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The Effect of Agency-Based Learning on Student Outcomes: An Effect-Size Study of AI-Supported, Student-Centered Instruction

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Abstract

As schools seek to prepare students for a rapidly changing world, there is growing interest in instructional models that move beyond teacher-directed learning toward greater student agency, voice, choice, and ownership. However, questions remain about whether agency-based learning can be implemented systematically while maintaining academic rigor, standards alignment, and measurable learning outcomes.

This study examines the impact of an agency-based, student-centered instructional model supported by generative and agentic artificial intelligence. In the intervention condition, teachers use an AI-assisted curriculum design platform to transform required standards and learning objectives into student-centered learning experiences. Students are provided meaningful opportunities to contribute to topic selection, make choices about learning pathways and products, collaborate with peers, engage in inquiry, and reflect on their learning, while teachers maintain responsibility for instructional goals, academic rigor, scaffolding, and assessment.

The study is being conducted in collaboration with Dr. Robert Marzano and participating educators using a comparative effect-size methodology. Teachers implement instructional units using both existing business-as-usual practices and the agency-based model. Student learning is examined using pre- and post-instruction measures, classroom assessments, and common learning outcomes. Effect sizes are calculated to estimate differences in student growth across instructional approaches. Additional measures examine student engagement, ownership of learning, teacher perceptions, instructional planning, and implementation fidelity.

The study investigates three primary questions: (1) To what extent does agency-based learning affect

student academic growth? (2) How does increased student voice and choice influence engagement and ownership of learning? (3) Can AI-supported instructional design help teachers increase student agency while preserving standards alignment and instructional quality?

The research contributes to the emerging evidence base on the intersection of student agency, artificial intelligence, and effective pedagogy. Findings are intended to inform educators, school leaders, and researchers seeking scalable approaches to student-centered learning that combine learner agency with measurable academic outcomes.

Keywords: Student Agency; Agency-Based Learning; Student-Centered Learning; Artificial Intelligence in Education; Effect Size; Student Engagement; Instructional Design; Academic Achievement