行政院國家科學委員會專題研究計畫 成果報告

遊戲式歷史學習活動結合認知師徒制之行動學習環境
研究成果報告(精簡版)

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行政院國家科學委員會補助專題研究計畫 ■ 成 果 報 告 □期中進度報告

遊戲式歷史學習活動結合認知師徒制之行動學習環境

計畫類別：■ 個別型計畫　　□ 整合型計畫
計畫編號：NSC　99-2511-S-216-003-
執行期間：2010 年 08 月 01 日至 2011 年 07 月 31 日

計畫主持人：張文智　中華大學資訊管理學系副教授
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執行單位：中華大學資訊管理系

中　華　民　國　100　年　10　月　15　日

行政院國科會科學委員會專題研究計畫成果報告

遊戲式歷史學習活動結合認知師徒制之行動學習環境

Game-based History Ubiquitous Learning Environment Through Cognitive Apprenticeship

計畫編號: NSC 99-2511-S-216-003-

執行期間：99 年 8 月 1 日至 100 年 7 月 31 日

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摘要

電子化學習在目前社會中越來越流行，遊戲式教學形式應用於歷史課程教學，讓學生實地去參加增加學習興趣與活動。在闖關與體驗過程中，為了能夠吸引學生學習動機與興趣，許多的互動方式不斷發展，並且集合系統上的分析，指導學生近可能接近於認知師徒制方式來協助學生學習。

Abstract

History education is hard for teachers to illustrate the history events accompany geography location, date and names. Besides, students learned History which people thought as common sense might not be true. Teachers have to cultivate students' historical thinking and realize the History development. If there is no appropriate geography tool for students, it would be hard foe students to imagine the indefinable geography location and to organize the History events order. Students will lost their learning motivation and just cram some names or date into their mind that they even don't understand. In History education, teachers need to prepare history material and maps to describe the event front and back. Maps could enhance the history lessons to understand their local and global environment, and how human activities take place in these environments. This research uses PDA Combined RFID and setup a Ubiquitous Context-Aware Mobile Learning System for Taipei Hsien Tamsui history. Using RFID with ubiquitous context-aware technology, students go outdoor on-site learning Tamsui history. Teachers can adjust the exam and items with the cognition and learning objects distribution easily. Students can realize the geography information with this system.

Keywords: RFID, Mobile Learning, Bloom's cognition taxonomy, History Education

1. Introduction

Using geographical maps to teach and assess history is one of the best ways to support students to fully understand concepts related to major historical events. History events occurred with geographical location, time and people. A map will show the distance, the neighboring countries, the climate which is related the history development.

History education is different from normal subject education. Students heard and learned partial history concept when they are children. Some concept is wrong and not really exists. History concept might learn from TV, historical novel, the old talks, radio and etc. Teachers have to motivate students with active learning and think historically. The way to assess the history learning and teaching objectives has no standard, but learning objective guides teaching and assessment.

Teachers can design the teaching material and set the learning objectives according to Bloom's taxonomy [1] which focus on the cognition level of students. Some teachers applied it in teaching and the others used it in examination to define the cognition level of examinees. Teachers can used new taxonomy for teaching students in different teaching methods and designed the course unit in assessments for detecting what students lack in knowledge dimension and cognition process. Originally, teachers have to define or design the learning objectives by themselves. However, there are some researchers provide related keywords for judging. These keywords are analysis and induced for specific cognition level.

No matter in a distance-learning environment or a traditional classroom, instruction and assessment operate together as a complete learning cycle. However, the instructor may miss some course key points when editing an examination. On the other hand, examination plays an important role in learning cycle. A good assessment system provides a suitable method to gather student feedback. With our assessment analysis, the teacher can adjust his/her teaching strategy, and redesign or reorganize learning materials if necessary. In addition, students can also learn the key point of learning materials. The analysis of assessment provides the students with the most important element of each subject and each course, individually.

The organization of this paper is as follows. Section 2 introduces related educational issues and related researches. In Section 3, architecture and implementation of the architecture are described. Section 4 shows the experiment result and analysis. Section 5 concludes the work and talks the future work.

2. Related Work

2.1. Bloom's Taxonomy and Revised Bloom's Taxonomy

Benjamin Bloom [1] invented the taxonomy of educational objectives in 1956, called Bloom's Taxonomy, who is an educational psychologist at the University of Chicago. Bloom's Taxonomy is a classification for educators set for students in different learning fields (learning objectives). It divides learning objectives into affective, psychomotor, and cognitive. Hope teachers can focus on give students a more holistic form of education. The cognitive domain is hierarchical, which involved six levels in the taxonomy. Students have to attain prerequisite knowledge and skill at lower levels and then enter high levels.

Since the instructions that the teacher plan and implement are changed, Anderson and Krathwohl [2] modified Bloom's cognition taxonomy with cognitive process and knowledge dimensions. The revised Bloom's taxonomy assists teachers revise learning objectives and design their teaching material.

Some researchers found that the knowledge dimension and cognitive process can be used to promote the learning efficiency of students. Anderson and Karthwohl incorporates both the kind of knowledge to be learned (knowledge dimension) and the process used to learn (cognitive process) in 2001. The revised bloom taxonomy is useful foe teachers to align learning objectives to assessment techniques efficiently.

In the teaching process, teachers can put the teaching material or course unit on the taxonomy table, ensuring that all levels of the cognitive process are used and that students learn different types of knowledge. For example, if a programming language teacher were planning a comprehensive unit, he or she could check the taxonomy table to insure that students not only learned different mathematical procedures, but also learned how to think (meta-cognition) about the best way to design a program to solve problems. In the assessment, teachers may examine current in units with assessments. The assessment result can inform teachers what kind of cognition process and knowledge dimension are needed for the students.

