Competencies for Middle Childhood Teachers: SCIENCE, Grades 4-8

2018

In addition to the Arkansas Teaching Standards, the teacher of middle school science, grades 4-8, shall be able to meet the expectations set by the following content-specific competencies:

1. Integration of STEM (science, technology, engineering, and mathematics) AR K-12 SS NGSS NRC (2013) NRC Framework	1.1 Understand and model key concepts of science, technology, engineering and mathematics (STEM) 1.2 Develop and deliver STEM-integrated, student-centered lessons and lab investigations taking into account factors such as safety measures, grades 4-8 classroom dynamics, problem solving, and project-based learning strategies, etc., which integrate grade-appropriate standards and practices 1.3 Understand and apply the engineering design process used to solve real-world problems in grades 4-8 lessons 1.4 Collect, evaluate, synthesize, and share real world data 1.5 Apply knowledge of STEM toward solving human and environmental problems 1.6 Utilize vocabulary, primary concepts, definitions, and models applicable to scientific investigations and engineering and design challenges 1.7 Develop and deliver STEM lesson assessments (formative and summative) 1.8 Recognize how an integrated approach can enrich the learning environment and build connections between STEM content areas 1.9 Appreciate of the nature of science and scientific inquiry through solving real-world problems 1.10 Develop and implement grades 4-8 STEM units and lessons 1.11 Share, model, and practice strategies to support the integration of STEM areas with the emphasis in the 4-8 classroom
2. Anchoring Instruction in Phenomena National Academies Press (2017)	2.1 Engage students in active science thinking 2.2 Help students make connections and understand how and why science ideas are important 2.3 Identify phenomena that describe events or facts that can be observed, unusual or not 2.4 Engage students in making sense of novel phenomena to gain conceptual understanding of what they are learning and what they observe in the world 2.5 Elicit students' natural curiosity about something that can be explained scientifically

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	2.6 Develop a range of activities that allow students to develop three-dimensional understanding of the core ideas and crosscutting concepts while using science and engineering skills
3. Fundamental understanding of the vision for 4-8 science education: scientific and engineering practices, cross cutting concepts, and core ideas AR K-12 SS NGSS NRC Framework	3.1 Demonstrate a command of the vision for K-12 science education- "… students, over multiple years of school, actively engage in scientific and engineering practices and apply crosscutting concepts to deepen their understanding of the core ideas in these fields." 3.2 Demonstrate a command of the eight scientific and engineering practices identified in the NRC Framework listed below: • Asking questions (for science) and defining problems (for engineering) • Developing and using models • Planning and carrying out investigations • Analyzing and interpreting data • Using mathematics and computational thinking • Constructing explanations (for science) and designing solutions (for engineering) • Engaging in argument from evidence • Obtaining, evaluating, and communicating information 3.3 Demonstrate understanding through the application of the seven crosscutting concepts that should be reinforced by repeated use in instruction across the disciplinary core ideas with • Patterns • Cause and effect: Mechanism and explanation • Scale, proportion, and quantity • Systems and system models • Energy and matter: flows, cycles, and conservation • Structure and function • Stability and change 3.4 Demonstrate understanding of the disciplinary core ideas in physical sciences, life sciences, and earth and space sciences as detailed in the NRC Framework 3.5 Identify and implement lessons/units that integrate the scientific and engineering practices and crosscutting concepts with each of the core ideas as specified in the performance expectations of the NRC Framework 3.6 Demonstrate content and science investigation teaching methods for grades 4-8 in the particular core ideas of: <u>Physical Sciences</u> PS 1: Matter and its interactions

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	PS 2: Motion and stability: Forces and interactions PS 3: Energy PS 4: Waves and their applications in technologies for information transfer Life Sciences LS 1: From molecules to organisms: Structures and processes LS 2: Ecosystems: Interactions, energy, and dynamics LS 3: Heredity: Inheritance and variation of traits LS 4: Biological evolution: Unity and diversity Earth and Space Sciences ESS 1: Earth's place in the universe ESS 2: Earth's systems ESS 3: Earth and human activity Engineering, Technology, and the Applications of Science ETS 1: Engineering design ETS 2: Links among engineering, technology, science, and society 3.7 Demonstrate a command of the implementation of the Arkansas English Language Arts Standards, Arkansas Mathematics Standards, and ISTE Standards for Educators as they support the NRC Framework 3.8 Design and conduct science investigations in at least one, if not all, of the disciplinary core ideas with attention to gathering and interpreting scientific data 3.9 Demonstrate diverse teaching strategies for reading and writing informational texts like those read and written by scientists
4. Principles of Life Sciences Praxis (5440)	4.1 Understands basic structure and function of cells and their organelles such as • Structure and function of cell membranes (e.g., passive and active transport, osmosis) • Structure and function of cell organelles • Levels of organization (cells, tissues, organs, organ systems) • Major cell types (e.g., muscle, nerve, epithelial) • Prokaryotes and eukaryotes 4.2 Understands basic cell reproduction such as • Cell cycle • Mitosis • Meiosis

