

Original Research

A Review of AI-Powered Personalized Language Learning: Implications for Vocabulary Acquisition in L2 Learners

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Abstract: This systematic review examines the role of artificial intelligence (AI) in personalizing vocabulary acquisition for second language (L2) learners. Following PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines, thirty-one peer-reviewed empirical studies (2020–2025) were identified across six academic databases and analyzed using a standardized six-category coding template. The review addresses three research questions: (1) the types of AI personalization techniques employed, (2) the learner data used to drive adaptivity, and (3) the effectiveness of these approaches across diverse learner profiles. Thematic and quantitative coding identified nine personalization technique categories, with adaptive learning systems predominating (32.3%), followed by chatbot/conversational AI and natural language processing (NLP)-based feedback (16.1% each). Performance metrics were the most frequently leveraged data type (54.8%), while affective and cognitive load indicators remained substantially underutilized. Findings confirm that AI personalization enhances short-term vocabulary retention and motivation—with statistically significant gains reported across key studies—though effectiveness is contingent on proficiency level, task type, and cognitive load management. Critically, 54.8% of studies reported no standardized effect sizes, and 67.7% targeted university-level learners exclusively. Grounded in Cognitive Load Theory, Input Processing Theory, and the Noticing Hypothesis, the review calls for theoretically anchored, methodologically rigorous, and demographically diversified research to advance learner-centered AI design in L2 education.

Keywords: *Artificial Intelligence (AI), Second Language Acquisition, Personalized Learning, Vocabulary Acquisition, Adaptive Learning Systems, Machine Learning*