Surprising Correspondence of the Score of Lawson's Classroom Test of Scientific Reasoning to School Age

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Abstract

Lawson's Classroom Test of Scientific Reasoning (LCTSR) is an assessment of students' cognitive developmental stages used in physics education. One achievement of our work is showing relation between the score of LCTSR and school age. One fore-going study have shown that LCTSR score increases with school age, following a logistic function until the age of university entry. This suggested using an inverse function of the logistic function, as an index value for cognitive level. We examined the development of LCTSR score at the University of Hyogo, and found that it followed roughly the same logistic function up to the graduate school. It is surprising that the index value increases linearly (0.22/year) with school age from elementary school to graduate school. Another achievement is a new method of correcting for a bias due to "regression to the mean", which enables evaluation of the index value for individual student. The statistic variation of this value roughly follows a normal distribution with standard deviation of $0.5/\sqrt{2}$. LCTSR would be valuable in STEM education, not only for students in colleges of science or technology, but also for students in the other field, and younger students in high schools and jounior high schools. The rate of developpement, 0.22/year, would function as a control when an educatior evaluates educational effect of a cognitive acceleration program.

Keywords: assessment, STEM education, cognitive acceleration, scientific reasoning