

See-Map-Speak™: A Conceptual Framework for Model-Based Learning and AI-Supported Inquiry

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Abstract

Generative AI has substantially reduced the effort required to obtain explanations, examples, and worked solutions. It has not, however, removed the need for learners to judge whether an explanation fits a situation, identify its assumptions, or reason through an unfamiliar problem. This paper introduces See-Map-Speak™, a conceptual framework for conceptual and systems-based learning designed to address that gap.

See-Map-Speak™ proposes three recurring movements. In See, learners encounter a system closely enough to generate observations and questions of their own. In Map, they construct a provisional working model by identifying relevant parts, relationships, causes, constraints, and predictions. In Speak, they explain that model in their own words, receive probing questions, and revise it in response to gaps, contradictions, or evidence. The framework is intended for domains in which understanding depends on relationships among components rather than factual recall alone, including STEM, engineering, ecology, urban systems, and immersive learning environments.

The paper synthesizes ideas from experiential learning, conceptual change, self-explanation, and relational model construction into a practical sequence for small-group facilitation. A virtual exploration of the Space Shuttle Discovery illustrates how a shared encounter can be differentiated across age and prior knowledge while preserving the same underlying cycle of observation, model-building, explanation, and revision.

The paper further argues that AI is most educationally useful when learners bring an initial observation, hypothesis, or working model to the interaction. Rather than treating AI literacy as prompt formulation alone, See-Map-Speak™ positions question quality and critical evaluation as consequences of prior sense-making. The framework is presented not as a universal instructional method, but as a testable design framework. Future evaluation may examine causal explanation, model revision, transfer to unfamiliar contexts, and students' capacity to interrogate AI-generated responses.

Keywords: AI Literacy; Systems Thinking; Conceptual Learning; Self-Explanation; Model-Based

Reasoning; STEM Education; Immersive Learning; Educational Technology