PBL-oriented Unit Integration and Team Teaching –Using Computer Science and English Courses in Senior Vocational High School as Study Case

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Abstract——*This research focused on the unit integration and team teaching, and used creative thinking teaching and problem-based learning methods as its major methods to teach students computer skills and English. These students came from the department of electronics in the senior vocational high school. This research also adopted the action research method in accordance with the creative thinking teaching and PBL methods to integrate the contents of two fields, that is, computer science and English, and to design team teaching activities.*

The research subjects were 40 first-year students in the department of electronics in the senior vocational high school. These 40 students were divided into six groups and had the same study theme of "A Beautiful Date." The instructional contents were categorized into two units. In the first unit, the focus of English teaching was on the introduction of restaurant English, menu and food names while the focus of computer science teaching was on Microsoft Publisher Software and Internet IPR issues. In the second unit, the focus of English teaching was on western table etiquette and manners while the focus of computer science teaching was on Microsoft Power Point Software and the use, editing and application of computer audio and video devices. There were four instructional steps: 1) implement English situational teaching, 2) set up instructional goals for computer skill teaching, 3) implement computer skill teaching, 4) present creative works by students

This research found that, in the aspect of learning efficacy, unit integration and team teaching that combined the contents of both English and electronics-related subjects could really help increase students' ability to apply knowledge. According to the student feedback questionnaire survey, diversified contents and team work were able to arouse students' learning interest and help create a more harmonious atmosphere in the class. This research also pointed out that if a teacher knew how to design PBL teaching activities, followed the instructional steps, and offered students appropriate guidance, vocational students' English proficiency and their ability to apply and integrate computer skills could be greatly enhanced.

Index Terms —— *English teaching, problem-based learning, team teaching, unit integration*

Introduction

1. **Motivation and Rationale**

In his book "Communication, no problems!", Peng Huai-Chen said many people like Carnival, a joyful and colorful event where they can have fun, surprises and pleasure, and , of course, a place where they can meet many people and see various kinds of things. (Peng, 2003). This lets us wonder why teaching activities can't be like carnivals.

Traditionally, teaching is conducted based on subjects. In class, there is only one teacher giving lectures on a single subject. If students are not interested in the teaching content, they will have little motivation to learn. The range of knowledge they absorb and their ability to apply knowledge flexibly will both be limited. Therefore, in an attempt to raise students' motivation to learn, inspire their creativity and potential, and enhance their learning efficacy, this research designed a course that integrated instructional contents of English and computer science and was taught by two teachers using a team teaching method.

2. Research Purpose

Based on the aforesaid motivation and rationale, this research had two purposes:

A. Developing a teaching framework and specific instructional steps for an integrated English and Computer Science course using a team teaching method.

B. Establishing a team-teaching model based on thematic teaching and problem-based learning (PBL) methods.

Methodology

This research adopted methods in action research, conducted literature reviews, expert interviews and teachers' conferences on teaching, and used computer science and English courses in senior vocational high schools as a study case. Self-made teaching media and various video equipment were used in the creation of teaching situations. Team teaching was used to integrated teaching units were designed. After lectures were given and teaching methods, such as cooperative learning and creative thinking, were used, PBL methods were used in the design of teaching activities. Then diversified assessments were carried out to see if students have the ability to use their creativity, establish professional expertise and learn from their experience. The study subjects were two classes of first-grade students majoring in electronics in a vocational high school, of which, one was the experimental group and the other, the control group.

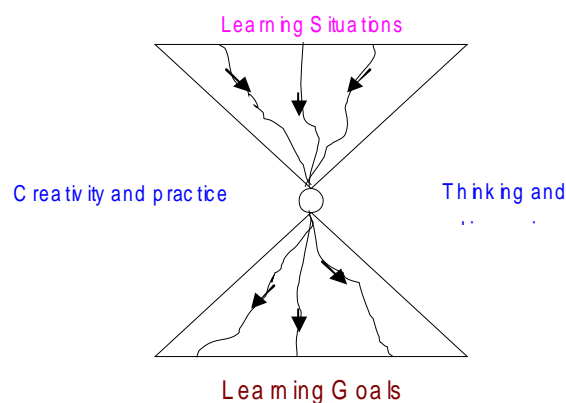## Research Design and Concept

Figure 1

CONCEPTUAL GRAPH FOR IMPLEMENTING PBL

Figure 1 showed how PBL method was implemented in this research. The upper part of the figure showed the teaching situations designed for teachers. Students were motivated in these situations to learn. There were many learning pathways and students could choose the way best suiting their learning needs and in accordance with planning of cooperative learning. Based on the learning goals set by the students and the team teaching method, two teachers designed different teaching activities, such as group discussions and brainstorming, to help students learn, integrate and apply different areas of knowledge.

