

國立臺灣師範大學 107 學年度碩士班招生考試試題

科目：科學學習心理學基礎

適用系所：科學教育研究所

注意：1.本試題共 2 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，否則依規定扣分。

一、名詞解釋 (20 分，每題 5 分。)

- 1.迷思概念(misconception)
- 2.學習準備度(learning readiness)
- 3.鷹架學習(scaffolding learning)
- 4.知識表徵(knowledge representation)

二、請說明何謂科學素養? (4 分) 科學素養可以如何評量? (6 分)

三、請根據下文用中文回答以下四題: (20 分，每題 5 分。)

- 1.科學教育中為何要訂定科學教師教學標準?
- 2.科學教學標準的訂定是基於那些假設?理由為何?
- 3.何謂有效的科學教師?
- 4.請總評下面文章的意涵。

Science teaching is a complex activity that lies at the heart of the vision of science education presented in the Standards. The teaching standards provide criteria for making judgments about progress toward the vision; they describe what teachers of science at all grade levels should understand and be able to do.

To highlight the importance of teachers in science education, these standards are presented first. However, to attain the vision of science education described in the Standards, change is needed in the entire system. Teachers are central to education, but they must not be placed in the position of being solely responsible for reform. Teachers will need to work within a collegial, organizational, and policy context that is supportive of good science teaching. In addition, students must accept and share responsibility for their own learning.

In the vision of science education portrayed by the Standards, effective teachers of science create an environment in which they and students work together as active learners. While students are engaged in learning about the natural world and the scientific principles needed to understand it, teachers are working with their colleagues to expand their knowledge about science teaching. To teach science as portrayed by the Standards, teachers must have theoretical and practical knowledge and abilities about science, learning, and science teaching.

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The standards for science teaching are grounded in five assumptions.

- The vision of science education described by the Standards requires changes throughout the entire system.
- What students learn is greatly influenced by how they are taught.
- The actions of teachers are deeply influenced by their perceptions of science as an enterprise and as a subject to be taught and learned.
- Student understanding is actively constructed through individual and social processes.
- Actions of teachers are deeply influenced by their understanding of and relationships with students.

Note: From National Science Education Standards (Chap 3: Science Teaching Standards, 1996)

四、學生的先備知識 (prior knowledge) 會如何影響科學學習？(6 分)

五、請定義何謂另有概念 (alternative conception)，並舉出自然科學概念中，學生可能持有之另有概念的實例，以及產生此另有概念的可能來源。(12 分)

六、請舉出兩種檢測學生是否持有另有概念的方法，並說明這些方法如何檢測出學生的概念。(16 分)

七、請舉出兩種可促進概念改變的教學策略，並說明其原理。(16 分)