Standards for Elementary Grades Teacher Candidates (Science)

Elementary teachers provide a foundation for K-6 students to become lifelong learners and critical thinkers who can successfully function, compete, and flourish in a global society. Therefore, effective 21st century elementary education teacher candidates must possess an overarching understanding and knowledge of the key concepts which drive all content instruction. These key concepts, connected with other core standards, include candidates’ knowledge of assessment and instruction, the nature of the learner, school governance and culture, theories of learning and development, critical use of technology and the understanding of how the arts affect and interact with all other content areas. While content knowledge is essential, elementary teacher candidates must also understand the dynamic relationships and connections between content, instructional design, and assessment in relation to all elementary children.

The elementary teacher candidate must understand the integrative and complex relationship between the following key concepts:

- Assessment and Instruction
- Nature of the Learner
- School Governance and Culture
- Theories of Learning
- Critical Use of Technology
- Classroom Learning Environment

In order to deliver content effectively, elementary teacher candidates must also have a broad understanding of 21st century literacy skills. The 21st century teacher candidate defines literacy as the ability to identify, understand, interpret, create, communicate and compute using a variety of auditory and visual formats and contexts. This includes, but is not limited to, print, visual images, online databases, internet, podcasting, etc. It is important for teacher candidates to understand that literacy involves a continuum of learning within each content area, which will enable individuals to achieve their goals through developing and expanding their knowledge and understanding. (UNESCO - United Nations Educational, Scientific and Cultural Organization)

It is critical that the 21st century teacher candidate possess an understanding of the content essential to meet the objectives of the North Carolina Standard Course of Study (NCSCOS) and the elementary education curriculum. Elementary teacher education candidates must possess a strong knowledge of the NCSCOS in order to deliver effectively the content associated with the following standards. Elementary teacher candidates are knowledgeable in and are able to design and implement learning tasks that involve:

A. the function, the influence and the diversity of language.
B. integrated practices of multimodal literacies.
C. foundations of reading.
D. reading processes through a wide range of text.
E. a wide range of reading and writing assessment tools and results in order to provide developmentally appropriate instruction.
F. multiple composing processes.
G. best instructional practices and techniques in the language arts for all learners.
Standard 3: Elementary grades teacher candidates have the knowledge and understanding of scientific inquiry, process skills, concepts and applications relative to the life, physical, and earth sciences. Science

In order to enhance the North Carolina Standard Course of Study, 21st century teacher candidates use conceptual and procedural knowledge to guide their students to inquisitively learn, reason, and think critically, logically, and creatively. Using this knowledge, candidates teach students to make informed decisions through analyzing problems in order to construct alternative explanations and communicate scientific arguments. Teacher candidates must have the knowledge of inquiry based science, effective use of science process skills, and the importance of debating issues involving science and technology from a global perspective. Teacher candidates realize that science content is constantly evolving.

Elementary teacher candidates are knowledgeable in and are able to design and implement science learning activities that:

A. demonstrate appropriate safety practices and procedures to ensure the welfare and safety of all students and living organisms in the learning environment, including proper maintenance and disposal of materials.
B. use the unifying concepts and processes in the life, physical, and earth sciences.
C. involve the nature of science, the historical development of scientific thought, the process of scientific inquiry, and the reciprocal relationship between science and society.
D. involve the application of science skills, equipment and processes, technological tools and mathematical knowledge and skills.
E. allow students to develop and apply content knowledge and critical thinking skills that lead to the development of scientific literacy.
Content Clarification for Elementary Standards

These clarifications may include but are not limited to the following examples of how teacher candidates might demonstrate proficiency in elementary content standards. These examples are for clarification purposes only. Teacher candidates are not expected to document evidence from each item on the clarification page.

The elementary teacher candidate must understand the integrative and complex relationship between the following key concepts:

**Assessment and Instruction**
- Diagnostic, Formative, and Summative Assessment
- Analysis of Assessment Data
- Assessment Guided/Driven Instruction
- Knowledge of instructional design
- Integrative curriculum, including the arts
- Content area specific pedagogy

**Nature of the Learner**
- Child Development and Growth
- Differentiation of instruction
- Diverse learners/societies/families
- Parental, family, community relationships
- Learning styles and modalities
- Responsive, unbiased instruction for all learners
- Appropriate tiered instructional strategies (e.g. Responsiveness To Instruction)
- Knowledge in ELL and EC content and instructional strategy

**School Governance and Culture**
- Basic knowledge of School Law
- Collaboration with teachers, resource professionals, etc.
- Teacher rights and responsibilities
- Continuing education and professional development
- Working effectively with administrators

**Theories of Learning**
- Educational Theory
- Learning Theory
- Development Theory
- Curriculum Theory

**Critical Use of Technology**
- Analysis of web page credibility
- Effective integration of technology
- Technology for teacher productivity
- Technology to increase student learning outcomes

**Classroom Learning Environment**
- Multiple components of the learning environment
- Student behavior and intervention
- Procedures and routines
- Time management
- Recordkeeping
- Creating a safe and orderly environment
Standard 3: Elementary grades teacher candidates have the knowledge and understanding of scientific inquiry, process skills, concepts and applications relative to the life, physical, and earth sciences.  

**Science**

A. Demonstrate appropriate safety practices and procedures to ensure the welfare and safety of all students and living organisms in the learning environment, including proper maintenance and disposal of materials.

- Ensure that safety precautions and procedures are included in instruction and provide supervision during science activities.
- Analyze the lab/activities for safety and research materials/chemicals, including use of MSDS (Material Safety Data Sheets), to identify safety concerns before they are used.
- Have a working knowledge of, and comply with, science safety laws, codes, standards, and procedures.
- Model and enforce appropriate safety behaviors.
- Collaborate with colleagues to develop a short- and long-term plan for improvement of science safety.

B. Use the unifying concepts in the life, physical, and earth sciences.

- Systems, Order and Organizations
- Evidence, Models and Explanation
- Constancy Change and Measurement
- Evolution and Equilibrium
- Form and Function

C. Involve the nature of science, the historical development of scientific thought, the process of scientific inquiry, and the reciprocal relationship between science and society.

- Science is universal, multidisciplinary, cumulative and self-revising
- Science represents a way to answer questions based on observations, confirmable evidence and logical thinking
- The development of scientific thought is not necessarily linear
- Modern science is based on contributions, both past and present, from diverse cultures
- Scientific knowledge and applications affect and change human society
- Science progresses through communication within the scientific community, as well as with the public, allowing for feedback, challenges, and peer review

D. The application of scientific skills, equipment and processes, technological tools and mathematical knowledge and skills.

- Demonstrate proficiency in using measurement tools to perform investigations and gather accurate information
- Employ principles and applications of mathematics appropriate to the science content they teach
- Demonstrate proficiency in using scientific equipment commonly used in a given grade level
E. Allow students to develop and apply content knowledge and critical thinking skills that lead to the development of scientific literacy.

- Plan for acquisition, dissemination and management of materials and equipment
- Incorporate appropriate field investigations and field trips
- Identify ‘real world’ questions and facilitate scientific investigations of these questions to teach science content
- Incorporate appropriate authentic assessment techniques to gauge student progress through inquiry based instruction