In team teaching, there is always one teacher playing a major role. The teaching activities are designed focusing on one specific area of subject expertise while other areas of subject expertise are taught in an auxiliary level. In this research, English was the major subject while computer science was taught auxiliarily.

Implementation

Figure 2 showed how the team teaching was implemented step by step in this research. First, the teachers needed to set up a teaching theme based on the instructional content of the major subject, that is, English.

Then, the two teachers designed teaching situations according to the teaching theme they set up. They also made teaching plans for team teaching and designed the content of each unit under the theme. When integrating the teaching content of the English and computer science subjects into one unit, there were three key factors that needed to be taken into considerations:

1. The correlation between the theme of English course and daily life.
2. What multi-media can best help students to learn from the English course?
3. Which multi-media information software and hardware are needed in these teaching activities?

The steps that the teachers took to design the units are as follows:

1. Divide the English course theme into several independent units.
2. Find materials from people, matters and objects that students contact in daily life and design teaching situations for each unit.
3. Find out the efficacy of multi-media used in the class.
4. Incorporate the use of multi-media information software and hardware into the teaching activities

In the sequent teaching activities, the teachers used pre-designed teaching situations to arouse students' motivation to learn. They created such an atmosphere in the class that encouraged students to learn and became interested in the teaching theme.

This English course was taught with the auxiliary of computer science, so an introductory course to multi-media information science was given students to help them develop a general idea about computer science. Through this arrangement, students also understood what resources they could use when setting up their learning goals.

Then the team teaching activities came into play. The teaching activities were divided into three acts, the basic content of which was based on the English teacher's design while the computer science teacher played only an auxiliary role. Each unit has an assignment. Each group of students had to set up their own learning goals and completed the assignment through what they learned from class. There were two assignments: designing a creative menu and recording a short broadcast program. These assignments were given to students during the Act I and II activities respectively.
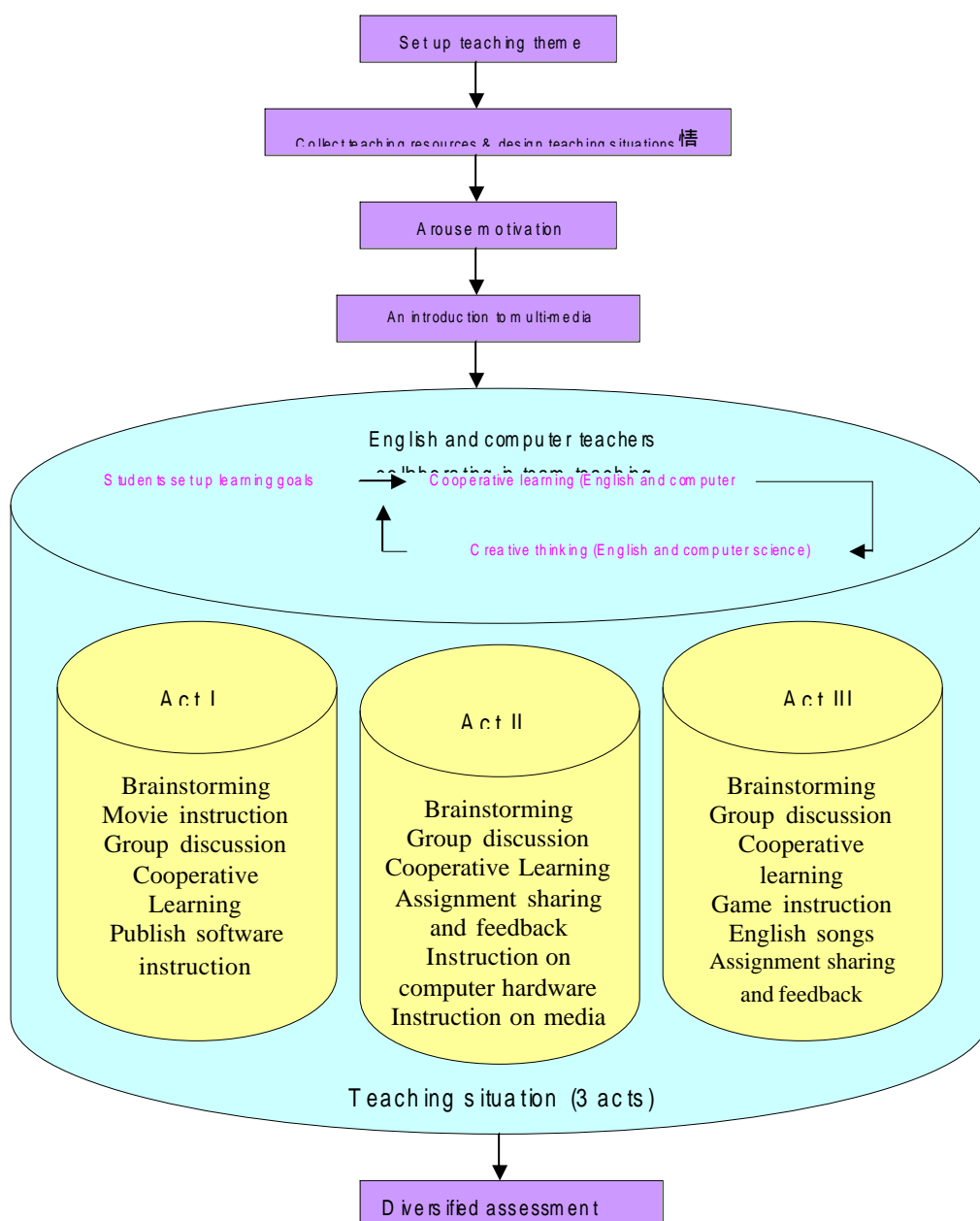
Figure 2