2.2. History Education

Thinking historically is the main objective of history learning. Thornton, S. J. [3] noted that historical knowledge motivates students to construct critical meaning by encouraging students to inquiry the past, analyze with evidence and make reasonable inferences regarding historical events. Learning history requires the processing of complex information. Yilmaz, K. [4] emphasized that students need to learn the historical methodology to realize and comprehend complex historical information. History makes students think historically by supporting them historical knowledge, inference procedure and synthesizes skill. Some teaching methods are useful to help students learning history and cultivate history thinking. Wains, S. I. & Mahmood, W.

[5] stressed that a multi-perspective understanding history is the basis of historical thinking. Holt, T. [6] argued that introducing students to the raw materials of history is important cultivating the essential skills needed by a historian. It helped students to realize, question and make inference to the raw historical materials for who made it? What is the purpose of this document? Is there any evidence support our assumption? Schreiber, J. [7] found that students should use various artifacts (i.e. bowel, hunting tools) and historical document (i.e. first hand and second hand accounts, contract among races) to understanding and constructing the abstract history. Artifacts and documents can help students give students more comprehensive historical knowledge than that acquired from textbooks. Ellis, J. B. et al. [8] discovered that online interviews enhance history learning in children. The meta-cognitive process enhances students learning. Carroll et al. [9] believed that learning history is essential because it encourages meta-cognitive process.

2.3. History Education Environment

More and more history education environments are created by researchers. Lo J. et al. [10] apply GIS information to develop a web-based spatial-person-temporal history educational system. This system used the acronym HES-SPATO (history educational system based on SPATO); SPATO means spatial, person, action/attribute, and temporal object. The participants in the experiments showed positive attitudes to this system. Chang W.C. et al. [11] integrate several ubiquitous technologies which include RFID, GPS location, and Google map in game-based learning. They try to construct a location-aware, digital game-based learning environment and adapt Taiwan's historical culture in the learning scenario. Akkerman, Sanne et al. [12] design a mobile and multimedia game for History education about Medieval Amsterdam. Students use UMTS/GPS phones for communication and exchange of information when they explore the history of Amsterdam by walking in the city. 216 students experienced this History game, in group of four or five students. There are three types of storification: receiving (spectator), constructing (director) and participating in (actor) the story designed in the game.

2.3. Assessment Systems

Map-based assessment system is helpful and interactive for students. However, not too many map based assessment systems are developed for history education. In 2007, Yang H.C. et al. [13] propose an on-line Assessment Management System Based on QTI and Web 2.0 with AJAX which uses an asynchronous communication way and provides a better using experience to students. The on-line adaptive testing system provides the Question and Test Interoperability (QTI) standardized item and adaptive assessment mechanism. José Bouzo et al. [14] apply Google maps to develop the IMS QTI compliment assessment system which described the assessment with web maps from Google Maps. The students can interact with the map to answer questions. The map supports the different ways of geography information.

3. System Architecture

In system architecture, we consider the possibility of research of early system. So we adopt client-server architecture to structure our system. In hardware part, we uses PDA as our client, and desktop our server. PDA is connected wireless network and plug-in CF interface and RFID reader. The function of PDA is browsers for students. Server is stored with database we need. And our Server is Microsoft SQL 2005 Server, a database environment. In addition, we used Microsoft Internet Information Server 5.1 Version of set up a photo server. We uses 3.5 G network for our PDA to smoothly connect with our remote Server. And we count in the network of Tamsui history, so we uses wireless 3.5 G as our regional warless network. PDA with 3.5 G wireless network takes and stores pictures, context, and test/exam materials and so on easily from far-end server. With this data record analysis, students can well understand their learning status.

This system has two kinds of students, one is teacher, and the other is student. Teachers can author/edit the test items, select items from the item database and store/retrieve the exam sheet in the exam database. This system deliveries the appropriate exam to students. There are four item types, map-based multiple choice problem, essay question, sequence question and map-based question. Each item will have the related information like the difficulty and discrimination. This system displays the exam sheet distribution percentage of the cognition level in Bloom's taxonomy. According to the item's latitude, longitude and zoom parameter, Google map service will transfer the appropriate geography picture.

Figure 1 shows what device is used in this proposed research. A part is wireless 3.5 G network; B part is the CF interface of RFID reader; C part is the RFID tag; D part is the mobile PDA, model number: HP iPAQ h5550.

Figure 2 reveals partly system architecture of this proposed research. In the teacher computer, storing Tamsui history guiding photos, and test information, students uses PDA with RFID reader look for RFID tag in Tamsui history site to sense RFID tag. Context is first step forward to history learning.

Figure 3 shows the multiple choice item authoring interfaces for teachers. We introduce the functionalities in the following.

A1 shows the marker and the related location name or information which can be edited in A2. A3 supports input latitude and longitude. Teachers can choose text item, multiple choice item and essay question in A4, select the marker on the map (A5), set the correct answer (A6) and define the Bloom cognition level (A7). This tool provides clear function (A8), preview edited item (A9), submit and save to database (A10).

A learning activity or exam includes more than one test item, we called "Learning Task" for students to challenge the exam like playing in a game. Therefore, teachers can set the learning task name, the related course unit, task start time/end time, proportional scale and the other related information (B1 in Figure 4). After teachers choose the appropriate test items (B2), the tool will show the Bloom cognition distribution percentage (B3).

