Comparing Normalized Gain $g$ and Effect Size Cohen’s $d$ to Measure the Improvement of Student’s Scientific Literacy

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ABSTRACT
In this work I investigate about my curiosity. My investigation focused on the implications on claims about student learning that result from choosing between one of two metrics. The metrics are normalized gain $g$, which is the most common method used in Physics Education Research (PER), and effect size Cohen’s $d$, which is broadly used in Discipline-Based Education Research (DBER) including Biology Education Research (BER). Data for the analyses came from the research about scientific literacy on Physics and Biology Education from courses at institutions across Indonesia. This work reveals that the bias in normalized gaing can harm efforts to improve student’s scientific literacy by misrepresenting the efficacy of teaching practices across populations of students and across institutions. This work, also, recommends use effect size Cohen’s $d$ for measuring student learning, based on reliability statistical method for calculating student learning.

Keywords: effect size Cohen’s $d$; metrics; normalized gain $g$; scientific literacy;