mobile-Device-Supported Brain-Friendly Reading System	Yu-Ju Lan, Yao-Ting Sung, Kuo-En Chang
10	The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL)	Ju-Ling Shih

三、 與會心得

本次除發表論文之外，尚參與臺灣的行動與無所不在研究群與國外進行學者進行交流。未來預計積極參加其他會議，與本次出訪所認識的國際學者互動與交流，並藉以發展臺灣的行動與無所不在學習，融入其他國家學者的心得與技術經驗。

個人非常感謝國科會及學校給予經費支持，使本次研討會得以成行，對將來的研究也產生相當正面的影響，期望將來能再有機會出國發表論文及研究狀況。

附件：發表之論文海報、發表之論文內容、主題研討會邀請函

發表之論文海報

The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies

Ju-Ling Shih
Dept. of Information and Learning Technology,National University of Tainan
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1. Introduction

Qualitative research (QR) is originated from the social science paradigm and emphasizes on discovering the reasons behind human behaviors and to observe intrinsic human changes. Using participant observation and in-depth interviews, qualitative researchers investigate into human cultures by looking at the "how" and "why" of a phenomenon instead of "what" and "how much" of it. Therefore, QR course is offered in graduate schools of arts and humanity as well as education to prepare learners with basic qualitative research competence, both theoretically and practically.

To most QR learners, field study is an unfamiliar and interesting part of the course. For data collection, they would need to go outside of classrooms and laboratories into the "field" which might be academic institutions, classroomsor labs, hospitals, museums, governmental organizations, communities, and villages, just list a few. To reach research effectiveness while being outdoors, students need to access to course materials, check their research progress, and search existing data. It might also be convenient for researchers to access digital learning system which facilitate them to upload and store data in various forms such as texts, graphics, audio and video clips, for documentation and tracing purposes.

Current researches on ubiquitous learning (U-Learning) are largely focused on the technological development, small-screen interface design,standardized data transmission implementation, and information managements, but far less in the instructional design aspect. The objective of this research is to implement pedagogical models on the digital learning system to create an adaptive environment to suffice students' individual learning needs outside of campus for QR course.

2. Literature Review

2.1 U-Learning in the Field and on the Web

Weiser [1] introduces the notion of mobile computing, context-aware pervasive computing, and ubiquitous computing models indicating learning to be longer limited to our desktops but in and around our lives. Hull, Reid, and Geelhoed [2] also suggest that the value of the application of ubiquitous computing is the delivery of situated experiences via digital technology which enhance users' physical locations. This research, first, situate students in both the real world and the virtual world to extend students' learning experience; second, design educational activities between fields and digital system to demonstrates the practices of ubiquitous learning which emphasizes learning to happen in the right time right place. Third, develop digital system to facilitate students' field study.

2.2 PBL for Research Purposes

Problem-based learning (PBL) is a learning model based on constructivist framework , and emphasizes on the practice of situated learning and collaborative learning [3, 4]. Different from traditional education, PBL is a student-centered pedagogy where teachers only provide necessary support.Students have to create self-directed learning, actively explore in the rich learning resources, experience real life problems, and search for solutions through careful investigation [5, 6].There is no pre-determined set of lectures, and no repeated tests and assignments. It places attention on the advancement of skills and enhancement of attitudes. Conclude from researcher's personal teaching experience, a PBL procedure is created to fulfill the teaching and learning objectives. (see Figure 1)

3. RPBL System

3.1 Purpose of RPBL System

In the process of implementation, we found the process of PBL and research correspond to each other that we draw a graphic (see Figure 2) to demonstrate their associations, for which we entitled it as "Research Problem-based Learning", in short RPBL.

3.2 Architecture of RPBL System

The architecture of the system include two parts, the teacher end and student end (see Figure 3). In the teacher end, teachers can assign tasks following the RPBL steps. In every step, there are preset tasks determined by theories, assigned tasks assigned by teachers to individual students accordingly,and adaptive tasks decided by students themselves in accordance with their research requirements. On the student end, each student has one individual space where they can download or upload data, and track their research progress by browsing their complete or incomplete tasks.

