

## **The development and validation of a test of science critical thinking for fifth graders**

### **Abstract**

The paper described the development and validation of the Test of Science Critical Thinking (TSCT) to measure the three critical thinking skill constructs: comparing and contrasting, sequencing, and identifying cause and effect. The initial TSCT consisted of 55 multiple choice test items, each of which required participants to select a correct response and a correct choice of critical thinking used for their response. Data were obtained from a purposive sampling of 30 fifth graders in a pilot study carried out in a primary school in Sabah, Malaysia. Students underwent the sessions of teaching and learning activities for 9 weeks using the Thinking Maps-aided Problem-Based Learning Module before they answered the TSCT test. Analyses were conducted to check on difficulty index ( $p$ ) and discrimination index ( $d$ ), internal consistency reliability, content validity, and face validity. Analysis of the test–retest reliability data was conducted separately for a group of fifth graders with similar ability. Findings of the pilot study showed that out of initial 55 administered items, only 30 items with relatively good difficulty index ( $p$ ) ranged from 0.40 to 0.60 and with good discrimination index ( $d$ ) ranged within 0.20–1.00 were selected. The Kuder–Richardson reliability value was found to be appropriate and relatively high with 0.70, 0.73 and 0.92 for identifying cause and effect, sequencing, and comparing and contrasting respectively. The content validity index obtained from three expert judgments equalled or exceeded 0.95. In addition, test–retest reliability showed good, statistically significant correlations ( $r = 0.76, P < 0.01$ ). From the above results, the selected 30-item TSCT was found to have sufficient reliability and validity and would therefore represent a useful tool for measuring critical thinking ability among fifth graders in primary science.