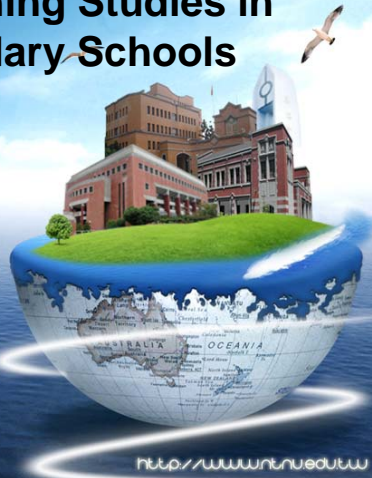


# 中小學行動學習研究案例分享

## Cases of Mobile Learning Studies in Primary and Secondary Schools

國立臺灣師範大學  
科技應用與人力資源發展學系  
許靜坤助理教授  
[ckhsu@ntnu.edu.tw](mailto:ckhsu@ntnu.edu.tw)  
2013.11.06



2013/11/06

<http://www.ntnu.edu.tw>

## 教育背景

- 1995** 國立臺灣師範大學資訊教育學系
- 1999** 教育學院學士、資訊實習教師  
開始高中職資訊教師生涯
- 2006** 國立高雄師範大學資訊教育教學碩士
- 2011** 教育部選送教師出國專題研究  
新加坡國立教育學院訪問學者
- 2012** 國立臺南大學數位學習科技博士  
比利時安特衛普大學DBR短期研究
- Present** 臺灣師範大學科技系專任助理教授



國立臺灣師範大學  
National Taiwan Normal University

## 學術研究

- 榮譽
  - 2011: 教育部公費選送教師出國專題研究  
(主題: 學校英語教學環境與教學策略之推動)
  - 2012: 第15屆國際電腦輔助語言學習研究生論文獎
  - 2013: 國立臺灣師範大學特殊優秀人才獎
- 研究興趣
  - 數位學習/網路學習
  - 行動學習
  - 資訊教育
  - 資訊與傳播科技(ICT)應用
  - 知識工程應用
  - 適性化學習



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

## 數位科技在中小學之過去、現在、未來

- |   |  |   |
|---|--|---|
| <b>12年前，教師學數位?</b> <ul style="list-style-type: none"> <li>• E-mail</li> <li>• Word 用於電腦出題、作講義等等</li> <li>• Excel 用於成績計算</li> <li>• Powerpoint 製作投影片教材</li> </ul> 學校行政單位 <ul style="list-style-type: none"> <li>• 架設學校網站</li> <li>• 學籍系統數位化、成績處理數位化</li> <li>• 建構校內資訊設備</li> </ul> | <b>現在，教師學數位?</b> <ul style="list-style-type: none"> <li>● ICT融入課程與教學</li> <li>● 數位教材發展</li> <li>● 知識社群網路</li> </ul> 學校行政單位 <ul style="list-style-type: none"> <li>● 架設數位教學平台、知識分享平台、圖書館E化</li> <li>● 數位教學資源</li> <li>● 強化網路資訊設備</li> </ul> | <b>再來，教師學數位?</b> <ul style="list-style-type: none"> <li>● 電子書</li> <li>● 行動學習</li> </ul> 學校行政單位 <ul style="list-style-type: none"> <li>● 教育雲</li> <li>● 室內外教學情境多元化</li> </ul> |
|---|--|---|

2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

## 國際行動學習應用成果

### Publications of seven SSCI journals of e-learning in 2008-2012

#### Selected SSCI journals

- Educational Technology & Society (ETS)
- Computers & Education (C&E)
- British Journal of Educational Technology (BJET)
- Innovations in Education and Teaching International (IETI)
- Educational Technology Research & Development (ET R&D)
- Journal of Computer Assisted Learning (JCAL)
- Interactive Learning Environments (ILE)

