Journal of Research in Education Sciences
2009, 54(4), 139-170

An Across-grade Study to Investigate the Evolutionary Processes of Students' Cognitive Characters in Series Connection

Jing-Wen Lin
Department of National Science,
Taipei Municipal University of Education
Assistant Professor

Mei-Hung Chiu
Graduate Institute of Science Education,
National Taiwan Normal University
Professor

Abstract

An across-grade study is helpful for the developing of vertical curriculum design, but it requires considerable time and manpower. Therefore, Lin and her colleague (Lin, 2006; Lin & Chiu, 2006) develop a cladistics approach in conceptual evolution to predict pupils' mental model evolutionary pathways in series connection with the assistance of the software. They hope to overcome the limitations of the across-grade studies in the early days by this approach. Accordingly, this study conducts an across-grade survey and adopts a set of diagnostic test items to 440 students from Grade 3 to Grade 9 to obtain the across graders percentages of students' cognitive characters and statuses for evaluating Lin and her colleague's prediction. The research results show that Lin's prediction almost fits the empirical data of the across-grade tests. In addition, they clearly represent a global picture of the evolutionary process of pupils' cognitive characters of mental models in series connection and explain the possible relationship between pupils' conceptual evolution in series connection and curriculum sequence by comparing Lin's prediction and the investigation results of the across-grade tests in this study. In sum, the research results verified the feasibility of applying cladistics approach in conceptual evolution to science education tentatively.

Keywords: cladistics approach in conceptual evolution, series connection, across-grade study, cognitive character

Corresponding Author: Jing-Wen Lin, E-mail: jwlin@tmue.edu.tw