3.3. Functions of RPBL System

The RPBL system serves as several different mechanisms. Its functions include: (1) Course platform: Students can browse RPBL lesson plans andexplanations and download assignment instructions. (2) Assignment portal: Students can upload their research data in all kinds of forms as attachments according to the task list. (3) Data collection tool: Students can collect graphic, audio and video data from participant observation, focus groups and in-depth interviews while conducting field research. (4) Electronic Journals: Students can write fieldnotes, reflections, and research memos on the system, not only exchange thoughts but also openly share their views using discussion boards. (5) Remote agent: Students can use mobile devices to connect to the system so toextend their learning to outside of classroom. It allows them to access the same materials while in the field.(6) Communication medium: Students can use the platform as peer collaboration or idea sharing tool. (7) E-portfolio: Students can use it as personal electronic portfolio which has all learning and research documents. They can traceback to their conceptual growth and make self-reflection.

4. Evaluation Results

Two stage formative evaluations are conducted to collect users' feedbacks. The first stage is heuristic evaluation, focusing on knowing the flaws of system's interface design; and the second stage is focus group interviews, aiming to gather suggestions about system's functionalities and uses.

Three users were asked to inspect the system with 25 heuristics in five aspects. The formative evaluation cycles that led to adjustments were continued until the design was sufficiently mature for official implementation. A brief review reports, (1) In appearance aspect, items such "appealing interface", "aesthetic and minimalist design", "readability", "intuitiveness of label functions", "consistency in visual presentation", and "consistency of the site with other conventions", are evaluated highly.(2) In language aspect, "clarity of terminologies and symbols", "consistency in terminology usage", and "availability of descriptive information" have almost no adjustments to be made. (3) In functionality aspect, "options availability", "tracingability", "display progress indicators", and "backup memory" are verywelcomed to users. However,"anticipation" is scored very low becauseusers desire the system to suffice higher level individual needs, such as research task alert.(4) In structure aspect,"hierarchical organization of information" and "indication of user locationwithin the site" are reported to be well designed. (5) In assistance aspect, "intelligent and customizable defaults", "procedural assistance", "mistake solving support", "plain language for assistance", as well as "reporting website modifications" are score lower than other items, which indicates a need to provide more online guidelines and task instructions.

The advantages of RPBL system include, (1) Amalgamation of group knowledge:Students share their research progress and results, and incorporate individual knowledge into a more complete entirety. (2) Full user experience: Students put theories into practice by bring their classroom thinking into the field, and then bring their field experience onto the web. (3) Quick response:The system allows students and teachers to quickly search through data and add functions according to individual needs. (4) All-way interaction: Students can interact with teacher and peers using online discussion facilities, as well as using their personal blogs to present and share ideas.

On the other hand, interviewees give several future development suggestions, include (1) Mobility enhancement: Use mobile devices to make learning more ubiquitous. Small screen design and connection problems need to be solved. (2) Knowledge management:Integrate devices for handwriting, audio, and video recording to make field documentation easier. (3) Social interaction: Peer collaboration and interaction mechanism is not fully developed. (4) Geographical notation: Allow users to draw maps and attach textual or visual notes. (5) Online support: Need more instructional guideline to tasks and field practices.

5. Conclusion

Digital learning technology redefines human's spatial and temporal relationships, and creates new culture, social, and psychological sphere. It compels changes of knowledge transmission and human communication in terms of means, patterns, speed, and authorities. It has impacted all facets of human life, including education. Digital technology has made learning to become more dynamic that students can access,retrieve, submit, display, exchange learning materials beyond the school boundaries of time and space. The research proved that digital learning systems designed in correspondence to instructional theories can more appropriately provide suitable services to students to enhance their academic researches and collaborative interaction.

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Reference

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Note: The author was originally affiliated with Dept. of Educational Technology, Tamkang University

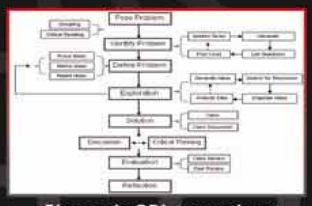

Figure 1: PBL procedure.