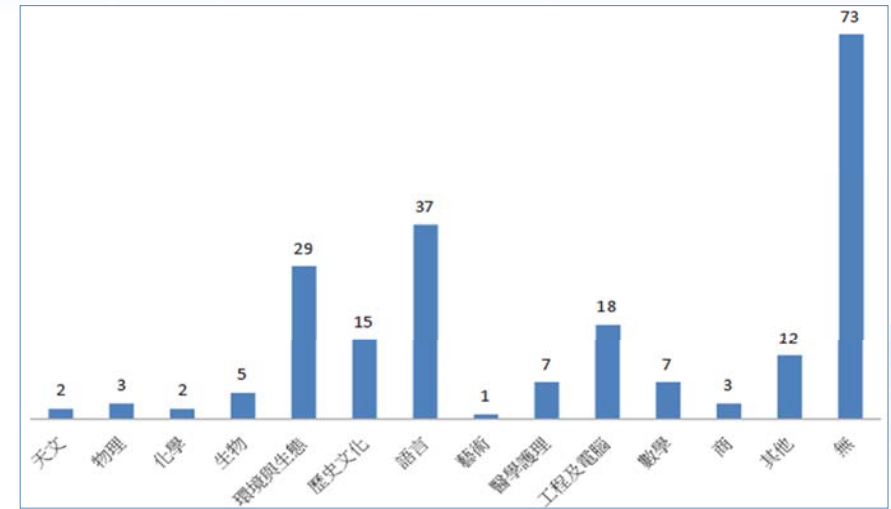
#### 2008-2012的2674文獻中有214個行動學習研究

2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

5

## 應用科目分布廣泛

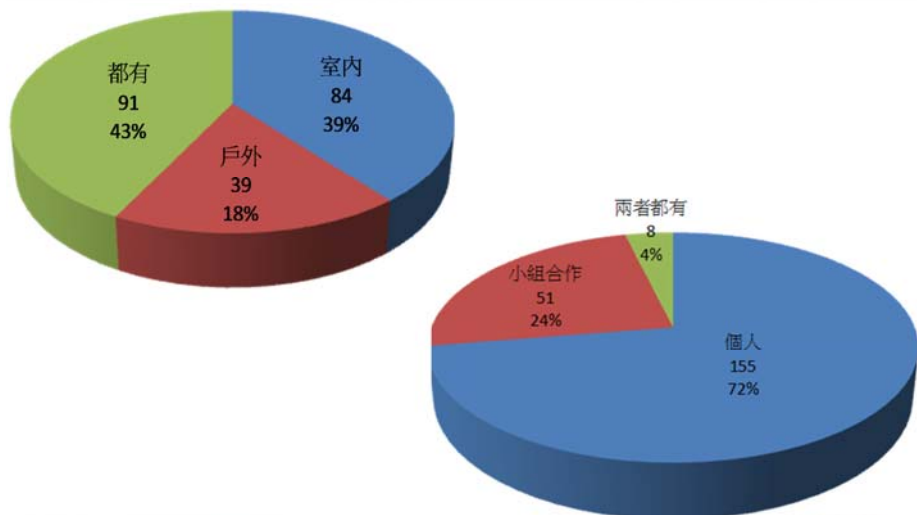


2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

6

## 活動場所及類型

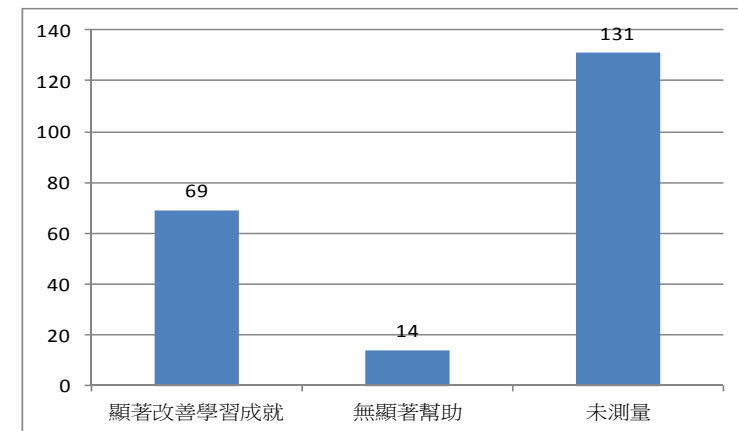


2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

7

## 對學習成就的幫助

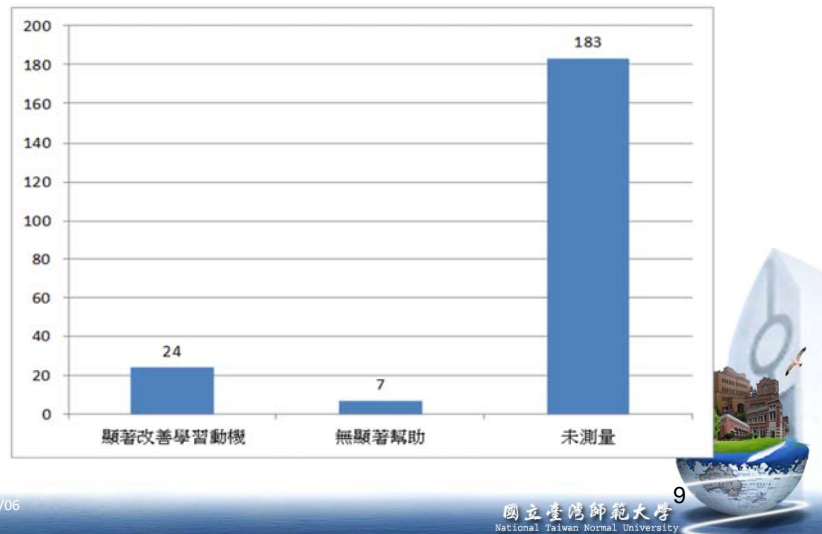


2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

8

## 對學習動機的改善

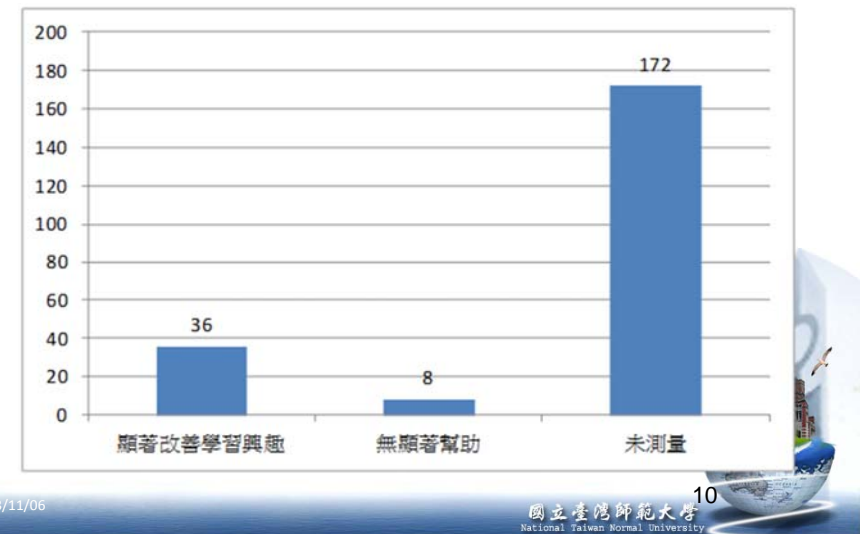


2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

9

## 對學習興趣的提昇



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

10

## 行動載具的特性

- 操作簡易
- 適合閱讀與瀏覽資訊
- 適合簡易的點選、拖拉、翻頁、註記
- 適合以照相、錄影、錄音方式進行記錄
- 不適合大量文字資料輸入

2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

11

## 現階段行動學習的實施模式



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

12



## 行動學習的實施步驟

- 教學內容數位化
  - 教材、學習單、教案、測驗卷
- 規劃學習環境
  - 建立無線網路
  - 建立專屬的伺服器或是運用現有的雲端服務
- 檢視教學內容，規劃不同的教學模式
  - 傳統教學
  - 課堂行動載具教學