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	• Cytokinesis 4.3 Is familiar with the basic biochemistry of life such as • Cellular respiration • Photosynthesis • Biological molecules (e.g., DNA, carbohydrates, proteins, lipids, enzymes) 4.4 Understands basic genetics such as • DNA structure • Replication, transcription, and translation • Dominant and recessive alleles • Mendelian inheritance (e.g., genotype, phenotype, use of Punnett squares) • Mutations, chromosomal abnormalities, and common human genetic disorders 4.5 Understands the theory and key mechanisms of evolution such as • Mechanisms of evolution (e.g., natural selection, punctuated equilibrium) • Isolation mechanisms and speciation • Supporting evidence (e.g., fossil record, comparative genetics, homologous structures) 4.6 Knows the elements of the hierarchial classification scheme and the characteristics of the major groups of organisms such as • Classification schemes (e.g., domain, kingdom, phylum/division, class, order, family, genus, species) • Characteristics of animals, plants, fungi, protest, and monera 4.7 Knows the major structures and functions of plant organs and systems such as • Characteristics of vascular and nonvascular plants • Control mechanisms and responses to stimuli • Structure and function of leaves, roots, and stems • Asexual and sexual reproduction • Uptake and transport of nutrients and water • Growth

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	4.8 Knows the basic anatomy and physiology of animals, including structure and function of human body systems and the major differences between humans and other animals such as • Homeostasis • Exchange with the environment (e.g., respiratory, excretory, digestive systems) • Internal transport and exchange (e.g., circulatory system) • Movement and support (e.g., skeletal and muscular systems) • Reproduction and development • Immune systems • Control systems (e.g., nervous system, endocrine system) • Response to stimuli and other organismal behavior 4.9 Knows key aspects of ecology such as • Population dynamics (e.g., growth curves; carrying capacity; behavior such as territoriality, mating systems, and social systems) • Community ecology (e.g., niche, succession, species diversity, interspecific relationships such as predator-prey and parasitism) • Ecosystems o Biomes o Stability and disturbances (e.g., glaciation, effect of global warming) o Energy flow (e.g., trophic levels, food webs) o Biogeochemical cycles (e.g., water, nitrogen, and carbon cycles, biotic/abiotic interaction
5.Principles of Physical Sciences Praxis (5440)	5.1 Understands mechanics • Describe linear and circular motion in one and two dimensions • Newton's first law: inertia • Friction • Work, energy, and power • Mass, weight, and gravity • Analyze motion and forces in a physical situation, including basic problems • Simple machines and mechanical advantage • Physical properties of fluids (e.g., buoyancy, density, pressure) 5.2 Knows electricity and magnetism • Electrical nature of materials

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	• Anayze basic series and parallel electrical circuits • Magnetic fields and forces 5.3 Understands basic waves and optics • Characteristics of light and the electromagnetic spectrum • Basic characteristics and types of waves • Basic wave phenomena • Basic characteristics and phenomena of sound • Basic optics 5.4 Is familiar with how to use the periodic table to predict the physical and chemical properties of elements • Organization of the periodic table • General trends in chemical reactivity based on position of elements in the periodic table (e.g., metallic and nonmetallic elements, noble gases) • General trend in physical properties based on position of elements in the periodic table (e.g., atomic radius, ionization energy) 5.5 Knows the types of chemical bonding and the composition of simple chemical compounds • Covalent and ionic bonding • Intermolecular attractions such as hydrogen bonding • Names of simple chemical compounds • Interpret chemical formulas 5.6 Understands states of matter and phase changes between them • Basic assumptions of the kinetic molecular theory of matter (e.g., particles in constant motion, speed and energy of gas particles are related to temperature) • Ideal gas laws (e.g., Charles' law: volume is proportional to temperature; Boyle's law: pressure and volume are inversely proportional) • Phase changes 5.7 Knows how to balance and use simple chemical equations • Balance simple chemical reactions • Simple stoichiometric calculations involving balanced equations • Use chemical formulas to identify and describe simple chemical reaction equations • Energy relationships (e.g., endothermic reactions, exothermic reactions) • Factors that affect reaction rates (e.g., concentration, temperature, pressure, catalysts/enzymes) 5.8 Understands basic concepts in acid-base chemistry • Chemical and physical properties of acids and bases • pH scale

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8

AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12

National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC

NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.

NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*

NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012

NSTA- 2012 NSTA Preservice Science Standards

Praxis II (5440) = Praxis II Middle School: Science Assessment

	• Neutralization • Buffers 5.9 Is familiar with solutions and solubility • Solution terminology and identification of different types of solutions • Factors affecting the dissolving process and solubility of substances
6. Principles of Earth and Space Sciences Praxis (5440)	6.1 Is familiar with physical geology • Types and characteristics of rocks, minerals, and their formation processes • Processes involved in erosion, weathering, and deposition of Earth's surface materials and soil formation • Earth's basic structure and internal processes • Water cycle 6.2 Is familiar with Historical Geology • Principle of uniformitarianism • Basic principles of stratigraphy (e.g., law of superposition) • Relative and absolute time (e.g., index fossils, radioactive dating) • Geologic time scale (e.g., eras, periods) • Fossil formation and the fossil record • Important events in Earth's geologic history (e.g., mass extinctions, Cambrian explosion, ice ages, meteor impacts) 6.3 Is familiar with the structure and processes of Earth's oceans and other bodies of water • Geographic location of Earth's oceans and seas • Tides, waves, and currents • Estuaries and barrier islands • Island, reef, and atoll formation • Polar ice caps, icebergs, and glaciers • Lakes, ponds, streams, rivers, and river deltas • Groundwater, water table, wells, and aquifers • Properties of water that affect Earth systems (e.g., density changes upon freezing, high heat capacity, polar solvent, hydrogen bonding) 6.4 Knows basic meteorology and major factors that affect climate and seasons • Basic meteorology • Major factors that affect climate and seasons 6.5 Is familiar with astronomy • Major features of the solar system • Interactions of the Earth-Moon-Sun system • Major features of the universe and theories of its origins

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	• Contributions of space missions, exploration, and technology
7. Principles of Engineering Design, Technology, and Applications of Science AR K-12 SS NGSS NRC Framework	7.1 Ability to demonstrate a deep understanding following active investigations in the principles of the engineering design cycle in the context of grades 4-8 science including • Defining and Delimiting an Engineering Problem • Developing Possible Solutions • Optimizing the Design Solution 7.2 Ability to demonstrate a deep understanding following active investigations in the principles of links among engineering, technology, science, and society in the context of grades 4-8 science including • Interdependence of Science, Engineering, and Technology • Influence of Engineering, Technology, and Science on Society and the Natural World
8. Safety NSTA	8.1 Design activities in a grade 4-8 classroom that demonstrate the safe and proper techniques for the preparation, storage, dispensing, supervision, and disposal of all materials used within their subject area science instruction 8.2 Design and demonstrate activities in a grade 4-8 classroom that demonstrate an ability to implement emergency procedures and the maintenance of safety equipment, policies and procedures that comply with established state and/or national guidelines 8.3 Ensure safe science activities appropriate for the abilities of all students 8.4 Design and demonstrate activities in a 4-8 classroom that demonstrate ethical decision-making with respect to the treatment of all living organisms in and out of the classroom 8.5 Emphasize safe, humane, and ethical treatment of animals and comply with the legal restrictions on the collection, keeping, and use of living organisms
9. Computing Concepts AR CSS K-8	9.1 Demonstrate understanding of computational thinking and problem solving by • Analyzing problem solving strategies • Analyzing connections between elements of mathematics and computer science • Solving problems cooperatively and collaboratively 9.2 Demonstrate understanding of data and information by