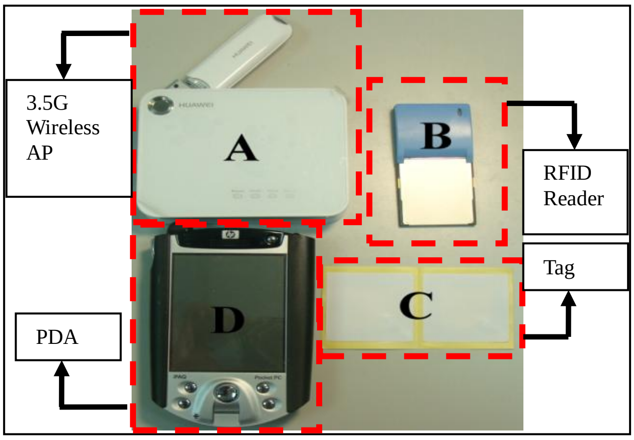


Figure 1. The RFID learning devices

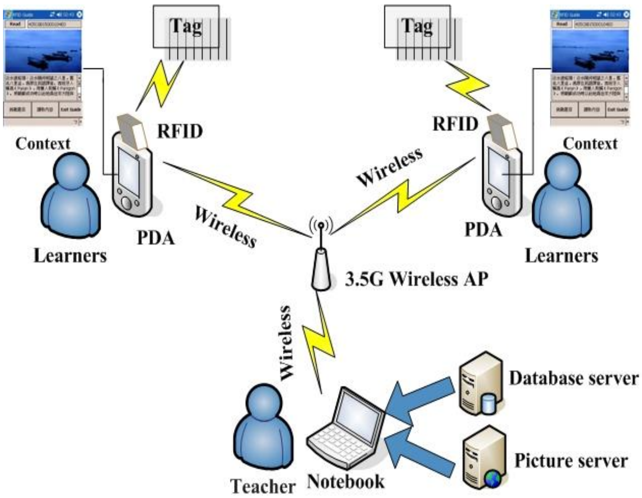


Figure 2. System Architecture

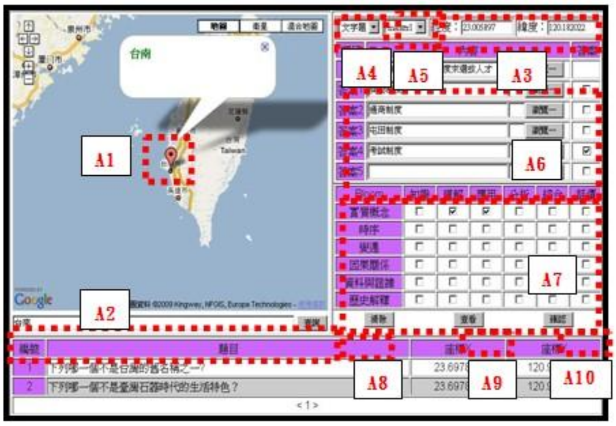


Figure 3. New test item authoring interface for teachers

System practice shows in Figure 5. In Figure 5, students adopt learning content browsing interface of this proposed research, students find and sense RFID tag in Tamsui ferry, then the pictures of Tamsui ferry are showed. Students can select the question he/she wants to challenge (Figure 5a). If students only casual look the content but didn't take the exam, which will be recorded by this learning content browsing interface. In each question of the exam, it is set by teacher with Bloom's cognition taxonomy. For example, Tamsui ferry's exam question is: how much is it to take a boat from Tamsui Fisherman's wharf to Tamsui ferry (Figure 5b) This kind of question is categorized into knowledge by Teacher, the purpose of which is to test if students really go to Tamsui ferry or not.

Figure 4. The learning task authoring interface for teachers

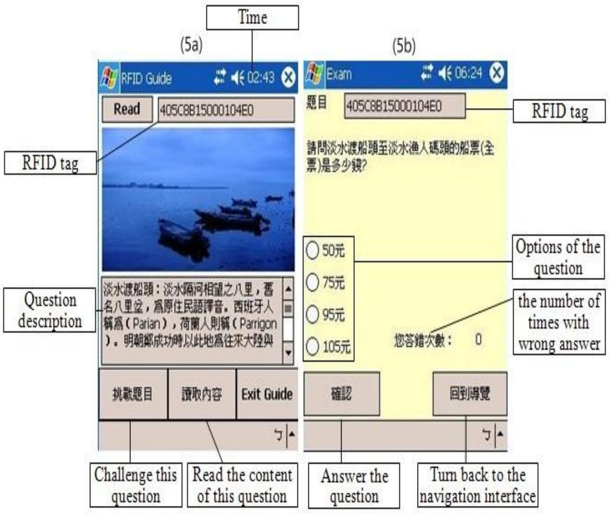


Figure 5. Learning Content browsing interface (5a) Exam question (5b).

This proposed research points out application of sequence knowledge, and each RFID tag binds on one object. We apply sequence knowledge's test system in Tamui Shimizu Patriarch Temple. Firstly, students must have browsing device, then heading for Shimizu Patriarch Temple to sense RFID tag. Browsing the guidance of Shimizu Patriarch Temple, afterward answer the sequence question set up by the Professor. Details are showed in Figure 6.

Students answer the sequential questions by sensing the RFID tags. After students submit the answer, the system will show the appropriate suggestions to students. This kind of sequential question makes students answer questions without guessing answer.

In addition, this proposed research provides learning distribution status, students can see what he/she can select to browse and take the test. Moreover, learning distribution status also reveals students success or fails at specific site.

In Figure 7, different color represents one kind of status. "Green color" is never browed by students; "blue color" is already browsed; "red color" is successfully challenged; "orange color" is students failed to challenge.