  - 戶外行動學習

2013/11/06

13  
國立臺灣師範大學  
National Taiwan Normal University



## 課堂學習活動

- 下載教材及課程補充資料
- 進行單元學習活動
  - 完成學習單、操作學習系統、投票、填寫問卷
- 進行主題式活動
  - 網路資料蒐集、彙整與分享
- 進行合作式或專題活動
  - 分組設計簡報、遊戲、數位說故事影片
- 進行測驗及繳交作業
- 進行同儕互動及作品觀摩
- 提供聯絡簿功能
- 記錄學生的學習狀態

2013/11/06

14  
國立臺灣師範大學  
National Taiwan Normal University



## 戶外學習活動

- 帶著走的學習活動
  - 英文單字、英文閱讀
- 結合情境脈絡的學習活動
  - 個人或小組合作
  - 導覽及觀察、探索活動、知識建構
  - 現場的測驗及回饋
  - 讓學生將真實環境與課本的知識連結
  - 增加學生真實情境探索及問題解決能力

2013/11/06

15  
國立臺灣師範大學  
National Taiwan Normal University



## 小學行動輔助學習研究案例

行動化影音輔助模式對國小學童  
英語聽力及字彙習得之影響

2013/11/06

16  
國立臺灣師範大學  
National Taiwan Normal University



# Introduction

- The MOE in Taiwan extended regular English instruction down to the **third grader** in the elementary school.
- In the next decade, regular English instruction is considered to be extended down to **the first grader** in the elementary school.
- Most of the **English certifications** today includes the **listening proficiency examination**, such as TOFEL, TOEIC and so on.