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	• Analyzing various ways in which data is represented Collecting, arranging, and representing data • Interpreting and analyzing data and information 9.3 Demonstrate understanding of algorithms and computer programs by • Creating, evaluating, and modifying algorithms • Creating computer programs to solve problems 9.4 Demonstrate understanding of computers and communications by • Analyzing the utilization of computers • Utilizing appropriate digital tools for various applications • Analyzing various components and functions of computers 9.5 Demonstrate understanding of community, global, and ethical impacts by analyzing appropriate uses of technology
10. Disciplinary Literacy AR DLS	<u>Reading Standards for Literacy in Science and Technical Subjects, Grades 6-8</u> 10.1 Read scientific and technical texts closely to determine what the text says explicitly and to make logical inferences from it, while determining central ideas or themes and analyzing development by: • Citing specific textual evidence to support analysis of science and technical texts • Determining the central ideas or conclusions of a text o Providing an a accurate summary of the text distinct from prior knowledge or opinions • Following precisely a multistep procedure when carrying out experiments, taking measurements, or performing technical tasks 10.2 Interpret words and phrases as they are used in scientific and technical texts, while analyzing the structure of such texts by: • Determining the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context • Analyzing the structure an author uses to organize a text, including how the major sections contribute to the whole and to an understanding of the topic

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	• Analyzing the author's purpose in providing an explanation, describing a procedure, or discussing an experiment in a text 10.3 Integrate knowledge and ideas by • Integrating quantitative or technical information expressed in words in a text with a version of that information expressed visually (e.g., in a flowchart, diagram, model, graph, or table) • Distinguishing among facts, reasoned judgement based on research findings, and speculation in a text • Comparing and contrasting the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text on the same topic 10.4 Complete a text complexity analysis using all three text complexity measures: quantitative, qualitative, and reader and task <u>Writing Standards for Literacy in Science and Technical Subjects, Grade 6</u> 10.5 Write arguments focused on discipline-specific content by • Introducing claim(s) about a topic or issue, acknowledging and distinguishing the claim(s) from alternate or opposing claims, and organizing the reasons and evidence logically • Supporting claim(s) with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources • Using words, phrases, and clauses to create cohesion and clarify the relationships among claim(s), counterclaims, reasons, and evidence • Establishing and maintaining a formal style • Providing a concluding statement or section that follows from and supports the argument presented 10.6 Write informative/explanatory texts, including scientific procedures/experiments or technical processes by: • Introducing a topic clearly, previewing what is to follow; organizing ideas, concepts, and information into broader categories as appropriate to achieving purpose; including formatting, graphics, and multimedia when useful to aiding comprehension

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment

	• Developing the topic with relevant, well-chosen facts, definitions, concrete details, quotations, or other information and examples • Using appropriate and varied transitions to create cohesion and clarifying the relationships among ideas and concepts • Using precise language and domain-specific vocabulary to inform about or explain the topic • Establishing and maintaining a formal style and objective tone • Providing a concluding statement or section that follows from and supports the information or explanation presented 10.7 Produce and distribute writing by: • Producing clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience • Developing and strengthening writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on how well purpose and audience have been addressed • Using technology, including the Internet, to produce and publish writing and present the relationships between information and ideas clearly and efficiently 10.8 Use research to build and present knowledge by • Conducting short research projects to answer a question (including a self-generated question), drawing on several sources, and generating additional related, focused questions that allow for multiple avenues of exploration • Gathering relevant information from multiple print and digital sources while using search terms effectively, assessing the credibility and accuracy of each source, quoting or paraphrasing the data and conclusions of others while avoiding plagiarism, and following a standard format for citation • Drawing evidence from informational texts to support analysis, reflection, and research 10.9 Write routinely over extended time frames (time for reflection and revision) and shorter time frames (a single sitting or a day or two) for a range of discipline-specific tasks, purposes, and audiences

AR CSS K-8- 2016 Arkansas Computer Science Standards for Grades K-8
AR DLS- Arkansas Disciplinary Literacy Standards for Grades 6-12
National Academies Press (2017)- Beatty, Alexandra and Schweingruber, Heidi (2017). *Seeing Students Learn Science: Integrating Assessment and Instruction in the Classroom, National Academies Press.* Washington DC
NGSS- NGSS Lead States. (2013). Next Generation Science Standards: For States, By States. Washington, DC: The National Academies Press.
NRC (2013) - National Research Council. (2013). *Monitoring progress toward successful K-12 STEM education: A nation advancing?*
NRC Framework = National Research Council. *A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas.* Washington, DC: The National Academies Press, 2012
NSTA- 2012 NSTA Preservice Science Standards
Praxis II (5440) = Praxis II Middle School: Science Assessment