

國科會計畫

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科學競賽---大眾科學教育探索式創意競賽研究(II)---生物科學篇  
Investigation of Biological Science Competition Associated with Exploratory  
Laboratory for All 〈II〉

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中文摘要

本子計畫的實施方法是透過假日講習及訓練的方式，最後以競賽的方式培育及檢驗同學的創造力與創新性。其目的是在鼓勵學生「動手做」科學實驗「動、植物的生理認識」，激發中、小學生的科學創意，培養學生合作解決問題的精神，提供學生趣味生動科玩的機會。本子計畫的活動先對彰化精誠中學公告徵求學生 100 人（分兩批），分組（三人一組）並於假日施予兩天密集的講習及訓練，隨後彰化地區國中公告徵求學生 100 人（分兩批）分組（三人一組），並擇一假日舉行創意競賽。除此之外，並於埔里地區宏仁國中進行一天密集的講習及訓練。這些活動在於達到科學大眾化，全面推廣科學的目的。結果顯示，不論是彰化精誠中學或埔里宏仁國中，由講習及訓練之前的前測可知學生植物基本概念、演化方向、分類型態、遺傳學常識及習性都有較高的答對率，表示學生在這一方面有先備的知識。而學生在植物基本概念、實物觀察及昆蟲型態生活史的後測分數高於前測分數，表示學生在經過教學後，對這些概念有成長的情形。但彰化精誠中學不論前後測成績均優於埔里宏仁國中，意味著城鄉差距的存在。創意競賽採彰化縣各國中自行組隊方式，每隊組員三名，共計 32 隊報名參賽。創意競賽的競賽項目有兩個，分別為「限時大搜索」與「形形色色大拼盤」。創意競賽的結果精誠中學兩組學生分獲 1、3 名，陽明國中與永靖國中各一組學生獲第二名，埤頭國中一組學生獲第三名。不論競賽名次及競賽過程的植物基本概念均可顯示學習的效應，以及「動手做」科學，激發中學生的科學創意的功效。

關鍵字：大眾科學；開放式實驗；科學競賽；生物

## Abstract

The approach of the subproject was to provide junior high school students with an opportunity to enhance their creativity, and which would be promoted by means of learning process and competition activity, hopefully. The aim was to encourage students to do the biology experiments by themselves, to stimulate students to make the science creative ideas, to train students to solve the problems with cooperation, and to give students the interesting experiments. We believed that more extra education training can fulfill the teaching and experiment of science on construction. There were two phases in this subproject. In Phase I, about one hundred junior high students of Changhua Ching Chang high school, divided into two groups, attended a 2-day workshop in biology discipline, in which all students were encouraged to be both hands-on and minds-on involving in the well-designed activities, “the understanding of animal and plant classification”. Through sharing ideas and problem solving within the group, student’s creativity was believed to be positively and significantly enhanced. The same activities were also applied in Puli Hong Jen junior high School, except it was executed in more condensed and intensive way. A quiz was given before activities, and the results revealed that students had had basic knowledge in botany, evolution, taxonomy, and genetics. A quiz was also given after activities, and the results indicated that students got higher scores in basic concept of botany, observation of real objects, and insect life-cycle than in previous quiz, suggesting that significant progress has been achieved after training. However, the average scores of both quizzes were higher in students of Changhua Ching Chang high school than those of Puli Hong Jen junior high school, implying that city-country difference did exist.

Phase II were “creative competition”. Students of all junior high schools of Changhua County were welcome to enroll as a team with member of 3. There were total 32 teams enrolled and attended the competition. The titles of each competition were “time-limit reconnaissance” and “colorful assorted dish”. Teams from Changhua Ching Chang high school won the champion and 2nd runner-up. Teams from Yung-Ming junior high school and Yongjing junior high school both won the 1st runner-up. A team from Pi-Tou junior high school won 2nd runner-up. The result of competition revealed that the objective of the sub-project has been achieved, that is more extra education training can fulfill the teaching and experiment of science on construction.

Key words : Science for all; Opened scientific biological experiment; Creativity competition; Biology