IMPLEMENTATION STRUCTURE OF TEAM TEACHING

After each group had set up their learning goals, the teachers started to design computer software and hardware course based on the students' learning goals. At this time, it was the computer science teacher who gave lectures in class while the English teacher played an auxiliary role. To help students complete the creative menu assignment, the computer science teacher had to design a course on Microsoft Publish software based on the students' learning goals, while the English teacher taught students about the design of menu content. For the short broadcast program assignment, the computer science teacher gave lectures on Microsoft Power Point software, the use of recorder pen, and audio file play and link transfer, while the English teacher guided students to design program content and taught them correct English pronunciation.

There were various teaching modes and media used in the teaching activities of each act, such as movie instruction,

game teaching, and teaching of English songs and computer animation. These activities aimed at helping students to learn naturally and hence enhance their learning efficacy and create a harmonious atmosphere in class.

Assignment presentation and sharing were held after completion of Act II and III respectively. Then diversified assessments were carried out, including traditional written tests, group assignment evaluation, file assessment, self-evaluation of each group and evaluation on other groups.

V. Model Establishment

Figure 3 showed the team teaching model that used the thematic teaching and PBL as its major methods. In this research, English course was the major course while the computer science was taught in the team teaching. The teaching activities were designed based on a PBL approach.

The PBL method requires that learners set up their own learning goals according to their own needs. Therefore, there was group discussion in the teaching activity of each act. Group members had to discuss the problems involved in the situations of each act and then set up their own learning goals. After the goals were set up, each group had to decide on the methods they would use to complete their assignment and on what kinds of computer software and hardware they would need. Then they had to provide the teachers with necessary information. The teachers would then design teaching activities based on students' needs and implement them accordingly. This research adopted the PBL and thematic teaching methods and implemented team teaching. All courses were taught by two teachers collaborating with each other. Based on their own expertise, one teacher would play a major role in teaching activities and the other would play an auxiliary role. Finally, diversified assessments were carried out to assess teaching efficacy.
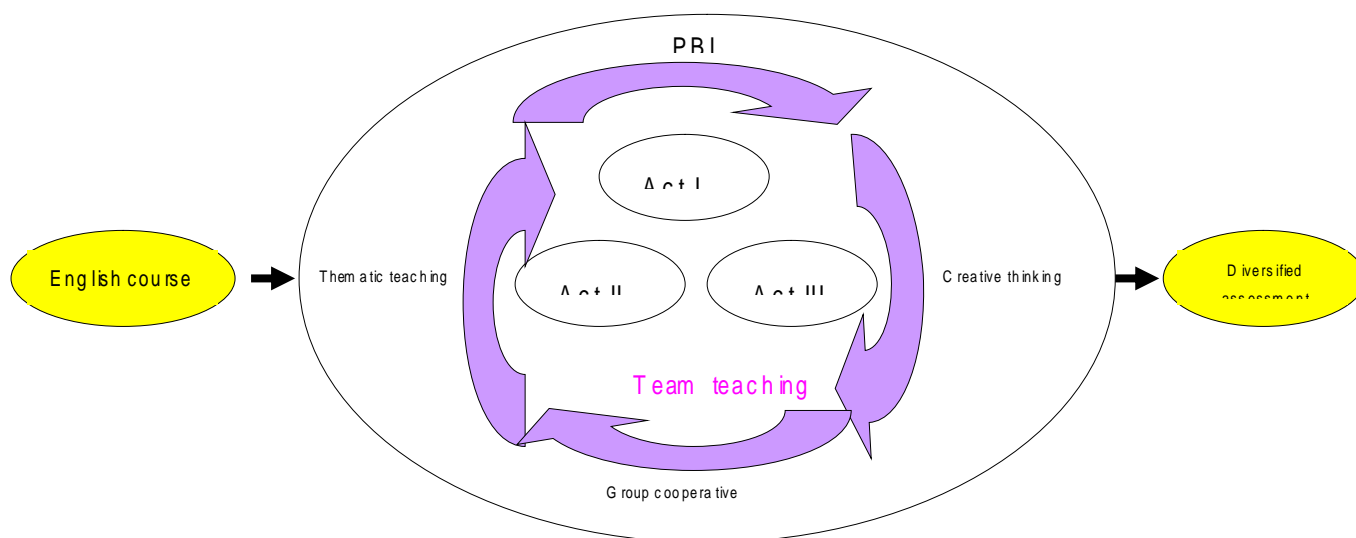

