

國科會計畫

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科學本質教材對科學教學與學習之影響

The Influence of Nature of Science-Embedded Teaching Materials on Science Teaching and Learning

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中文摘要

科學素養乃科學教育之重要目標，發展能促進學生理解科學本質的教材是達成此目標的關鍵。本計畫旨在探討以協助教師進行明示科學本質教學的教育性教材（簡稱 NOS 教材，包含教科書和教師手冊），對教師科學學習、教學、與科學本質信念與實務的影響，以及學生科學本質的理解。教育性意指促進教師學習，而非僅提供學生學習。一份以溶解單元為主題的教師手冊乃藉由提問刺激教師反思，以及科學本質能力指標和關鍵概念的詮釋、科學本質教學模式的示範，和明示的文本表徵等方式，支持教師進行明示科學本質的教學。邀請 10~12 位有、無科學本質學習經歷的國小教師試用 NOS 教材。利用半結構式訪談、教學錄影、焦點團體訪談、科學概念和科學本質概念評量試卷、學生科學本質觀問卷，以及教師對 NOS 教材學習和幫助知覺問卷等方式收集資料。另外，採用 RTOP-NOS (Reformed Teaching Observation Protocol- Nature of Science) 觀察工具評量教師的科學本質教學。透過計畫的進行，期望提供教材發展者教育性教材的影響，發展協助教師學習之課程教材。

關鍵字：教材；教師手冊；教師學習

Abstract

Scientific literacy is a major goal of science education. Developing teaching materials, including textbook and teachers' guide, that promote students' understanding of nature of science (NOS) is critical for reaching the goal. The purpose of this proposal is to investigate how an educative teaching material influences teachers' beliefs of science learning, teaching, NOS, and teaching practice, as well as its impact on students' understanding on nature of science. Educative teaching materials don't merely improve student learning but also teacher learning. The teachers' guide of dissolving unit was developed to stimulate teacher reflection by Q&A, and to support teachers' explicit NOS instruction by providing interpretation of NOS competence indicators and NOS tenets, examples of NOS teaching model, and explicitly textual representations. 10~12 elementary teachers with or without NOS learning experience were invited to use the developed NOS-teaching material. Data are collected by a semi-structured interview, teaching recording clips, a focus group interview, tests of scientific concepts and NOS concepts, questionnaires of students' view of NOS (SVNOS), and teachers' perception of on the usefulness of the NOS teaching material. Teachers' performances of NOS instruction are analyzed by an observation tool, RTOP-NOS (Reformed Teaching Observation Protocol- Nature of Science). Through this project, we expect to provide material developers information about influence of an educative teaching material to develop innovative curriculum materials with teacher learning.

Key words : Teaching material; Teachers' guide; Teacher learning