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

17

# Introduction

- An increasing number of MALL studies have been devoted to **vocabulary acquisition** and learning, and the learning outcomes are significant (Chang, & Hsu, 2011; Kim, & Kim, in press; Chen, & Chung, 2008; Lu, 2008).
- Students were encouraged to use **mobile phones** to access **video clips** explaining English idioms (Thornton & Houser 2005).
- This study conducted a number of MALL instructional experiments, in which **different modes of captions and subtitles** were inset in the MALL video material for different groups, with the purpose of identifying better instruments for English as foreign language learners (i.e., EFL learners).



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

18

# Introduction

1. Control group one: A video **without any caption** of English and Chinese subtitle
  - because previous studies indicated that no caption or subtitle help student get adaptive to various pronunciation appearances, such as **reduced forms assimilation elision** and resyllabification.
2. Experimental group one: A video with **full English captions** and **Chinese subtitles** of target vocabulary
  - because a previous study showed that **full Chinese subtitle is not needed**
3. Experimental group Two: A video with both **English caption of target vocabulary** and **Chinese subtitle of target vocabulary**



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

19

# Research questions

1. Whether different display modes of caption and subtitle result in different effectiveness on **listening comprehension** and **vocabulary acquisition** of elementary school students?
2. How the learning performance of different **learning style** students in learning with **different caption modes**?
3. How the students' perceived **satisfaction** of, perceived **usefulness** and **ease-of-use** toward the mobile learning activity in the experimental groups?



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

20

## Literature Review (1/2)

- Many studies confirmed that combining captions with audio-visual materials is an effective instructional method to enhance **listening** and **reading comprehension** of second language (Borras& Lafayette,1994; Danan, 2004)
- Captions **visualize** the information of foreign language which learners heard in the video (Danan, 2004)
- Another scholar stated that providing **native subtitle** for learners will **obstruct their listening familiarity** of pronunciations (Vandergrift, 2007).



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

## Literature Review (2/2)

- Researchers have indicated that, for the students to get used to the **tempo** of usual conversation, there is no need to provide the **fast forward** or **slow play** function;
  - instead, the function of **play pause** **replay** is necessary for listening training (Grgurovi & Hegelheimer, 2007; Winke, Gass, & Sydorenko, 2010).



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

## Method-- Participants

- **Eighty-one** low-achievement fifth graders participated in the learning activity.

Groups	Boys	Girls
Control group	16	11
Experimental group one	12	16
Experimental group two	15	11



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

## Method-- Research design

- The same listening materials and the same English teacher, but different caption modes.



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University



# Method-- Research Tools

- The students in each group can use a stylus to operate the function of **play**, **pause**, and **replay** to listen in the limited time once a week.
- The study used the **mid-term test** conducted one week before the experiment as the pre-test.
- **TAM** questionnaire & Felder-Soloman's Index of **Learning styles**

