

# 國立臺北教育大學 99 學年度博士班招生入學考試

## 自然科學教育學系博士班 科學教育專業英文 科試題

1. 閱讀以下的文章之後，回答下列兩個問題。

### 閱讀文章

Many advances in science are made on the basis of a simple *it's like* type of transfer. The invention of a new representation (e.g., Einstein's theory of relativity, Darwin's theory of evolution) seems to involve a basic insight into the nature of the problem to be solved. Einstein is famous for his use of everyday mental images of concrete situations and analogies for thinking about abstract problems. Charles Darwin transferred the idea of the selective (i.e., artificial) breeding of animals to his development of the principle of natural selection to his theory of evolution. In place of a farmer selectively picking what genetic traits of an animal are to be reproduced or enhanced. Darwin saw that nature or natural selection was at work in the place of the farmer. It seems simple now, but it wasn't then.

(-- Robert Haskell, Transfer of Learning)

### 問題與作答

- (1) 以中文寫出上述英文文章的大意。(15%)
  - (2) 請以文中兩位科學家的例子，提出你個人引導學習遷移(transfer of learning)可以使用的教學策略。(10%) (中英文作答皆可)
2. 翻譯及評論(請將以下英文部份翻譯為中文，並以中文進行分析評論。其中翻譯佔 15%、評論佔 10%)

本文出自：Ozdemir, G., & Clark, D. (2009). Knowledge structure coherence in Turkish students' understanding of force. *Journal of Research in Science Teaching*, 46(5), 570-596.

Abstract: This study investigates Turkish students' knowledge structure coherence in physics. In particular, this study investigates the conflicting findings reported in

Ioannides and Vosniadou's [Ioannides and Vosniadou [2002] *Cognitive Science Quarterly*, 2, 5-61] and diSessa, Gillespie, and Esterly's [diSessa et al. [2004] *Cognitive Science*, 28, 843-900] studies about students' understandings of force. Ioannides and Vosniadou's study of four different age levels of students in Greece demonstrated broad consistency in students' understandings of force. diSessa and colleagues' quasi-replication in the United States demonstrated conflicting results supporting a more fragmented elemental perspective on students' knowledge structure coherence. The current study investigates these conflicting findings by studying students in a third country using the analytic methods from both studies to clarify the debate over knowledge structure coherence. The levels of consistency demonstrated by students in the current study are somewhat higher than the levels reported by diSessa, Gillespie, and Esterly according to both coding schemes, but are closer overall to the levels reported by diSessa, Gillespie, and Esterly than to the levels reported by Ioannides and Vosniadou. In addition, closer inspection of students' explanations suggests that students' explanations may code as consistent according to the coding schemes for a particular force meaning category but not actually represent a coherent understanding of that force meaning. These results therefore more closely support fragmented elemental perspectives on knowledge structure coherence. The results, however, demonstrate important systematicities in students' thinking and support the possibility that differences between the student populations in the countries of the original studies contributed to the differences in findings of the original studies.

3. 請將以下中文翻譯成英文。

- (1) 國民中小學九年一貫課程的自然與生活科技學習領域提出「科學與科技素養」包含有過程技能、科學與技術認知、科學本質、科技的發展、科學態度、思考智能、科學應用以及設計與製作。(15%)
- (2) 一個成功的科學課程應聚集在核心概念上，強調這些概念之間的關係以及聯結，還有課程內容與自然界事物之間的呼應。(10%)

4. 針對主題，下關鍵字(詞) (Keywords)

【答題說明：以下有3篇文章的題目，請閱讀並就您的理解，參考以下表格的方式，各寫上您認為最合適的3個中文與英文的關鍵字(詞)。】

(1) Reasoning up and down a food chain: Using an assessment framework to investigate students' middle knowledge (8%)

(2) Conceptions of knowledge in research on students' understanding of the greenhouse effect: Methodological positions and their consequences for representations of knowing (8%)

(3) Alignment between the physics content standard and the standardized test: A comparison among the United States-New York State, Singapore, and China-Jiangsu (9%)

(答題參考用，請在答案卷上作答)

題 號	Keyword 1		Keyword 2		Keyword 3	
	英	中	英	中	英	中
(1)						
(2)						
(3)						