The Effects of “Cognitive Acceleration through Science Education” program in Japan

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We have examined the possibility to introduce the “Cognitive Acceleration through Science Education (CASE)” program[1] into the Japanese compulsory education course to bring up the scientific thinking ability of the student. The CASE program was developed in U.K. to promote the thinking ability of students between the ages of 11 and 14 to the formal operational stage. In the program, students take 30 lessons which are focused on the application of Piaget’s schemata, that is, reasoning patterns: control of variables, proportionality, correlation, probability, the use of formal models, etc. in the formal operation. However, it is generally difficult to introduce the whole program into science curriculum in Japan because of the difference of educational circumstances between in Japan and in U.K. Therefore, we have practiced with two styles at several pilot schools. The styles are as follows: (1) a two-year practice using the whole program in a special curriculum including 30 lessons, (2) a practice using only a specific reasoning pattern, e.g., the control of variables.

In each lesson, students experienced the cognitive conflicts for tasks, and were able to construct the reasoning pattern as simple way to resolve the conflict through a discussion with the other students and/or teachers. In addition, after taking the two-year program, most students succeeded in recognizing their own modification related to the characteristic of the formal operational thinking. In this study, detailed results and challenges of the practice in Japan are discussed.