『問題導向學習』與『傳統教學法』在國中自然科學問題解決能力之比較研究

學生：黃偉銘　　指導教授：褚德三教授

國立交通大學理學院碩士在職專班網路學習組

摘　　要

本研究主要目地在探討「問題導向學習」與「傳統主題教學」兩種教學策略對九年一貫八年級學生自然科學問題解決能力的增進是否會產生差異。研究對象為臺北市某市立國中九年一貫八年級學生兩個班級，研究設計採用「準實驗設計」的方法，選定其中一個班級為實驗組接受「問題導向學習」教學策略，另一個班級為對照組接受「傳統主題教學」。在教學介入前，分別將兩個班級學生，依照國文、數學及自然三科成績總分進行 S 型交插分組，使各小組間能力相近，以利教學研究進行。研究進行中以「浮沉子製做」為學習內容，在教學介入前後分別進行「雙層式浮力另有概念網路測驗」、「國中學生自然科學問題解決能力問卷」及「網路化自然科學態度量表」等測驗，所得資料以 t 檢定及單因子共變數等統計方法進行分析。期望了解不同教學策略對實驗組及對照組學生在「結構性」及「非結構性」問題的解決能力是否有所不同，同時可以檢驗在不同的教學策略下，「自然科學態度」對學習者的問題解決能力是否會造成影響。

研究結果顯示：

1、排除前測成績影響後，實驗組學生在「結構性」及「非結構性」問題的解決能力後測得分上均優於接受傳統主題教學策略的學生且達統計上的顯著。

2、在排除「自然科學態度」影響後，實驗組與對照組在「結構性」及「非結構性」問題的解決能力後測得分差異上未達顯著，顯示良好的「自然科學態度」，對接受「問題導向學習法」學生「問題解決能力」的提昇也有正向的效果。

A comparative study of problem-based learning and traditional teaching approach on the problem solving ability of natural science in the Junior-High.

Student：Wei-Ming Huang Advisors：Dr. Der-San Chuu

Degree Program of E-Learning

National Chiao Tung University

Abstract

The purpose of this study was to investigate the differences in problem solving ability of natural science by using Problem-Based Learning (PBL) and traditional teaching approaches. The research was based on the quasi-experimental design. Participants in this study are 83 junior high school students come from two classes of 8th grade of a public junior high school in Taipei city. One class underwent PBL instruction (experimental group) and another one was taught by traditional teaching approach (control group). Before the study, students from each group were divided into 8 small groups. In order to keep uniformity in academic performance, the members of each small group are consisted of the student with high, average and low academic performance in mathematics, Chinese and Science courses. The “Cartesian diver” was chosen as the teaching topics because it contains the conceptions of buoyant force、pressure、torque and Newton’s laws of motion. The research tools used in this study are: Web-based Two-tier Diagnosing Test of Buoyant Force, Problem Solving Ability Questionnaire of Natural Science of Junior High school students and Web-based Attitude Toward Natural Science Scale. Both groups took pre-test questionnaires as a criterion for the evaluation of the experiment. After the end of a six-hour instruction (6 weeks later), post–test questionnaires were performed.

The following conclusion can be obtained from the study:

1. Excluding from the influence on pre-test, students in the experimental group show a remarkable improvement not only on “Well-structured” but also on “Ill-structure” problem solving ability.
2. The finding also indicates that experimental group has better attitude toward natural science that is helpful to promote problem solving ability.