Student Learning Outcomes Library

Office of Assessment & Accreditation

Indiana State University

BS Science Education

Spring 2020

Outcome	Related Foundational Studies or Graduate Goal
Foundations of Science Teaching	
1.1 Nature of Science—Teaching candidates of science engage students effectively in studies of the history, philosophy, and practice of science. They enable students to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science. To show they are prepared to teach the nature of science, teacher candidates of science must demonstrate that they: (a) understand the philosophical tenets, assumptions, goals, and values: understand the philosophical tenets, assumptions, goals, and values that distinguish science from technology and from other ways of knowing the World (b) engage students in studies of the nature of science: engage students successfully in studies of the nature of science including, when possible, the critical analysis of false or doubtful assertions made in the name of science	FS1 FS2 FS6
1.2 Safety and Welfare	FS3 FS5

	Teacher candidates of science organize safe and effective learning environments that promote the success of students and the welfare of all living things. They require and promote knowledge and respect for safety and oversee the welfare of all living things used in the classroom or found in the field. To show that they are prepared, teachers of science must demonstrate that they: (a) understand the legal and ethical responsibilities: understand the legal and ethical responsibilities of science teachers for the welfare of their students, the proper treatment of animals, and the maintenance and disposal of materials (b) know and practice proper techniques for the use of materials: know and practice safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used in science Instruction (c) know and follow safety procedures: know and follow emergency procedures, maintain safety equipment, and ensure safety procedures appropriate for the activities and the abilities of students	FS9
	1.3 Professional Growth Teacher candidates of science strive continuously to improve their knowledge and understanding of the ever-changing knowledge base of both content, and science pedagogy, including approaches for addressing inequities and inclusion for all students in science. They identify with and conduct themselves as part of the science education community. Teacher candidates will: (a) professional development in content knowledge: engage in professional development opportunities in their content field such as talks, symposiums, research opportunities, or projects within their community. (NSTA 6a) (b) professional development in pedagogical content knowledge: engage in professional development	FS2 FS3 FS8 FS10

opportunities such as conferences, research opportunities, or projects within their community. (NSTA 6b)	
Science Curriculum	
2.1 Curriculum Teacher candidates of science plan and implement an active, coherent, and effective curriculum that is consistent with the goals and recommendations of the national and state science standards. They begin with the end in mind and effectively incorporate contemporary practices and resources into their planning and teaching. To show that they are prepared to plan and implement an effective science curriculum, teacher candidates of science must demonstrate that they: (a) understand curricular recommendations: understand the curricular recommendations of the national and state science standards, and can identify, access, and/or create resources and activities for science education that are consistent with the standards (b) plan units of study: plan and implement internally consistent units of study that address the diverse goals of the national and state science standards and the needs and abilities of students.	FS1 FS2 FS3
2.2 Issues Teacher candidates of science recognize that informed citizens must be prepared to make decisions and take action on contemporary science- and technology - related issues of interest to the general society. They require students to conduct inquiries into the factual basis of such issues and to assess possible actions and outcomes based upon their goals and values. To show that they are prepared to engage students in studies of issues related to science, teacher candidates of science must demonstrate that they: (a) understand socially important issues related to science: understand socially important issues related to science and technology in their field of licensure, as well as processes used to analyze and make decisions on such issues	FS5 FS6 FS7 HS10

(b) engage students in the analysis of problems: engage students successfully in the analysis of problems, including considerations of risks, costs, and benefits of alternative solutions; relating these to the knowledge, goals and values of the students.	
2.3 Science in Community Teacher candidates of science relate their discipline to their local and regional communities, involving stakeholders and using the individual, institutional, and natural resources of the community in their teaching. They actively engage students in science - related studies or activities related to locally important issues. To show that they are prepared to relate science to the community, teacher candidates of science must demonstrate that they: (a) relate science to the community: identify ways to relate science to the community, involve stakeholders, and use community resources to promote the learning of science (b) involve students in activities that relate science to the community: involve students successfully in activities that relate science to resources and stakeholders in the community or to the resolution of issues important to the community	FS1 FS2 FS5 FS7
Instructional Strategies for Teaching Science	
3.1 Inquiry Teacher candidates of science understand how students learn and develop scientific knowledge. Preservice teachers use scientific inquiry to develop this knowledge for all students. Teacher candidates will: (a) variety of inquiry approaches: Plan multiple lessons using a variety of inquiry approaches that demonstrate their knowledge and understanding of how all students learn science. (NSTA 2a) (b) active inquiry lessons: Include active inquiry lessons where students collect and interpret data in order to develop and communicate concepts and understand scientific processes, relationships and natural patterns from empirical experiences. (NSTA 2b)	FS1 FS2 FS3 FS10

(c) continuing naïve concepts and preconceptions: Design instruction and assessment strategies that confront and address naïve concepts/preconceptions. (NSTA 2c)	
3.2 General Skills of Teaching Teacher candidates of science create a community of diverse learners who construct meaning from their science experiences and possess a disposition for further exploration and learning. They use, and can justify, a variety of classroom arrangements, groupings, actions, strategies, and methodologies. To show that they are prepared to create a community of diverse learners, teacher candidates of science must demonstrate that they: (a) vary teaching methods: vary their teaching actions, strategies, and methods to promote the development of multiple student skills and levels of understanding; (b) promote the learning of science by diverse students: successfully promote the learning of science by students with different abilities, needs, interests, and backgrounds; (c) use technological tools: successfully use technological tools, including but not limited to computer technology, to access resources, collect and process data, and facilitate the learning of science	FS3 FS8
Effects on Student Learning and Assessment	
4.1 Effects on Student Learning Teacher candidates of science provide evidence to show that P-12 students' understanding of major science concepts, principles, theories, and laws have changed as a result of instruction by the candidate and that student knowledge is at a level of understanding beyond memorization. Candidates provide evidence for the diversity of students they teach. Teacher candidates will: (a) student learning of scientific knowledge: Collect, organize, analyze, and reflect on diagnostic, formative and summative evidence of a change in mental functioning demonstrating that scientific knowledge is gained and/or corrected. (NSTA 5a)	FS2 FS3 FS6

(b) student understanding of Nature of Science: Provide data to show that P-12 students are able to distinguish science from nonscience, understand the evolution and practice of science as a human endeavor, and critically analyze assertions made in the name of science. (NSTA 5b) (c) developmentally appropriate inquiries: Engage students in developmentally appropriate inquiries that require them to develop concepts and relationships from their observations, data, and inferences in a scientific manner. (NSTA 5c)	
4.2 Assessment Teacher candidates of science construct and use effective assessment strategies to determine the backgrounds and achievements of learners and facilitate their intellectual, social, and personal development. They assess students fairly and equitably and require that students engage in ongoing self--assessment. To show that they are prepared to use assessment effectively, teacher candidates of science must demonstrate that they: (a) use multiple assessment tools and strategies: use multiple assessment tools and strategies to achieve important goals for instruction that are aligned with methods of instruction and the needs of students (b) use assessment results to guide instruction: use the results of multiple assessments to guide and modify instruction, the classroom environment, or the assessment process	FS2 FS4