LEARNING SCIENCE PRACTICES VIA ONLINE RESEARCH: INVESTIGATIONS WITH DIGITIZED SPECIMENS

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THEME:

Innovative STEM pedagogy and curriculum.

BACKGROUND AND OBJECTIVES

The use of science practices—including asking questions, planning and carrying out investigations, analyzing and interpreting data, constructing explanations, making evidence-based arguments, and communicating with others (NGSS, 2014)—is a core dimension of science education. However, young students have infrequent opportunities to engage in research that facilitates direct application of some (let alone all) of these practices. Further, existing opportunities often are decontextualized and lack direct experience with objects (Dierking, 2002), making it difficult for learners to understand data and conclusions.

Our work has focused on the development and evaluation of an innovative resource for science education: EPIC Bioscience. EPIC Bioscience is a suite of free, online, fully supported research investigations designed for middle school learners. EPIC investigations focus students on authentic questions related to pressing global issues (e.g., climate change), are aligned to NGSS standards, and utilize digitized specimens from natural history collections (see Figure 1) as the basis for students to collect and analyze data, develop evidence-based arguments, and communicate conclusions. Investigations are structured but open-ended—students choose an investigation path, collect their own data, and develop their own (data-driven) conclusions.

STRUCTURE OF THE SESSION

Primary audiences for this workshop are science educators, STEM teaching leads/coaches, and researchers focused on educational technology and science learning.

The workshop will provide participants with an interactive experience using components from EPIC Bioscience's varied online investigations (entomology, vertebrate zoology, mycology, botany). The workshop will begin with an overview to the EPIC Bioscience approach and its pedagogical foundations (object-based learning, multimedia learning, and technology-supported cognition). Workshop attendees will engage in hands-on exploration of investigation activities, including data collection and analysis using digitized specimens. The workshop will conclude with a reflective discussion about participant experiences, classroom integration, and implications for science education, including lessons-learned during design and development, usability evaluations, and classroom testing.

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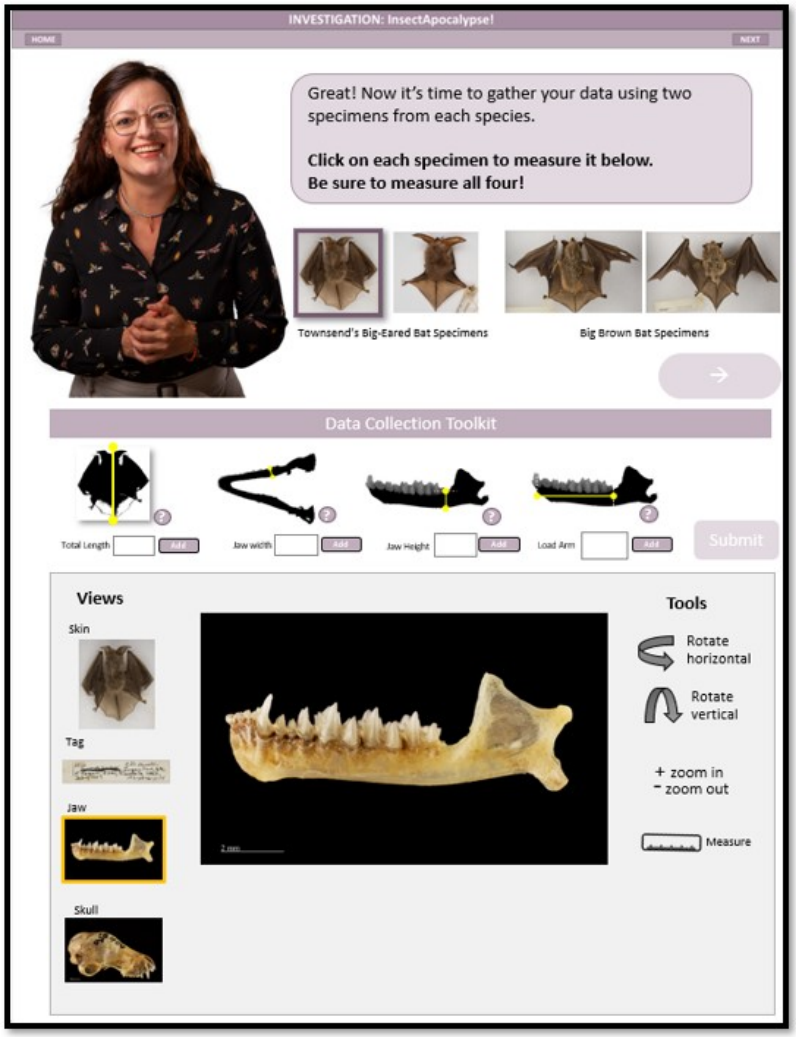

Figure 1. Example data collection interface for bat specimens (vertebrate zoology).

IMPLICATIONS

EPIC Bioscience investigations engage students in compelling science investigations on pressing global issues with real specimens (in digitized form), providing young learners with transformative opportunities to develop in-depth understanding of science practices.

REFERENCES

Dierking, L. D. (2002). The role of context in children's learning from objects and experiences. In S. G. Paris (Ed.), *Perspectives on object-centered learning in museums* (pp. 3-18). Lawrence Erlbaum.

NGSS. (2014). *Science and engineering practices*. https://ngss.nsta.org/PracticesFull.aspx