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Towards a Pedagogy of Self-Regulation: Teaching and Learning from Errors in Engineering

Nuria Novas Castellano[1], Rosa María García Salvador[2], Eduardo José Viciana Gámez[3], Francisco Portillo Rodríguez[4], Manuel Fernández Ros[5], Francisco Segura Pardo[6], Luis Poyatos Marzo[7], José Antonio Gázquez Parra[8]

Universidad de Almería, Spain

Abstract

This work shows a methodological proposal focused on Error Based Learning (EBL), applied in the subject Power Electronics in the degrees of Electrical Engineering and Industrial Electronics and Automation Engineering. The strategy combines continuous evaluation, structured feedback, and experimental practices with microcontrolled boards, allowing students to analyze and correct real errors in controlled environments. To evaluate the impact of this approach, three differentiated surveys were applied: one on the general methodology and two on the practices with the Alternating Current to Alternating Current (AC-AC) and Direct Current to Alternating Current (DC-AC) converters. The results show an average valuation of 4.5 over 5 points for the methodology, which highlights its ability to improve conceptual comprehension, reinforce confidence, and provide academic progression. The experimental practices were also well valued, especially the one corresponding to the DC-AC converter, compared to an average of 4.06 in the AC-AC practice. These findings reflect the effectiveness of the EBL approach in integrating theory and practice, encouraging self-regulation, and promoting deeper and more significant learning.

Keywords: self-regulation; continuous evaluation; error-based learning; formative feedback; lab practices