Overview: ConnectedBio is a Design and Development project that seeks to build and implement interactive lessons by combining the innovative curricular materials from the Evo-Ed.org project, with the technology-facilitated learning approach of the Concord Consortium, and the standards outlined in the NGSS.

Specifically, the project that seeks to research how technology-based materials designed to foster interlinked, three-dimensional learning of high school genetics and evolution increase sophistication of student understanding of core ideas, crosscutting concepts and science practices. We are specifically interested in how materials designed to support three-dimensional learning can support growing complexity in student understanding of the linked ideas of evolution, traits, and the underlying molecular mechanisms through the practices of analyzing and interpreting data, constructing scientific explanations and the crosscutting concepts of patterns and cause and effect.

Research Questions:
(1) How does students’ learning progress over time when they experience a set of coherent interactive 3D biology learning materials?
(2) How do students’ understanding about the relationships between molecules, cells, organisms, and populations transfer from one biological phenomenon to another?

Developmental Approach: Project materials are developed using a cyclical, approach where the integrative evolution cases are deconstructed and reassembled as a set of observable phenomena, occurring at different biological scales. These phenomena become the object of student investigations that are structured around NGSS Performance Expectations, through a coherent “storyline” (i.e., a learning sequence), facilitated with online interactive simulations.

Each integrated case of trait evolution is re-constructed as a set of lesson-level questions, guided by phenomena observable at different scales. These phenomena are investigated by students at each scale and student findings help them piece together the integrative, cross-scale nature of trait evolution. Student investigations are designed to have explicit links to NGSS Performance Expectations and are articulated with Lesson-Level Learning Performances.

Timeline and Targets

- 2017: Use principles of 3D learning to design a coherent learning sequence
- 2018: Adapt a cyclical, case-based approach
- 2019: Test materials in an agile, iterative manner
- 2020: Develop supporting technology-based environments

Timeline and Targets

Project Impact: Implementation and beta-testing of our project curriculum and interactives is set to happen in five States. Through our Evo-Ed.org and Concord Consortium networks, we expect this to grow as our interactives and associated material come online.

Our project will provide high school biology teaching and learning materials that are focused on helping students reach an integrated understanding of biology and evolution. The information gleaned from our research on how students learn with these materials will help all investigators in science education learn how students can achieve greater levels of sophistication and they build their understanding and make connections between concepts to increase the complexity of their thinking.

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