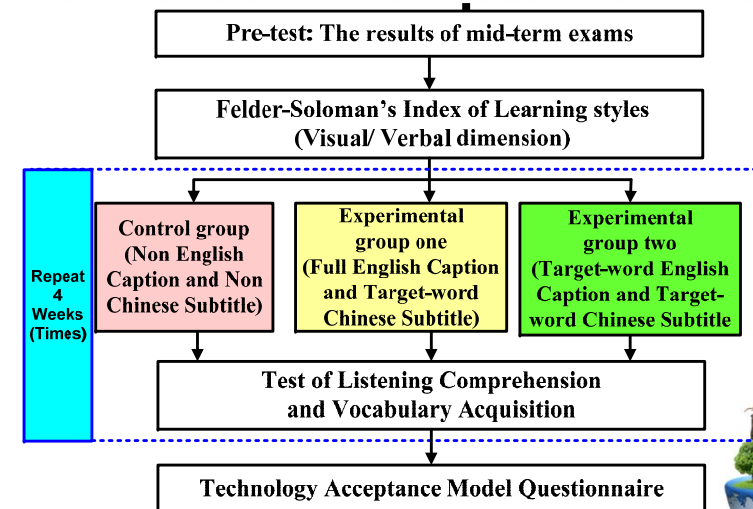


2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

25

# Method-- Experimental



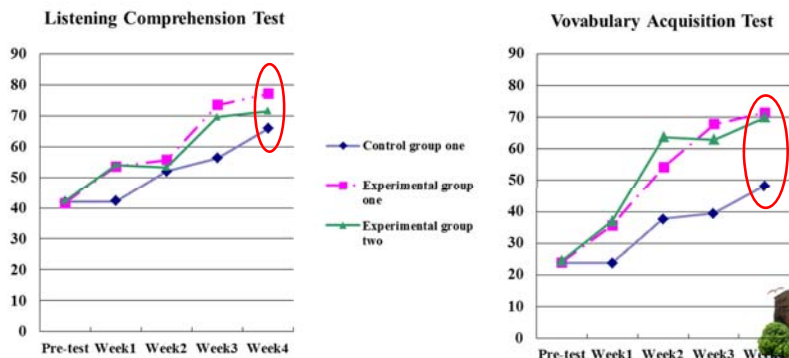
2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

26

# Results-- Analysis of Tests

- The ANOVA analysis results of the pre-test among the three groups are **not significant difference** ( $p=.94 > .05$ )
  - the three groups of the students had **equivalent prior knowledge** before the learning activity.



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

27

# Results-- ANCOVA analysis of tests

- By employing ANCOVA on the post-test scores of the three groups,
  - No significant difference was found between the **listening** comprehension scores of the three groups ( $F=1.94, p > .05$ ).
  - Significant differences were found between the **vocabulary acquisition** scores of the experimental groups and those of the control group (shown as the following Table).

Group	N	Mean	SD	Adjusted Mean	F	Pairwise comparisons
Control group (a)	27	48.15	24.34	51.10	3.71*	(b) > (a) (c) > (a)
Experimental group one (b)	28	71.43	26.35	68.81		
Experimental group two (c)	26	70.00	33.11	67.17		

2013/11/06  $p < .05$

國立臺灣師範大學  
National Taiwan Normal University

28

## Results-- Different Learning Styles

- The students with **visual** learning style in the **target-word group** performed as well as the students with visual learning style in the **full-caption group** for **vocabulary acquisition**.
- Both the target-word group and the full-caption group **outperformed** the non-caption group.

Learning style	Group	N	Mean	SD	Adjusted Mean	F	Pairwise comparisons
Verbal (L)	Control group(L1)	7	51.43	27.95	51.17	0.84	
	Experimental group one(L2)	9	73.33	33.17	69.53		
	Experimental group two(L3)	9	62.22	38.01	68.42		
Visual (V)	Control group(V1)	18	47.37	24.23	51.55	3.23*	(V1)<(V3)*
	Experimental group one(V2)	19	70.53	23.45	68.71		(V1)<(V2)*
	Experimental group two(V3)	17	74.12	30.63	70.30		

2013/11/06 \* $p < .05$

29  
國立臺灣師範大學  
National Taiwan Normal University

## Results-- TAM of Experimental Groups

- Perceptions of the target word subtitles
  - In the six-point Likert-scale, where 1 represents "strongly disagree" and 6 represents "strongly agree", the descriptive statistics of the technology acceptance model in **experimental group two** all reach the degree of higher than 5 on average.

Scale	Experimental group one			Experimental group two		
	N	Mean	SD	N	Mean	SD
Satisfaction	28	4.83	1.33	26	5.00	1.05
Usefulness	28	4.65	1.46	26	5.08	1.01
Ease of Use	28	4.58	1.49	26	5.07	1.04

2013/11/06

30  
國立臺灣師範大學  
National Taiwan Normal University

## Conclusions

- The **paired sample t-test** results between the pre-test and the post-test showed that the three groups all made **significant progress** in listening comprehension and vocabulary acquisition during the four weeks with  $p < .01$ .
- This study found that the **target-word** strategies have better effects on **vocabulary acquisition** than on **listening comprehension** for low-achievement elementary school students.
- From Interview, students in experimental group one (the full English caption group) indicated that it was **not necessary** to provide them with full English captions.

