SYMPAB - (16063) - SHIFTS IN STUDENTS' EXPLANATION TYPES AFTER EVOLUTION INSTRUCTION: IMPLICATIONS FOR ADDRESSING TELEOLOGY

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Short Abstract

In recent years biology educators have begun to move away from the perspective that teleological language and explanations are universally problematic and towards a more nuanced and complex stance. In order to advance understanding of the association between students' types of evolutionary explanations and knowledge and "misconception" magnitudes, this study employs the Trommler and Hammann (2020) (T&H) explanation framework to study the ways in which a large student sample (n> 400) explains evolution before and after a course focusing on evolution. Two research questions guided the study: (RQ1): Can the T&H framework be applied to evolutionary explanations produced in response to ACORNS instrument items? (RQ2): Did students' explanatory types change in response to instruction, and if so, how? In addition to students' CANS and ACORNS scores, the 1,764 evolutionary explanations were studied for their alignment with the explanation categories outlined by T&H: (i) Etiological explanations (ETIOEs), (ii) constitutive explanations (CONSEs), (iii) contextual explanations (CONTEs), and (iv) ontological teleological explanations (ONTs). For RQ1, we found that the T&H framework aligns with evolutionary ACORNS explanations, although mixed and ambiguous explanations were coded. For RQ2, we found large changes in explanation types pre- to post-course; ONTs characterized a large number of explanations pre-course, but a very small fraction post-course. CONSEs remained uncommon pre- and post-course. ETIOEs displayed the greatest shifts pre- to post-course, with the majority of post-course explanations of this type. CONTEs were much more common pre-test. Students who shifted from ONTs to other explanation types also displayed large increases in CANS (and ACORNS) scores, and at post-test students enriched pre-test ONTs and CONTEs to encompass explicit origins (i.e., become ETIOEs). This work suggests that learning evolution not only involves increasing content understanding but is associated with shifts in the forms of explanation.

Keywords: Quantitative methods, Conceptual Frameworks, Measurement