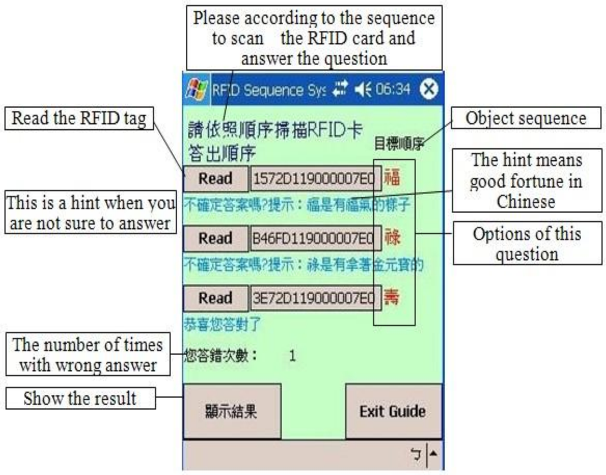


Figure 6. Sequential knowledge exam interface

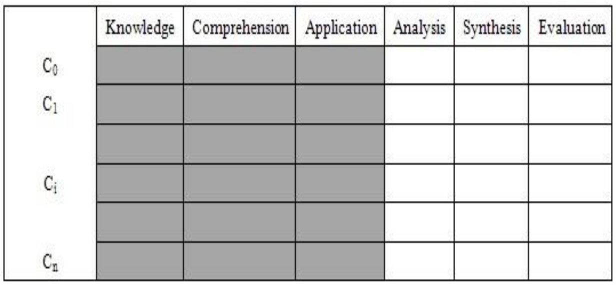
Figure 7. The Learning Map interface and the learners' learning status

3.1 Bloom's cognition knowledge distribution.

This research proposes an algorithm for clustering Bloom's cognition knowledge. Low level cognition knowledge involves knowledge, comprehension, and application. High level cognition knowledge includes Analysis, Synthesis, and Evaluation. We list four types in the following.

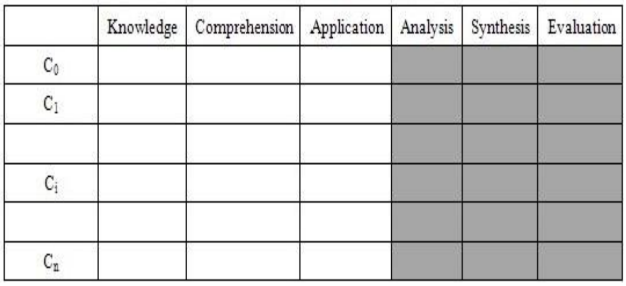
We defined a table, and the horizontal axle means the six levels of cognition knowledge and the vertical axle presents the chapters of the learning content. Ci is the i^{th} content and Cn is the nth content. Table 1 shows the most content focus on low level cognition knowledge (A type). Table 2 presents most content emphasize on the high level cognition knowledge (B type). Table 3 reveals the content is balanced in low level and high level cognition knowledge (C type).

Table 1. "A" type for Bloom's cognition knowledge distribution



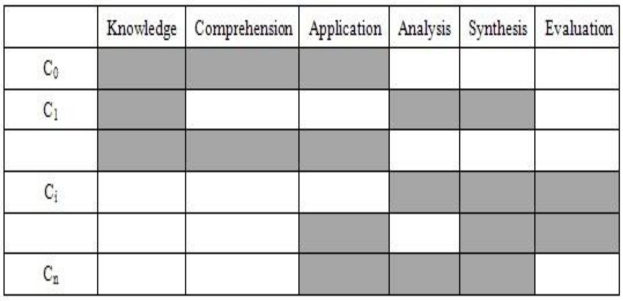
	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
C_0						
C_1						
C_i						
C_n						

Table 2. "B" type for Bloom's cognition knowledge distribution



	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
C_0						
C_1						
C_i						
C_n						

Table 3. "C" type for Bloom's cognition knowledge distribution



	Knowledge	Comprehension	Application	Analysis	Synthesis	Evaluation
C_0						
C_1						
C_i						
C_n						

Clustering the above cognition distribution types needs an algorithm to judge and evaluate. The following is the procedure of the algorithm.

Procedure 1:

The first step is order by the number of cognition knowledge in each content level. For example, C0 involves knowledge and comprehension levels and then the number of Co is 2. C1 involves knowledge, comprehension and application levels, and then the number of C1 is 3. We list Co higher than C1 in the table.

Procedure 2:

Follow procedure 1, if the number of the content level is the same, for instance, C0 and C1 are all 2. But C0 involves knowledge, comprehension, and C1 includes comprehension, application. We list Co higher than C1 in the table.

Procedure 3:

For evaluate and judge which cognition types, the algorithm is used for clustering.

IF (the number of low level cognition knowledge < the number of high level cognition knowledge) **Then** A Type
IF (the number of low level cognition knowledge > the number of high level cognition knowledge) **Then** B Type
IF (the number of low level cognition knowledge = the number of high level cognition knowledge) **Then** C Type
ELSE D Type

In the Figure 8, this experiment used ten exam questions as a Bloom's cognition knowledge distribution to analyze. The proposed algorithm can analyze the result effectively for teachers and students (Figure 8).

4. The Experiment Result and Analysis

This research experiment designed experimental group 44 students and control group 39 students attended the per-test and post-test in Tamsui history. Before we implement per-test part, the teacher designed a total 20 questions exam for students, per-test context is on Tamsui history questions, by the way students are not local residents and living Tamsui, so students has no memory, knowledge.

