

# 國立臺灣師範大學 100 學年度碩士班招生考試試題

科目：科學課程

適用系所：科學教育研究所

注意：1.本試題共 3 頁，請依序在答案卷上作答，並標明題號，不必抄題。2.答案必須寫在指定作答區內，否則不予計分。

一、請翻譯及解釋以下名詞，並舉例說明在教學實務上的應用。(翻譯 2 分，解釋 3 分，教學實務應用舉例 3 分。第一大題共 40 分)

1. Concept Mapping
2. Conceptual Change
3. Working Memory
4. Modeling
5. Curriculum Integration

二、請閱讀以下文章，寫出摘要，並說明你贊成或反對這段論述的理由。(摘要 5 分，說明理由 5 分。第二題共 10 分)

One goal of project-based science is to promote the development of scientific discourse communities in classrooms. Holding rich high school scientific discussions is challenging, especially when the demands of content and norms of high school science pose challenges to their enactment. There is little research on how high school teachers enact scientific discussions using project-based science curricula, making the kinds of necessary embedded supports unclear. To address that gap in the research literature, we analyzed curriculum supports and embedded educative features for the enactment of science discussions in one high school project-based science curriculum. Through a study of teacher enactment and a comparison of the curriculum discussion supports, we observed that while teachers increased their attempts to engage in inquiry-based discussion practices where supports were offered, they relied on heavily on traditional “recitation” formats, demonstrating that existing curricular supports were not developed enough to support dialogic classroom interactions. We hypothesize about conditions that may contribute to the pervasiveness of typical discourse practices in high school science discussions. We argue for expanded curricular discussion supports for teachers and design research on developing discussions in high school project-based science classrooms to examine how such supports are taken up, dismissed, or modified in practice.

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三、國民中小學九年一貫課程綱要自然與生活科技學習領域中一項分段能力指標內容如下：「3-4-0-7 察覺科學探究的活動並不一定要遵循固定的程序，但其中通常包括蒐集相關證據、邏輯推論及運用想像來構思假說和解釋數據。」

(一) 此能力指標最有可能對應的是哪一項基本能力的培養？(3分)

(二) 為培養學生達成此能力指標，可採用什麼教學內容和教學策略？舉例說明你的教學構想。(12分)

四、近期有學者提倡「科學走入生活」，你如何詮釋這個標題？(5分) 若要達成這個目標，目前的科學教育的課程和教學需要有什麼改變？(10分)

五、請閱讀所附的文章段落，回答下列問題：

(一) 對於文中出現的兩個名詞 transmission 和 transformation 的中文意義分別為何？(4分)

(二) 以前述這兩個名詞為取向的課程分別有什麼特徵？(8分)

(三) 本段文章所強調的教師角色在這兩種取向的教學中又有何不同？(8分)

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閱讀文章段落出處：Barrett, S. E. & Pedretti, E. (2006). Contrasting orientations: STSE for Social reconstruction or social reproduction? *School Science and Mathematics*, 106(5), pp. 239.

## *The Role of the Teacher*

Historically, teachers have been expected to take aims of education on trust without critically examining them (Pedretti & Hodson, 1995). This role is ideal for a teacher implementing a curriculum oriented toward transmission, as it does not encourage critique (Pedretti & Hodson, 1995) and is easily standardized to “ensure” the quality of what is transmitted. The uncontested content does not require consideration of either the teacher or the students beyond efficient transmission of information. Thus, the role of the teacher is to implement curriculum. This, however, does not imply that it is an easy task. The technician role for the teacher remains a challenging one; however, one of its challenges is *not* critique of content, and the difficulty of the job requires limited intellectual autonomy on the part of teachers to be effective.

The role demanded of a teacher in a transformative curriculum is quite different. Transformation cannot be imposed but must come from within — within the student, the teacher, or society. Agency amongst students is not just encouraged but necessary. This encouragement is ineffective without teacher autonomy (Hodson, 1999; Pedretti & Hodson, 1995), because the teacher acts as a role model and an active participant in the learning process. Teachers can only facilitate development of agency in their students effectively if they are free to alter the content and intent of the courses they teach. Further, as role models, teachers show the students what it means to be autonomous, able to make decisions and think critically about what constitutes equity and justice within society, and able to act on those decisions. If students perceive teachers as being uncritical, the teachers’ ability to teach the students how to become agents of change is undermined. In other words, critical thinking requires autonomy. The habits of mind necessary for critical thinking require modeling (Siegel, 1996); thus, a teacher without autonomy cannot teach autonomy. The role of teachers in a transformative curriculum, then, is that of transformative intellectuals (Giroux, 1988) who model the habits of mind and deed that their students are encouraged to develop.