12 - 14 June 2026 Tokyo , Japan

Assessing Domain-Specific Critical Thinking Skills in Electricity and Magnetism among 11th-Grade Students

Teerapath Sitawan

Mahasarakham University, Thailand

Abstract

Despite critical thinking (CT) is a fundamental skill to be implemented and fostered in the science education context at all levels, how to assess CT skills within specific domain or discipline is still an open question especially at secondary educational level. This study aimed to explore the profiles of 11th-grade Thai students applying CT skills specifically in Electricity and Magnetism. Following Halpern's (2014) approach of the CT skills within specific domain, the critical thinking skills in this study were assessed using the 35-item Critical Thinking in Electricity and Magnetism (CTEM) test. The test measures five aspects of CT, that are, drawing valid inferences, argument analysis, hypothesis testing, likelihood and uncertainty analysis, and problem-solving/decision-making. Participants were 55 Grade 11 students of science-mathematics stream at Sarakham Pittayakhom School, selected by a purposive sampling. Students' scores on each sub-skill of CT identified their extent of their performance and level of their proficiency in terms of advanced, proficient, developing, emerging, and unobservable. The findings from this study revealed several "skill gaps" that students showed particular difficulty that need to be addressed by more instructional focus. These results serve as a basis for the evaluation of teacher's practices and can lead to improving those in order to better support students in developing their critical thinking skill within the specific domain.

Keywords: Critical Thinking; CTEM; Electricity and Magnetism; Secondary Students