Figure 8. The sort result of Bloom's knowledge exam question algorithm

After the navigation end teachers have to implement a post-test, post-test analysis in Figure 6. In Figure 6 line chart shows the posttest score of the students used the proposed system improved a lot. The average score of control group is 55.1281 and the experimental group is 76.363. The average improve score is 0 in the control group and 23.295 in experimental group.

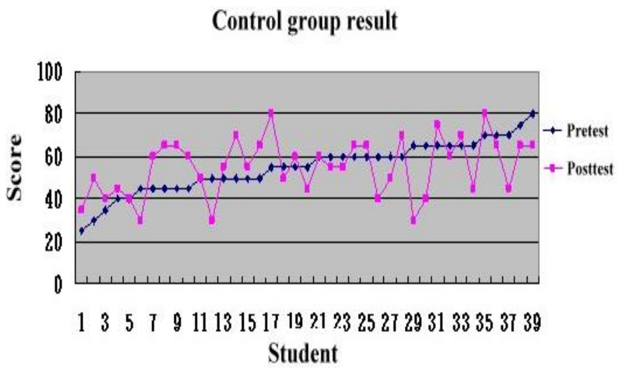


Figure 9. The learning performance comparison of pretest and posttest in control group

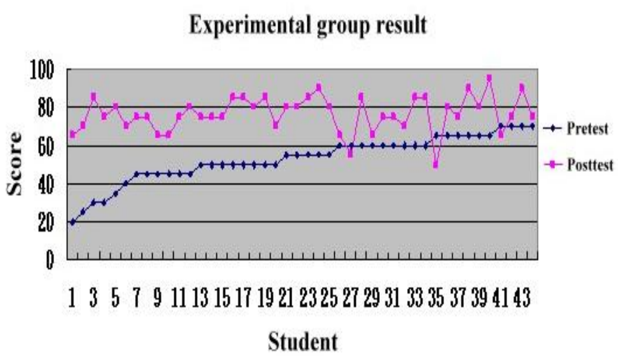


Figure 10. The learning performance comparison of pretest and posttest in experimental group

In this experiment, three hypotheses were tested for history knowledge learning performance between pretest and posttest.

H1 There is no significant difference between the experimental group and control group in the pretest.

H2 There is no significant difference between the experimental and control groups in the posttest.

H3 There is no significant difference between the experimental and control groups in terms of learning improvements.

Table 4. Descriptive statistics of the pretest

	No. of subjects	mean score*	S.D.
Experimental group	44	53.068	12.162
Control group	39	55.128	12.057

Table 5. T-Test for the pretest.

	t	d.f.	Significance (two-tailed)	Average deviation	S.D.
Pretest	0.773	81	0.442	2.06002	2.66404

Table 6. Descriptive statistics of the posttest and improvement

		No. of subjects	Mean score*	S.D.
Posttest	Experimental group	44	76.363	9.298
	Control group	39	55.128	13.498
Improvement	Experimental group	44	-23.295	14.465
	Control group	39	0	14.445

Table 7. T-Test for the posttest and improvement

	t	d.f.	Significance (two-tailed)	Average deviation	S.D.
Posttest	-8.242	66.32	.000**	-21.235	2.576
improvement	-10.093	43	.000**	2.181	14.465

The descriptive statics of the pretest is shown in Table 4. The hypothesis result is shown in Table 5. According to Table 5, we can not reject H1 which suggested that there is no significant difference between the experimental group and control group in the pretest.

Then the hypothesis 2 (H2) and hypothesis 3 (H3) descriptive statistic of pretest, posttest and improvement of control/experimental group are revealed in Table 6 and Table 7. The result shows that there are significant differences between the experimental group and control group in the pretest and posttest after using the proposed history education system. Also there exist significant differences of the learning improvements between the experimental group and control group in the pretest and posttest.

After the posttest, the result of the t-test in H2 and H3 hypothesis result is shown in Table 5 and Table 6. According to the analysis, both H2 and H3 were rejected. The result showed that there are significant differences between the experimental and control groups in the posttest. Also there is significant difference between the experimental and control groups in terms of learning improvements. The experimental result showed that our ubiquitous history education system was effective.

According to Table 7, we reject H2 which suggested that there is no significant difference between the experimental and control groups in the posttest. Also in Table 7, we reject H2 which suggested that there is no significant difference between the experimental and control groups in terms of learning improvements.

In experiment 2, we designed a questionnaire for learners after using the proposed history education system. The questionnaire consists five phase which is shown in Table. We applied Likert five point questionnaire which designed five levels (1:strong disagree; 2:disagree; 3: Neutral ;4:agree;5:strong agree). The questionnaire result (Table 8) shows that learners like to use this history education system. Most of them agree that this system is useful and learners hop to use it in the near future.

5. Conclusion

Students are hard to learn History with complex information and easily lost their learning confidence learning History which includes geography information, decade information, person and event. In this paper, the authors provide a map-based exam authoring tool for teachers. Students can easily understand the geographical location and promote the learning motivation.

This research proposed a mobile learning ubiquitous context-aware technology system for Tamsui history education. This system also combined Bloom's cognition taxonomy analysis. Teachers can realize the cognition distribution of the exam questions, and provides students the misconceptions after exams. Through the RFID technology and PDA mobile devices, students can participate in the interactive learning activity and challenge the sequential knowledge quiz; this system can motivate students learning and promote learning efficiency in History education.