2013/11/06

31  
國立臺灣師範大學  
National Taiwan Normal University

## Conclusions

- From Interview, students stated that showing full captions **interfered** with their listening to the learning materials.
- They believed that providing only **target words** was sufficient to assist them in improving their listening comprehension
  - which conforms to the results of the investigation of **perceptions** of using the system for learning English listening.

2013/11/06

32  
國立臺灣師範大學  
National Taiwan Normal University



## Future suggestions

- The study suggests that future researchers can set and **show** the **target words** and **hide** the other words in the captions of different video lengths for learners of different ages.
- English listening proficiency needs learners to spend **more time** practicing and training so as to more easily make progress.
  - in the future, we plan to extend the experiment in a **seamless learning environment** to accelerate the listening proficiency of learners.
- Because English teachers may not have the skills in information and computer technologies, we plan to establish **caption processing tool freeware**.

33



## 高職行動輔助學習研究案例

### A CONTEXT-AWARE UBIQUITOUS LEARNING APPROACH FOR PROVIDING INSTANT LEARNING SUPPORT IN PERSONAL COMPUTER ASSEMBLY ACTIVITIES

34



## Conventional learning

- ◆ In a secondary school computer course, a teacher usually needs to instruct a class of up to 40 students, indicating the difficulty faced by the teacher in catering to **the needs of individual students**.



35



## Mobile learning

- ◆ To improve the practice efficiency and learning, it has been suggested that teachers provide students with **one-on-one operation guidance** in a real-world environment (Hwang, Chu, Lin, & Tsai, 2011).
  - This study proposes a **situated multimedia ubiquitous learning (SMUL) system** which applies personal digital assistants (PDAs), wireless communication networks, and radio frequency identification (RFID) technologies in the learning activities of computer assembly.



36



# Literature Review of Mobile Learning



2013/11/06

## Previous study: 情境式學習應用於鄉土教學



Prompt the student to find a wall-painting created in Qing dynasty.

Hwang, Gwo-Jen, & Chang, Hsun-Fang. (2011). A formative assessment-based mobile learning approach to improving the learning attitudes and achievements of students. *Computers & Education*, 56(4), 1023-1031. doi: 10.1016/j.compedu.2010.12.002

## Previous study: 情境式學習應用於自然生活與科技



Guide the student to find "Liquidambar" for further observation.

Map to show the locations of the student and the target object.



Chu, Hui Chun, Hwang, Gwo Jen, Tsai, Chin Chung, & Tseng, Judy C. R. (2010). A two-tier test approach to developing location-aware mobile learning systems for natural science courses. *Computers & Education*, 55(4), 1618-1627.

2013/11/06

## Previous study: 情境式學習應用於化學實驗



2013/11/06

## Previous study: 情境式學習應用於科學儀器操作



2013/11/06

41  
國立臺灣師範大學  
National Taiwan Normal University

## Literature Review of Cognitive Styles



2013/11/06

42  
國立臺灣師範大學  
National Taiwan Normal University

## Cognitive Styles

- **The Group Embedded Figures Test (GEFT)** proposed by Witkin, Moore, Goodenough, and Cox (1977) has been widely used to identify those students who are **field independent (FI)** or **field dependent (FD)**.
  - FI learners can quickly identify the positions of embedded figures and obtain higher scores
  - FD learners have lower scores in the test.



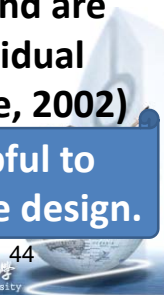
2013/11/06

43  
國立臺灣師範大學  
National Taiwan Normal University

## Cognitive Styles

- Higher FD learners would like to have information presented in order or in clear and concise ways and tend to accept the provided information without reorganizing it.
  - FD students like group activities
- FI students prefer individual learning and are active in finding and constructing individual learning experiences (Chen & Macredie, 2002)

Considering cognitive style could be helpful to system developers in improving interface design.



