International Journal of Teaching and Learning (INJOTEL) e-ISSN: 3025-8308
Vol. 4 No. 4 (2026), pages: 189~208

INTEGRATION OF COMPUTATIONAL THINKING IN MATHEMATICS LEARNING TO IMPROVE STUDENTS' MATHEMATICAL REASONING SKILLS

Titin Supriyatin *
Universitas Indraprasta PGRI
Titinsupriyatin06@gmail.com

Roida Eva Flora Siagian
Universitas Indraprasta PGRI
roidaeva.siagian@yahoo.co.id

Abstract

Although computational thinking has been increasingly integrated into mathematics education, empirical evidence of its contribution to students' mathematical reasoning remains limited, particularly at the junior secondary level. This study examined the effect of integrating computational thinking into mathematics learning on eighth-grade students' mathematical reasoning ability. A quasi-experimental method with a non-equivalent control group design was employed, involving 64 students at SMP N 4 Jakarta, divided equally into experimental and control classes. Data were collected through mathematical reasoning tests, student questionnaires, and classroom observations. Analyses included descriptive statistics, instrument quality tests, assumption tests, t-tests, N-Gain, effect size, and ANCOVA. The experimental class achieved a higher posttest mean score (82.28) than the control class (68.56). Their respective N-Gain scores were 0.645 and 0.373. The difference was statistically significant ($p < .001$), with a very large effect size (Cohen's $d = 2.073$). ANCOVA also confirmed a significant effect after controlling for initial ability. These findings suggest that computational thinking is an effective pedagogical approach for strengthening mathematical reasoning among junior secondary students.

Keywords: Computational thinking; mathematical reasoning; mathematics learning

INTRODUCTION

Mathematical reasoning ability is one of the essential competencies in mathematics learning because it enables students to connect concepts, construct arguments, identify patterns, formulate generalizations, and draw conclusions based on mathematical principles. Mathematical reasoning involves more than obtaining correct answers; it also requires students to explain their thinking processes, justify their strategies, and establish logical relationships between mathematical concepts. These competencies are particularly important in contemporary education, where students are expected to solve complex, open-ended, and contextual problems. Through mathematical reasoning, students can develop a deeper understanding of mathematical ideas and apply their knowledge to unfamiliar situations. Hidayat et al. (2022) emphasized the importance of mathematical reasoning in solving everyday