The Influence of Pedagogical Content Knowledge (PCK) for Teaching Macroevolution on Student Outcomes in a General Education Biology Course

Emily M. Walter

Dr. Patricia Friedrichsen, Dissertation Supervisor

Abstract

This study investigated the influence of pedagogical content knowledge (PCK) for teaching macroevolution on non-science majors’ knowledge of macroevolution and evolution acceptance. The nature and sources of an experienced faculty member’s PCK and instruction as enacted PCK (Park & Oliver, 2008) were examined to consider the influence of these components on students’ knowledge of macroevolution and evolution acceptance. The study used a mixed methods approach to understand how PCK influences student outcomes, and is one of the first to examine the influence of PCK on student outcomes at the post-secondary level. In addition, the study is one of few to document a significant relationship between knowledge of evolution and evolution acceptance, including how instruction influenced these outcomes.

The instructor was found to have deep knowledge of learners, and this knowledge in turn informed the other components of her PCK. Her knowledge of learners was built through reflecting on student exam outcomes, referencing the pedagogical literature, interactions with students, and discussions with colleagues. These findings have implications for faculty professional development.

The influence of the course was examined both quantitatively and qualitatively. Students were surveyed using the Measure of Understanding of Macroevolution (Nadelson & Southerland, 2010a) the Measure of Acceptance of the Theory of Evolution (Rutledge & Warden, 1999, 2007). From pre- to post-test, students became significantly more accepting of evolution ($p < .0001$) and made significant gains in understanding macroevolution ($p < .0001$). Knowledge of macroevolution and evolution acceptance were also significantly correlated ($r[268]=.47$, $p<.01$). Twelve students initially scoring low on both instruments also interviewed to examine how the instruction influenced their responses on the instruments. Nine of the students became more accepting of evolution, which they attributed to learning about the volume of evidence for evolution (especially transitional fossils) and learning about the history of life. These findings have important implications for evolution education policy and practice at the post-secondary level.