2013/11/06

44  
國立臺灣師範大學  
National Taiwan Normal University



# Research Objectives

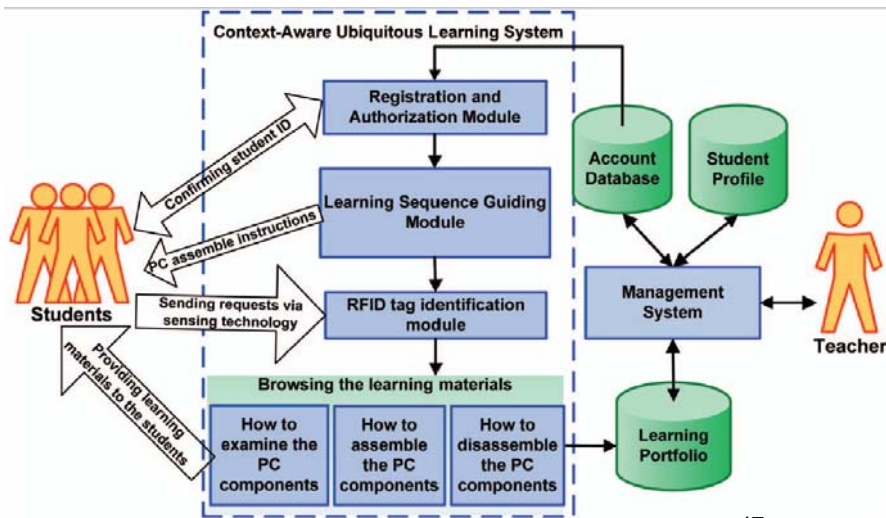
- In this study, we attempt to investigate the effect of the students' cognitive styles on their context-aware u-learning performance.
  - The investigation results can be a good reference for improving u-learning systems in the future.



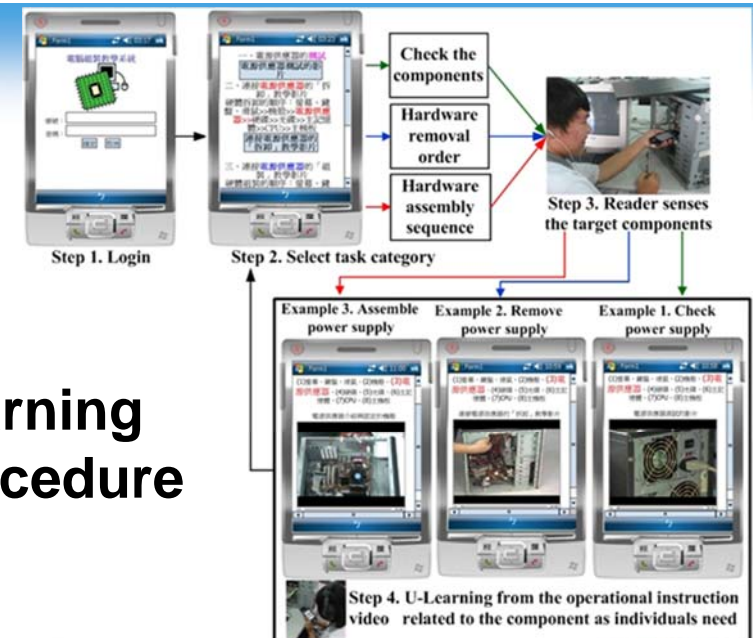
# Method



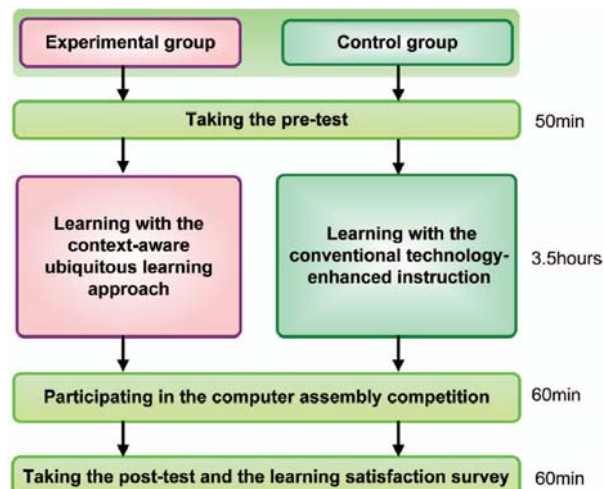
# The structure of SMUL system



# Learning Procedure



# Experimental Design



2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

49

# Results

2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

50

# Learning Effectiveness

- Independent t-test on the scores of the control group and the experimental group

Examine	Groups	N	Mean	SD	t
Pretest	Control group	39	37.18	7.99	-0.255
	Experimental group	39	36.69	8.84	
Post-test	Control group	39	62.10	9.83	2.49*
	Experimental group	39	68.05	11.25	

Note: \* $p < .05$ .

