NABT Position Statement:
Role of Laboratory and Field Experiences in Life Science Education

Engaging in the practices of science is the primary process by which scientific knowledge is gained. Focusing only on the products of science "*without developing an understanding of how those facts were established or that ignores the many important applications of science in the world misrepresents science…"* (*America's Lab Report*, National Research Council, 2006). Laboratory and field activities are essential components of biology and life science education at all levels and are the most effective vehicle for all students to gain firsthand experience with recommended scientific practices. Laboratory and field study have also been demonstrated to be effective means for comprehension, understanding, and application of biological knowledge.

The National Association of Biology Teachers (NABT) encourages educators to design hands-on learning that is inclusive, cost-effective, and creates opportunities for students. Educators should provide practical courses of action and a deep knowledge-base that will help their students explore current scientific problems and propose creative solutions. Laboratory and field experiences should also guide students in jointly developing their understanding of science practices and STEM careers. The richness of these experiences requires educators to consider the needs and accommodations necessary to ensure that all students can fully and safely participate.

Laboratory experiences should be in a student-centered environment where the learner is "interacting directly with the material world or with data drawn from the material world" (*A Framework for K-12 Science Education,* National Research Council, 2012). Field experiences are considered extended investigations conducted in outdoor settings that focus on the process of science (SERC, 2022). These include, for example, outdoor analysis of insect populations on foliage, researching soil types for native plantings, urban ecology of predators and scavengers, age demographics of trees in a city, and macroinvertebrate sampling of local rivers. Field and laboratory experiences can often be paired with community science projects to contribute to the larger body of scientific research.

The generation of knowledge in biological concepts and practices involve the scientific skills of asking questions, developing and using models, planning and carrying out investigations, analyzing and interpreting data, using mathematics and computational thinking, constructing explanations, engaging in argument from evidence, and obtaining, evaluating, and communicating information (*Call to Action for Science Education,* NASEM, 2021). Laboratory and field experiences should incorporate collaboration as well as processes, equipment, and materials of science under the guidance and facilitation of qualified educators to construct their own evidence-based explanations of biological phenomena.

Policy statements such as *America's Lab Report, Vision and Change in Undergraduate Biology Education* and the *Next Generation Science Standards* (NGSS) all emphasize the importance of including science practices to build a scientifically literate society (AAAS, 2011; NGSS Lead States, 2013; National Research Council, 2006). These documents not only call for the inclusion of laboratory experiences to introduce students to the practices of science, but also for the integration of authentic

research into these laboratory experiences for high quality and equitable pathways to learning (NASEM, 2021). In addition, developing inclusive laboratory and field environments are crucial to overcoming long standing barriers in the life sciences and providing engaging opportunities for learning.

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Revised and adopted by the NABT Board of Directors, May 2022. This position supersedes and replaces all previous NABT statements on the role of laboratory and field experiences.