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## 跨年級學生電學心智模式一致性與課程 進程之比較研究

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### 摘 要

「兒童是否具一致性的概念架構？」這個問題一直眾說紛紜，而不同的觀點將影響對教學的建議。本研究以電學為概念主題，心智模式為概念架構之分析單位，設計跨年級診斷式測驗，以檢驗440位三年級至國三學生之心智模式是否具一致性。結果發現，三年級學生之心智模式一致性僅占26.67%，且以錯誤的撞擊模式為主；而至國三時，其心智模式一致性則上升至52.63%，且以科學模式為主。除三年級外，不一致之心智模式並非任意組合，而是隨課程進程有不同的集中類型。是故，本研究認為心智模式受完整性、一致性及正確性三要素影響，而適當的課程進程及設計可協助學生移除重要另有概念、促進兒童心智模式之完整性，進而提升其正確性及一致性。

**關鍵詞：**心智模式一致性、電學、跨年級測驗

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## **A Comparison Study between the Coherence of Across-grade Students' Mental Models in Electricity and Curriculum Sequence**

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### **Abstract**

The viewpoints of “children have coherence conceptual framework” are widely divided. Different viewpoints influence the suggestions that researchers give. This study adopts mental model as analysis unit to conduct electricity across-grade test and to investigate the coherence of mental models of 440 third graders to ninth graders. The results show that the coherence of mental models of third grades is only 26.67%, and the main mental model is incorrect clashing currents model, while that of ninth graders is 52.63%, and the main mental model is scientific model. Except third graders, the inconsistent mental models in all grades are specific types rather than random combinations. Therefore, this study claims that the operation of mental model is influenced by the completeness, coherence, and correctness, three factors. Appropriate curriculum sequence and design will assist pupils to remove their robust alternative conceptions, increase the completeness, and then to promote the correctness and the coherence of their mental models.

**Keywords:** coherence of mental models, electricity, across-grade test

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