Acknowledgments

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Table 8. The questionnaire result of Experiment 2

		1	2	3	4	5
Perceived ease of use	The design of the system is clear and easy.	0%	0%	9%	57%	34%
	The function is convenient in the system.	0%	2%	20%	55%	23%
	I am satisfied with the response of the system.	0%	2%	11%	48%	39%
Perceived usefulness	The system provides me better history knowledge.	0%	2%	16%	62%	20%
	The system provides me history knowledge what I need.	0%	2%	23%	55%	20%
	The content of the system is helpful for me.	0%	0%	25%	61%	14%
Attitude of use	The system has a favorable view for me.	0%	2%	18%	60%	20%
	I like the system.	0%	5%	23%	56%	16%
	The system increased me the interesting of history after browsing the system.	0%	0%	34%	50%	16%
	I am willing to spend more times to use internet to learn the history knowledge.	0%	2%	30%	52%	16%
Future to use	I will use the system in the future.	0%	5%	35%	46%	14%
	I will recommend the system to other people.	0%	2%	32%	48%	18%
Intension to use	I had an image of the content in the system after browsing it.	0%	0%	9%	57%	34%
	I remembered part of the history knowledge after browsing the system.	0%	0%	9%	45%	46%
	I can describe the details of the architecture in the content of the system after browsing the system.	0%	2%	30%	48%	20%

References

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本計劃[遊戲式歷史學習活動結合認知師徒制之行動學習環境]，原先提計畫為兩年期計畫，在執行過程中以設計開發行動學習環境，並且設計認知師徒制在系統中，但是因為時間限制，認知師徒制的實施有限，只能在部分發表論文的實驗設計中，將認知師徒制透過非系統方式展現在其中。因此對於第一年實施國科會計畫上有所限制。另外，本計劃實施中，已經加入社會網路分析與探討學習社群的分布狀況與因素。將陸續撰寫發表論文。

目前累積本國科會計畫，已發表相關研究成果，**EI-index 國際研討會 3 篇**、**EI-index 國際期刊 3 篇**、**國際期刊 1 篇**如下頁:

國際期刊論文

1. 以 RFID 為基礎開發行動學習結合布魯姆認知分析

Wen-Chih Chang, Te-Hua Wang and An-Sheng Li, “An RFID-Based Learning System Supporting Ubiquitous Context-Aware Bloom's Cognition Knowledge Analysis”, ICIC Express Letters Volume 4, Issue 5(A), pp. 1637-1642 (2010)

2. 無所不在學習環境，透過互動式影音系統與無所不在技術開發學習系統。

Jui-Hung Chen, Han-Bin Chang, Chun-Yi Shen, Te-Wua Wang, **Wen-Chih Chang**, Timothy K. Shih, “Immersive Learning Environment with Integrated Interactive Video and Ubiquitous Technologies”, Journal of Convergence Information Technology, pp.61-72 (2010)

3. 設計與開發冒險遊戲協助學生學習的系統，進行 pilot 實驗驗證。

Jui-Hung Chen, David Tawei Ku, Te-Hua Wang, **Wen-Chih Chang**, Timothy K. Shih, ”Using Adventure Game to Facilitate Learning Assessment Process”, Journal of Convergence Information Technology, pp.126-134 (2010)

4. 棋盤遊戲教學運用在大學生學習網路概念中的最小生成樹學習。

Wen-Chih Chang, Te-Hua Wang, Yan-Da Chiu, “Board Game Supporting Learning Prim's Algorithm and Dijkstra's Algorithm”, International Journal of Multimedia Data Engineering and Management (IJMDEM), Vol.1 Issue.4, pp.16-30 (2010)

國際研討會論文

1. 利用社會網路分析理論分析學習者在實驗室群組中，線上環境與真實世界的人際關係差異探討。

Wen-Chih Chang, Te-Hua Wang, Yen-Ching Huang, “Exploring the distribution and relationship between MSN and the physical world”, International Conference on Networked Computing and Advanced Information Management (NCM), pp.716-721 (2010)

2. 利用社會網路分析探討大學生在開發專題方面，班級學生在專題分組與學習的社會網路分析探討。

Wen-Chih Chang, Hsiao-Wen Lin, Lai-Chi Wu, “Applied Social Network Anaysis to Project Curriculum”, International Conference on Networked Computing and Advanced Information Management (NCM), pp.710-715 (2010)

3. 炸彈超人遊戲角色扮演與劇情遊戲，讓學習者扮演炸彈超人的操作者，透過 C 語言的 coding 來操作炸彈超人闖關，安排劇情融入 C 語言的一維陣列、二維陣列、Switch、IF-ELSE、For 迴圈、While 迴圈等。並且結合線上即時指導來協助學習。

Wen-Chih Chang, Yu-Min Chou, Kuen-Chi Chen ”Game-based digital learning system assists and motivates C programming language learners”, International Conference on Networked Computing and Advanced Information Management (NCM), pp.704~709 (2010)

行政院國家科學委員會補助國內專家學者出席國際學術會議報告

99 年 9 月 8 日

附件三

報告人姓名	張文智	服務機構及職稱	中華大學資訊管理系 助理教授
時間 會議 地點	99 年 9 月 5 日- 99 年 9 月 7 日	本會核定 補助文號	NSC 99-2511-S-216-003
會議 名稱	（中文）第三屆智慧資訊國際研討會 （英文）Third International Symposium on Intelligent Informatics (ISII2010)		
發表 論文 題目	（中文）以 RFID 支援無所不在學習情境感知在 Bloom 認知分析 （英文）An RFID-Based Learning System Supporting Ubiquitous Context-Aware Bloom's Cognition Knowledge Analysis		

