

SP - (16662) - EXPLORING BIOLOGY INSTRUCTORS' AND STUDENTS' CONCEPTIONS AND APPLICATIONS OF SCIENTIFIC HYPOTHESES AND PREDICTIONS

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Short Abstract

Guidelines for undergraduate biology education identify evaluation and application of scientific hypotheses as an essential area of competency for biology majors. There is, however, clear evidence that undergraduate students need more support to fully grasp the concept and application of scientific hypotheses. Additionally, while established perspectives regarding the nature of scientific inquiry and experimentation emphasize hypotheses alongside the associated concept of “predictions”, guidelines and resources for biology teaching rarely mention predictions. Furthermore, we see a lack of explicit definitions of these fundamental concepts in teaching resources. There is, hence, a clear indication of an implicit assumption of common understanding regarding the concepts, role, and application of hypothesis and prediction in the context of scientific inquiry. We explored this assumption via characterization of the variation in conceptions surrounding hypotheses and predictions among biology faculty, graduate students, and students. We interviewed Biology faculty, graduate TAs, and undergraduate students at a large, Midwestern, public University with very high research activity in the United States (US). Thematic coding of interviews used deductive codes derived from Karl Popper's ‘The Logic of Scientific Discovery’ and inductive codes derived from the data. We find that faculty members’ conceptions of hypotheses and predictions – regarding concept, application, and role – align closely with Popper’s perspective, while graduate TAs and undergraduate students’ ideas are more varied. Undergraduate students’ definitions suggest that they conflate the two concepts and both graduate TAs and undergraduates are less familiar with predictions than hypotheses. Undergraduate students are less able to explain the role of hypotheses and predictions as compared to faculty and graduate students. Lastly, we discuss challenges and opportunities in student learning of these concepts identified by our different participant groups.