ABSTRACT. The study investigated elementary school pupils’ ideas concerning the concept of electricity and the effect of school instruction on the pupil’s views. Pupils of different cultural backgrounds were assessed to ascertain their knowledge in four areas: Relation of certain natural phenomena to electricity; Mental models (images) of direct current in a circuit; Images possessed regarding electricity and electric current. Pupils’ ideas were investigated before and after instruction, thus providing information about the effect of instruction on the views of pupils. In contrast to the previous findings, certain phenomena (lightning and thunder among them) were related by the pupils to electricity even before those were taught. Evidently, the instruction changed the mental models and images of electricity and electric current.

(一) 以中文寫出上述摘要內容大意。(15 分)
(二) 如果你是作者，英文的標題為何(4 分)? 並試提出三個關鍵字 (keywords) 為何(6 分)?(本小題以英文作答)

二、翻譯題(英譯中)（共 25 分）
Changing Emphases（2 分）

The National Science Education Standards envision change throughout the system.

The teaching standards encompass the following changes in emphases: （3 分）

LESS EMPHASIS ON
Treating all students alike and responding to the group as a whole
Rigidly following curriculum
Focusing on student acquisition of information

MORE EMPHASIS ON
Understanding and responding to individual student's interests, strengths, experiences, and needs
Selecting and adapting curriculum
Focusing on student understanding and use of scientific knowledge, ideas, and inquiry processes
Presenting scientific knowledge through lecture, text, and demonstration
Asking for recitation of acquired knowledge
Testing students for factual information at the end of the unit or chapter
Maintaining responsibility and authority
Supporting competition
Working alone

Guiding students in active and extended scientific inquiry
Providing opportunities for scientific discussion and debate among students
Continuously assessing student understanding
Sharing responsibility for learning with students
Supporting a classroom community with cooperation, shared responsibility, and respect
Working with other teachers to enhance the science program

三、請閱讀下列一段文章後，陳述文章重點並作分析評論，中英文均可。（重點15分，評論10分）

The term “thinking” is used in a variety of ways, but, in general, the kind of behavior implied is the relating of two or more ideas rather than simply remembering and repeating these ideas. Inductive thinking involves drawing generalizations from several items of specific data. Deductive thinking involves applying one or more generalizations to specific cases. Logical thinking involves the arrangement of assumptions, premises, and conclusions in a way to develop a logical argument. Quite commonly, in particular situations, several kinds of thinking will be required so that it is rare for a teacher to concentrate upon only one aspect of thinking. Since the learning experience must give the student opportunity to do these kinds of thinking, it is important that the situation be such as to stimulate this kind of behavior. (Ralph W. Tyler)

四、請翻譯並以中文說明意涵。（每小題5分，共25分）

1. delphi technique
2. situated cognition
3. argumentation
4. normalized standard scores
5. collaborative learning

第2頁，共2頁