報告內容應包括下列各項：

一、參加會議經過

第一天的議程，因為班機於晚間抵達，因此無法如期參與。

第二天的議程，上午前往報到並且參加會議進行，在會議過程中，認識了來自高雄應用科技大學的張瑞芳主任、育達商業科技大學資訊管理系的陳建民博士、東海大學產業工學部石岩教授、台中技術學院資訊管理系柯志坤教授等。彼此交流參加研討會的心得與研究的感想。

第三天返回台灣。

與會心得

在參與會議過程中，學者們因為有不同的學術領域與專業，因此開放的在討論中彼此交換意見與心得。

在國際會議的報告中，感覺許多的台灣學者無法載英文演說中，很自在的將自己的研究透過英文報告演說出來，感覺很可惜。另外一方面，大會的活動安排上，歡迎與晚宴的活動中，許多學者可以有機會跟國外學者，例如日本、中國等多元國家的學者與研究生討論與交流，這樣的感覺很棒，可以瞭解國際之間，在學術研究與計畫執行方面，各個國家的優勢與處境，還有可能會遭遇到的狀況。

透過國際會議更了解國內外對於資訊管理領域與資訊技術領域多元的應用，對於也是需要跨領域合作的遠距教學是一種很棒的交流。

二、建議

感謝中華民國的國科會能夠提供此經費，讓我們能夠跟其他國家與跨領域學者相互交流，並且有機會討論合作的事宜，非常感謝!

三、攜回資料名稱及內容

ISII2010 Proceeding

四、其他

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一、參加會議經過

6/22 上午的會議，由於時間有限，並且大會另外移動一篇論文到本會議議程，因此形成時間不夠的狀況。本會議是 NCM 2011 中的第三屆 AIAE workshop。大會主席宣布 opening 開場後，本人負責第二場 session 的主持人，並且透過當中控制報告時間，其中有遇到兩位中國的教授們提問關於場次中的一篇論文報告，大家對於此議題 ”Wordnet” 相當感興趣。並且提出自己看法。

在本次會議中，我也報告了與淡江大學顧大維老師的合作論文 uFolio: A Conceptual Design Framework for a Learning Platform and Assessment System。韓國的學者對此行動學習議題很有興趣，並且表示相當認同研究的理念。

二、與會心得

本次參加的國際研討會過程中可以遇到較多亞洲國家學者，以及部分其他非亞洲國家的學者與博士班學生，感覺很新鮮並且可以透過不同交流，認識國內與國外相關研究者，收穫很大。感謝國科會科教處與中華大學的經費贊助。

三、建議

會議進行中，自己對於時間掌控可以再加強，另外對於報告後與相關學者交流十分重要，因為目前報告的時程都安排較密集，不容易在 Q&A 進行交流。

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表 Y04

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八、攜回資料名稱及內容

NCM 2011 Proceeding 1 本

九、其他

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圖一.參加會議的台灣學者拍照紀念

圖二.論文報告照片

圖三.NCM2011 大會海報

國科會補助計畫衍生研發成果推廣資料表

日期:2011/09/26

國科會補助計畫	計畫名稱: 遊戲式歷史學習活動結合認知師徒制之行動學習環境
	計畫主持人: 張文智
	計畫編號: 99-2511-S-216-003- 學門領域: 資訊教育一電腦輔助教學
無研發成果推廣資料	

99 年度專題研究計畫研究成果彙整表

計畫主持人：張文智			計畫編號：99-2511-S-216-003-				
計畫名稱：遊戲式歷史學習活動結合認知師徒制之行動學習環境							
成果項目			量化			單位	備註（質化說明：如數個計畫共同成果、成果列為該期刊之封面故事...等）
			實際已達成數（被接受或已發表）	預期總達成數(含實際已達成數)	本計畫實際貢獻百分比		
國內	論文著作	期刊論文	0	0	100%	篇	
		研究報告/技術報告	0	0	100%		
		研討會論文	0	0	100%		
		專書	0	0	100%		
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（本國籍）	碩士生	6	3	100%	人次	培養 6 位參與國科會計畫，學習設計開發行動學習與社會網路分析的碩士班研究生。
		博士生	0	0	100%		
		博士後研究員	0	0	100%		
		專任助理	0	0	100%		
國外	論文著作	期刊論文	4	4	100%	篇	1. 以 RFID 為基礎開發行動學習結合布魯姆認知分析 Wen-Chih Chang, Te-Hua Wang and An-Sheng Li, ’ An RFID-Based Learning System Supporting Ubiquitous Context-Aware Bloom's Cognition Knowledge Analysis’, ICIC

								系統與無所不在技術開發學習系統。 Jui-Hung Chen, Han-Bin Chang, Chun-Yi Shen, Te-Wua Wang, Wen-Chih Chang, Timothy K. Shih, ’Immersive Learning Environment with Integrated Interactive Video and Ubiquitous Technologies’, Journal of Convergence Information Technology, pp.61-72（2010） 3. 設計與開發冒險遊戲協助學生學習的系統，進行 pilot 實驗驗證。 Jui-Hung Chen, David Tawei Ku, Te-Hua Wang, Wen-Chih Chang, Timothy K. Shih, ’Using Adventure Game to Facilitate Learning Assessment Process’, Journal of Convergence Information Technology, pp.126-134（2010） 4. 棋盤遊戲教學運用在大學生學習網路概念中的最小生成樹學習。 Wen-Chih Chang, Te-Hua Wang, Yan-Da Chiu, ’Board Game Supporting

							Learning Prim's Algorithm and Dijkstra's Algorithm', International Journal of Multimedia Data Engineering and Management (IJMDEM), Vol.1 Issue.4, pp.16-30 (2010)
		研究報告/技術報告	0	0	100%		
		研討會論文	3	3	100%		1. 利用社會網路分析理論分析學習者在實驗室群組中，線上環境與真實世界的人際關係差異探討。 Wen-Chih Chang, Te-Hua Wang, Yen-Ching Huang, 'Exploring the distribution and relationship between MSN and the physical world', International Conference on Networked Computing and Advanced Information Management (NCM), pp.716-721 (2010),