2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

51

# Learning Satisfaction

Items in the questionnaire	Experimental group			Control group			t
	N	mean	SD	N	Mean	SD	
Q1. I am satisfied with the content presentation of the course.	39	4.18	0.60	39	3.85	0.78	2.12*
Q2. I am satisfied with the instructional plan and goal.	39	3.97	0.54	39	3.74	0.75	1.56
Q3. I am satisfied with the usage of the instructional facilities in learning hardware composition.	39	3.95	0.65	39	3.23	0.90	4.04**
Q4. I am satisfied with the instructional device and teaching aids.	39	4.00	0.83	39	3.38	0.78	3.38**
Q5. Overall, I am satisfied with this course.	39	4.05	0.56	39	3.72	0.72	2.28*

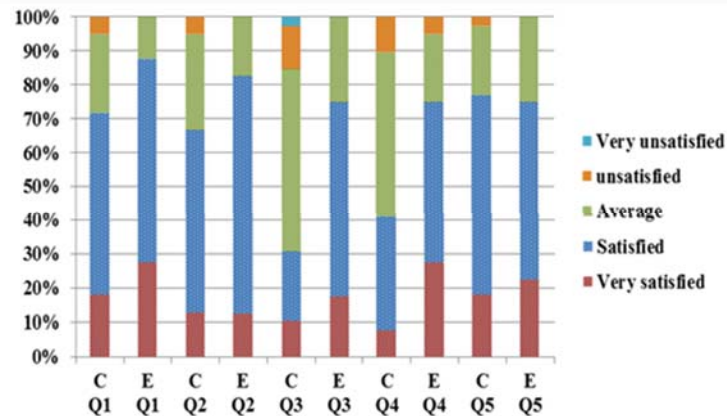
\* $p < .05$ , \*\* $p < .01$

2013/11/06

國立臺灣師範大學  
National Taiwan Normal University

52

## Learning satisfaction



2013/11/06

53  
國立臺灣師範大學  
National Taiwan Normal University

## Cognitive styles

Dimension	Scales	Cognitive style	N	Mean	SD	t	p
Academic achievement	Pre-test	FD	20	38.30	9.89	1.17	.25
		FI	19	35.00	7.48		
Academic achievement	Post-test	FD	20	70.20	12.45	1.23	.23
		FI	19	65.79	9.66		
Task-oriented learning	PCDIY performance (Minutes)	FD	20	25.42	9.97	3.19*	.00
		FI	19	16.80	6.66		
Cognitive loads	Mental load	FD	20	2.73	0.88	2.74*	.01
		FI	19	2.05	0.62		
Cognitive loads	Mental effort	FD	20	2.90	1.12	2.18*	.04
		FI	19	2.24	0.73		
Learning attitudes	Experience of using PDAs to learn	FD	20	4.52	0.62	-2.96*	.01
		FI	19	5.09	0.57		
Perceptions of participating in the u-learning activity	Feelings about the SMUL system	FD	20	4.00	0.62	-3.436*	.00
		FI	19	4.86	0.92		
Perceptions of participating in the u-learning activity	Satisfaction with the learning approach	FD	20	4.54	0.63	-2.43*	.02
		FI	19	5.08	0.75		
Perceptions of participating in the u-learning activity	Satisfaction with the learning approach	FD	20	4.53	0.58	-2.26*	.03
		FI	19	5.00	0.70		

\*p < .05

2013/11/06

54  
國立臺灣師範大學  
National Taiwan Normal University

## Conclusions

- In such courses as computer assembly that require **frequent interactions with real-world learning targets** (e.g., computer components), without proper learning guidance, the students might spend much time **reading the instructions** or learning materials, while **ignoring the learning targets**; moreover, they might fail to link their prior knowledge to the **present learning tasks** when encountering

**The context-aware ubiquitous learning approach has effectively coped with these problems.**

2013/11/06

55  
國立臺灣師範大學  
National Taiwan Normal University

## Conclusions

- The **FI** students showed **higher learning efficiency**, **lower cognitive load**, and **better learning attitudes** than the **FD** students regarding computer assembly.
- Additional time may be needed to help the **FD** students get used to the new technologies or interfaces.
- It could be helpful to **assign fewer learning tasks** or **provide less learning content** to the **FD** students in the same amount of time in order to **reduce their cognitive load**.

2013/11/06

56  
國立臺灣師範大學  
National Taiwan Normal University