

Argumentation, Inquiry and Hot Cognition: A Study of Children's Judgment on the Rationality of Scientific Explanations

Wen-Cheng Chen

National Dong Hwa University, Taiwan

Abstract

It is important to cultivate the student with scientific literacy that can distinguish evidence-based argument from personal opinions. It is also crucial to empower the student's ability to conduct inquiry and develop understanding about scientific inquiry. However, there are many factors affecting judgment. Motivation can be defined as any process that initiates and maintains learning behavior. Hot cognition is the behaviors that are motivation/emotion-loaded and affected by need and feelings, causing judgment to be colored by goals or emotions. There are three main purposes in this study: (1) to investigate student's situational interest in inquiry-based learning and concept cartoon argument instruction, the difference of situational interest in two learning environment is analyzed too. (2) to explore the differences of children's judgment of scientific explanations after inquiry-based learning and concept cartoon argument instruction. Furthermore, whether the arousal of hot cognition on children's judgment of scientific explanations under the intervention of class social norms is analyzed too. (3) to understand the mental model and self-perception of hot cognition on children's judgment of scientific explanations.

The quasi-experimental method was adopted in this research. There are three tests of rationality of science explanations in this study. Two forms of rationality of scientific explanations instrument were developed. The form A instrument was used in the first and second test, the form B instrument was used in the third test. There are two stages in this study, stage1 is consisted of first and second test, and stage 2 is consisted of second and third test. The experimental group and contrast group were conducted all the three test of "rationality of scientific explanations test". In stage1, experimental group one performed concept cartoon argument instruction, and experimental group two performed inquiry-based learning activities. In stage2, the personal factors (such as class social norms) were attached in each question of 3rd-test.

The subjects would be about 300 upper graders of eight classes at the eastern Taiwan elementary school. Six classes were selected as experimental group, the other

two classes were assigned as contrast groups. In order to explore children's mental model on judgment of scientific explanations, 24 students (4 per class) from experimental groups would be chosen to conduct interviews.

The self-designed instruments "rationality on scientific explanation test" and "situational interest test" were adopted in this study. On the "rationality of science explanations test", the difference in number of people agree with item A or B is analyzed by the (χ^2) significance test. The difference of reasonableness judgment in item A and B is analyzed by the significant t-test.

Analysis of student interest levels was carried out using a one-way analysis of variance (ANOVA) with post hoc comparisons using the Tukey HSD test. Beside, We adopted the relational framework proposed by Roschelle and Greeno (1987) to present the mental model and reasoning process of children making judgment. Based on this research finding, the implications for science teaching and learning were discussed.