							Conference on Networked Computing and Advanced Information Management (NCM), pp.710-715（2010） 3. 炸彈超人遊戲角色扮演與劇情遊戲，讓學習者扮演炸彈超人的操作者，透過 C 語言的 coding 來操作炸彈超人闖關，安排劇情融入 C 語言的一維陣列、二維陣列、Switch、IF-ELSE、For 迴圈、While 迴圈等。並且結合線上即時指導來協助學習。 Wen-Chih Chang, Yu-Min Chou, Kuen-Chi Chen ’ Game-based digital learning system assists and motivates C programming language learners’, International Conference on Networked Computing and Advanced Information Management (NCM), pp.704~709（2010）
		專書	0	0	100%	章/本	
	專利	申請中件數	0	0	100%	件	
		已獲得件數	0	0	100%		
	技術移轉	件數	0	0	100%	件	
		權利金	0	0	100%	千元	
	參與計畫人力（外國籍）	碩士生	0	0	100%	人次	
		博士生	0	0	100%		
		博士後研究員	0	0	100%		

		專任助理	0	0	100%		
其他成果 (無法以量化表達之成果如辦理學術活動、獲得獎項、重要國際合作、研究成果國際影響力及其他協助產業技術發展之具體效益事項等，請以文字敘述填列。)		無					

	成果項目	量化	名稱或內容性質簡述
科教處計畫加填項目	測驗工具(含質性與量性)	1	包含在行動學習系統上的測驗評量模組。
	課程/模組	1	整合在行動學習系統上的台灣歷史學習模組。
	電腦及網路系統或工具	1	歷史學習行動學習系統
	教材	0	
	舉辦之活動/競賽	0	
	研討會/工作坊	0	
	電子報、網站	0	
	計畫成果推廣之參與（閱聽）人數	0	

國科會補助專題研究計畫成果報告自評表

請就研究內容與原計畫相符程度、達成預期目標情況、研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）、是否適合在學術期刊發表或申請專利、主要發現或其他有關價值等，作一綜合評估。

1. 請就研究內容與原計畫相符程度、達成預期目標情況作一綜合評估

■達成目標

□未達成目標（請說明，以 100 字為限）

□實驗失敗

□因故實驗中斷

□其他原因

說明：

2. 研究成果在學術期刊發表或申請專利等情形：

論文：■已發表 □未發表之文稿 □撰寫中 □無

專利：□已獲得 □申請中 ■無

技轉：□已技轉 □洽談中 ■無

其他：（以 100 字為限）

本計劃[遊戲式歷史學習活動結合認知師徒制之行動學習環境]，原先提計畫為兩年期計畫，在執行過程中以設計開發行動學習環境，並且設計認知師徒制在系統中，但是因為時間限制，認知師徒制的實施有限，只能在部分發表論文的實驗設計中，將認知師徒制透過非系統方式展現在其中。因此對於第一年實施國科會計畫上有所限制。另外，本計劃實施中，已經加入社會網路分析與探討學習社群的分布狀況與因素。將陸續撰寫發表論文。

目前累積本國科會計畫，已發表相關研究成果，EI-index 國際研討會 3 篇、EI-index 國際期刊 3 篇、國際期刊 1 篇。

3. 請依學術成就、技術創新、社會影響等方面，評估研究成果之學術或應用價值（簡要敘述成果所代表之意義、價值、影響或進一步發展之可能性）（以 500 字為限）

學術成就

在未來一年內，本計劃將發表 4 篇(EI、ISIP)國際研討會論文與 3 篇(SSCI、SCI、EI)國際期刊論文，並且對於遊戲式學習應用於行動載具上有實務系統開發，應用與實驗。此系統可以加以運用與變化，運用於不同學科，依據不同學科領域課程來做適當的調整。此外透過遊戲式包裝可以延伸學習興趣與學習環境。在後續的研究中可加入社會網路分析以及分析應用於分析學習群組之間的應用。

技術創新

有關本計畫案對於學術研究以及國家發展的貢獻方面為希望藉由探討其遊戲式學習領域之相關文獻、遊戲內容與教學內容之融入認知師徒制與支援行動學習的多元評量、相關技術層面(現有技術如 GPS 訊號解析、學習資料分析、Location-aware 教學應用等)。未來的技術發展上,我們將朝向開發在 smart phone 的 APP 前進拓展遊戲式學習在系統上的發展。

社會影響

本計畫對於社會上將培養人才發展此遊戲式學習開發環境，必須結合科技實作技巧與相關教育理論。對於計畫參與人員而言，可發揮自身研究領域的專業知識之外，對於如何將其他學術領域融會貫通，提供非常寶貴的研究及訓練機會。

對於實際能落得訓練之項目，以下列點方式予以說明：

(1) 增強對於遊戲式學習平台相關技術，網際網路相關應用技術的瞭解與應用。

(2) 加深並瞭解其遊戲式學習平台之相關設計模式。

(3) 瞭解並應用多元智能與多元評量於遊戲式行動學習研究。

(4) 研究遊戲式學習平台與學習紀錄技術的相關性及所需技術(如 GPS 分析,內文感知活動)。

(5) 規劃實驗設計能力與社會網絡分析應用與探討。

目前此計劃畢業學生，2 位碩士，另外 2 位碩士班學生仍在學，將持續在此領域上努力。