

高中數學建模課程與實踐之研究

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摘 要

對從事基礎學科教學的專業教師而言，如何建立一個以學生為「學習中心」的實踐性課程，一直是一項高難度的挑戰。近來「數學建模」教育在近代教育理論的支持下，對世界各國的教育課程發展與改革，已經引起廣泛的注意。國內一群關心數學教育的學者教授與數學教師，基於這樣的背景之下成立了「台灣數學建模與創意學會」，期望將知識經濟的種子根植於下一代。

本論文的主要研究方向在於因應這股全球教育改革的浪潮，藉由理論引導的實務操作，探討在高中數學課程內，開展數學建模活動的教育意義、內容及其方式與方法（第一章、第四章），試圖在衝擊層面最小的情境中，透過課程活動的設計，適切地融入「數學建模」教學。並將美國、中國大陸、台灣有關數學建模的課程實施、競賽活動與試題內容做概略性的介紹及整理（第二章、第三章）。同時，因為電腦科技的快速發展與新興教育科技的介入，傳統的教育觀念與方法，在現今多元價值觀的社會期待下，勢必要「與時俱進」。因此，在目前課程標準的對應範圍內，我們嘗試結合「資訊科技」與「數學建模」的活動設計（第五章），希望吸引並觸發學生的主動探索行爲。

考量現今社會環境與整體教育認知的氛圍下，台灣在「數學建模」的各項腳步，相較於幾個主要的先進國家雖然稍顯落後，我們仍在第六章中提出若干建議，希望經由親身的實踐過程「拋磚引玉」，提供有志者後續的研究。

關鍵字：數學建模、問題解決、合作學習。

A Study of Mathematical Modeling in the Curriculum and Practice for Senior High Schools

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Abstract

How to create a practical student-based course has always been a big challenge to teachers in high school. “Mathematical modeling” supported by modern educational theory has inspired the fundamental reform and development in the curriculum and practice in high schools all over the world recently. Following this trend, the Society of Taiwan Mathematical Modeling and Creative Thinking has been established a few years ago with the hope of keeping knowledge-driven economy rooted in the next generation.

In response to this wave of educational reform, the meanings, contents, methods and approaches of mathematics application and modeling activities in senior high schools will be surveyed in Chapters 1 & 4. The teaching of mathematical modeling has been integrated into the course structure through appropriate design of curriculum. The mathematical courses, contest activities and contest problems in America, Mainland China and Taiwan will be studied comprehensively in Chapters 2 & 3. Moreover, with the development of computer science and modern educational technology, the traditional concepts and methods of education must be updated. We try to combine computer-based activity designs with those of mathematical modeling in Chapter 5, in the hope of promoting students’ motivation for exploration activities. Under the current social environments, Taiwan is behind some industrialized countries in the teaching of mathematical modeling. Some proposals for promoting the teaching of mathematical modeling in Taiwan will be presented in Chapter 6.

Keywords: mathematical modeling, problem solving, cooperative learning