SYMPAB - (16024) - LINKING COGNITIVE AND MEASUREMENT FRAMEWORKS IN STUDIES OF EVOLUTION ACCEPTANCE

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Short Abstract

An unanswered question in biology education is whether recent work on students' knowledge coherence or fragmentation about evolution has relevance for the conceptualization and measurement of evolution acceptance. This study introduces a conceptual framework for the measurement of evolution acceptance that is grounded in prior studies of evolutionary thinking and that contrasts three aspects of this trait: magnitude ("how much"), variance ("degree of an individual's variability across contexts"), and dimensionality ("degree of a sample's predictability across contexts"). These aspects of a trait can allow investigations of coherence ("degree of consistency across contexts") and coherence change ("change in degree of consistency across contexts") of acceptance. The framework is applied to a quantitative analysis of evolution acceptance measures from >4000 students before and after evolution instruction. Two research questions guided the study: (RQ1) Prior to evolution instruction, is acceptance best characterized as coherent or fragmented, and (RQ2) post instruction, how does the structure of evolution acceptance change at the individual and sample levels? The I-SEA instrument was used to characterize acceptance across micro-, macro-, and human evolutionary contexts, and student response data were converted into linear measures using Rasch. Coherence was measured by comparing the magnitude and dimensionality of acceptance across the three I-SEA subscales. Coherence change was measured by comparing pre and post measures of dimensionality (sample level) and variance across subscales (individual level). Acceptance was moderate in magnitude and fragmented in structure pre-test, and although acceptance increased significantly in magnitude post-test, it remained largely fragmented at the sample (whole class) and individual level (each student). These findings demonstrate the potential of the conceptual framework to yield additional insights into the measurement of acceptance beyond magnitude of change.

Keywords: Quantitative methods, Conceptual Frameworks, Measurement