Figure 2: RPBL Model.

Figure 3: Architecture of RPBL system.

Figure 4:Mark up interface

The Design of an Ubiquitous Learning System with Research Problem-based Learning (RPBL) Model for Qualitative Studies

Ju-Ling Shih
Dept. of Educational Technology, Tamkang University
juling@mail.tku.edu.tw

Abstract

This paper describes the design and development of an ubiquitous learning system for students who are initiating educational qualitative studies. The learning system aims to enhance the mobility of field research that it allows students to access teaching and learning assets when they are in the field, and traces learners' research progress on the web.

Therefore, the paper proposes a research problem-based learning (RPBL) model as the system structure in order to lead students through a systematic pedagogical process, but at the same time makes adaptive learning possibilities available through the customizable task list.

The preliminary formative evaluation suggests minor modification of the system and provides positive feedbacks to its instructional use and development.

Keywords: digital learning system, problem-based learning, qualitative research, ubiquitous learning

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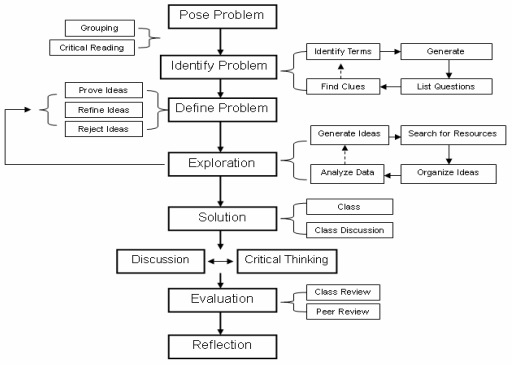

Figure 1: PBL procedure

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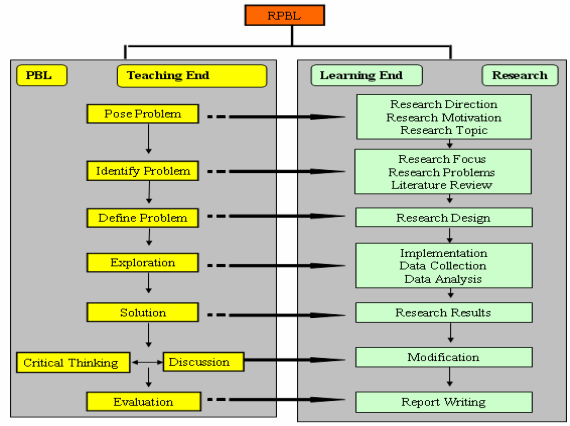

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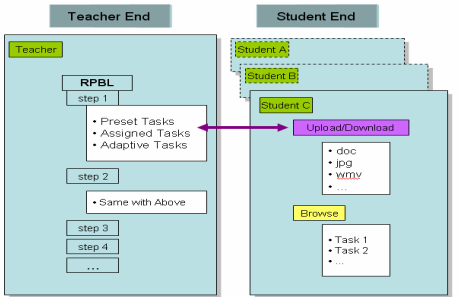

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全球華人計算機教育應用學會
Global Chinese Society for Computers in Education

數位學習主題研討會邀請函

尊敬的施如齡教授：

爲加強兩岸數位學習主題研究的交流與合作，推動電腦教育應用研究的深入發展，本學會擬於 2008 年 3 月在北京舉辦“數位學習主題研究群研討會”。鑒於您在本研究領域的深厚造詣和所取得的豐碩成果，特邀請您出席會議，共同研討今後兩岸數位學習主題合作研究的新趨勢、新思路與新方法，建立兩岸學者的共同研究社群。

會議有關事項通告如下：

主辦單位：全球華人電腦應用學會

協辦單位：北京大學、北京師範大學、清華大學、首都師範大學

會議主題：數位學習主題研討會

會議時間：2008 年 3 月 27 日—3 月 28 日

會議地點：北京大學

全球華人電腦教育應用學會

學會主席　陳德懷教授 敬邀

2008 年 3 月 6 日