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Predictive Validity of a Diagnostic Mathematics Assessment on Freshmen Calculus Performance in Engineering Programs in a Polytechnic College in Philippines

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ABSTRACT This study emphasises early academic support and performance monitoring in engineering education. It examined the predictive validity of a diagnostic mathematics assessment on Calculus performance among first-year engineering students at Camarines Sur Polytechnic Colleges. It investigated whether scores in Algebra, Trigonometry, Solid Geometry and Analytic Geometry could predict academic outcomes in Calculus. A correlational design was employed, using data from 787 purposively selected students enrolled in the 2022-2023 academic year. A significant negative correlation was found ($r = -0.276$, $p < 0.05$), indicating that higher diagnostic scores corresponded to better (lower numerical) Calculus grades. Multiple regression analysis revealed a weak but significant collective effect [$F(5,781) = 18.67$, $p < .001$, $R^2 = 0.09$, $R^2_{adj} = 0.08$], with Sex, Strand, Algebra, Trigonometry and Solid Geometry emerging as significant predictors. The findings affirm the value of diagnostic assessments in identifying students at risk and informing early intervention strategies in engineering education.