Figure 3

TEAM TEACHING MODEL BASED ON THEMATIC TEACHING AND PBL METHODS

- A CASE STUDY OF ENGLISH COURSE.

Research Results and Findings

After carrying out the PBL-based team teaching on the integrated English and computer science course, the research had the following findings:

1. The students clearly understood the process of problem thinking and the methods they could use to solve problems.
2. Group members learned how to set up their own learning goals and understood what they should and want to learn.
3. The team teaching carried out by the teachers of two different subjects successfully enhanced the students' ability to apply and integrate knowledge.
4. The integration of two different areas of subject expertise helped enhance the diversity and flexibility of teaching materials.
5. Students learned how to learn autonomously and had successfully enhanced their interest and ability in English.
6. The teaching process had helped the students to learn about team spirit and sport spirit and develop an appreciation for others' help. It also helped generate a harmonious atmosphere in class.

Conclusion and Future Development

   This research used thematic teaching and PBL methods as its main structure to carry out team teaching and unit integration. It incorporated various teaching activities, including situation teaching, brainstorming, creative thinking, group discussion, movie instruction, and English songs teaching. After the six-step process, namely, literature review, analysis on teaching theories, design of teaching materials and activities, teaching experiment, diversified assessments and analysis on teaching efficacy, were completed, five conclusions were made:
1. The teaching activities design of this research can help enhance learners' interest in learning English.
2. Such a design can help generate a harmonious atmosphere and team spirit in class.
3. Such a design can develop students' ability and motivation to learn autonomously.
4. The teaching activities can be carried out even more efficiently if there is participation of administration units of schools.
5. This design was made based on an English course with computer science course playing a part in team teaching. In the future, more courses can be integrated and taught by teachers of different subject expertise using team teaching.

Reference

[1] L. A. Chen　1994　. Creative Thinking Instruction. Taipei: Shita Bookstore.

[2] Linda Campbell, Bruce Campbell, Dee Dickinson　1998　. Teaching and Learning Through Multiple Intelligences. Taipei Metropolis　Yuan-liou Publishing Co. Ltd.

[3] David Lazear　2000　. Multiple intelligence approaches to assessment. Taipei Metropolis　Yuan-liou Publishing Co. Ltd.

[4] S.L. Shu　2000　. Instructional Media—Systematic Design, Making and Application. Taipei, Taiwan, Wu-Nan Book Inc.

[5] C.S. Wu (2002) Definition of Educational Terms: Problem-based learning. Educational Research Monthly, August 2002. Taipei, Taiwan.

[6] Intel　2002　Intel Teacher to the Future With Support form Microsoft. Teaching materials of Intel e-teachers program.

[7] Y. H. Shi, et al. (2003)　English for Senior Vocational High School, Vol. 5. Taipei: The Far East Book Co., Ltd.

[8] S. G. Chen　2003　. A Practical Guide to English Language Teaching　Taipei: Caves Educational Training Online.

[9] J. Z. Zhu　2003　. Practical Hotel & Restaurant English. Taipei: Yang-Chih Book Co. Ltd.

[10] Robert Delisle　2003　How to use problem-based learning in the classroom? Taipei: Psychological Publishing Co., Ltd.

[11] Gale Maxfield　2003　Mebook-love and warmness. Taipei: VDM Publishing Company.

[12] Chu Yu-Wen　2003　Design and Implementation of a FPGA-Based Control Chip Development Platform for Induction Motor. Taipei: National Taiwan University of Science and Technology.

[13] C.J. Tien, S.T. Chu, et al.(2002) Activity-Teaching Design of Problem Based Learning　According to an Example of University Mechanical Engineering Department. 4th Asia-Pacific Conference on Problem-Based Learning. Hat Yai, Thailand.

[14] Chu Yu-Wen, "Study On The Course Of Special Topic Making and Talented Students' Creativity in Vocational High School", The Forth Thinking Qualities Initiative Conference, Hong Kong, 2003.

[15] Chu Yu-Wen, "The Platform-Based Teaching and Learning Method of the SOC Design System – Example of a Servo Motor Control System" International Conference on Engineering Education ICEE-2003, Valencia, Spain, 2003.July.