Elementary (Grades K -5) Science

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  Science classrooms in Alabama must create opportunities for students to develop scientific literacy. Well-prepared graduates are expected to be scientifically literate. A scientifically literate person understands what science is and how to use it to make decisions and take actions in everyday life. Scientifically literate persons can access and evaluate information so that they can understand scientific concepts and phenomena and apply this knowledge to new and often nonscientific situations. They can identify credible sources and evaluate their reliability, which can combat the propagation of misinformation and misconceptions. Engagement in research and engineering is essential for the development of scientific literacy training. To achieve scientific literacy, students must use reading, writing, speaking, and listening to access, process, and communicate scientific knowledge. All students, K-12, are expected to use developmentally-appropriate literacy skills in the science classroom, such as reading scientific texts; writing observations and data, journaling, and composing reports or essays; and communicating their ideas using current technology for presentations and discussions. These skills are further defined in standards in Alabama's English Language Arts and digital literacy and computer science courses of study. Improving students' general literacy through science instruction goes hand in hand with fostering scientific literacy.

  Students must develop an understanding of the nature of science in order to become scientifically literate. The nature of science is an integral component of instruction, beginning in the earliest grades. While the rigor of concepts and skills progresses throughout a student's education, the core principles of science remain constant. For students to become scientifically literate, the nature of science must be explicitly addressed through instruction (alongside scientific and engineering

practices, disciplinary core ideas, and crosscutting concepts) and through reflective discussions among students about the science concepts they are learning.

All students should have opportunities to learn scientific information through inquiry and experience, using their individual funds of knowledge to enhance classroom instruction. Science and engineering are collaborative processes that take place within a global scientific community. Throughout history, individuals and groups of people from many backgrounds and societies have contributed to the body of scientific knowledge. This knowledge has resulted in remarkable technological advances that benefit all humankind. The future scientific community can be enhanced by having many perspectives represented. To enhance the growth of scientific knowledge, all students should have equal access to learning science. Scientific learning is built on the foundation of students' funds of knowledge, which are derived from family and community cultural practices and bodies of knowledge. Valuing students' individual funds of knowledge enhances teaching and learning in the science classroom. Educators should actively encourage students to share their science-related experiences in positive ways to promote sharing and collaboration in learning. Educators should also utilize instructional strategies that recognize and respect the differences that students bring to the classroom. Schools should provide access to quality learning space and equipment, qualified teachers who are enthusiastic about science, and adequate time for instruction and practice

Providing differentiated instruction in the science classroom is essential for meeting the diverse needs of all students. Differentiated instruction must be implemented in the science classroom in order to achieve the goal of access and equity for all students. For many students, including English learners, students with exceptionalities, and those in need of AL-MTSS (Alabama Multi-Tier System of Supports), differentiated instruction is crucial for academic success. ● Teachers of English Learner (EL) students need to understand and integrate content, language, and pedagogy in order to provide high-quality science instruction. Integrating language learning with science content provides necessary scaffolds and ensures that science teaching practices and materials are both inclusive and culturally relevant. English learners who simultaneously engage with science content and develop their language skills show greater academic success. The Alabama English Language Learners (ELL) Framework supports educators in shifting from traditional to systemic practices. These practices can include differentiated instruction, instructional strategies, and accommodations to ensure meaningful access to science content, bridge linguistic gaps, and address the individual needs of

every student. The National Science Teaching Association (NSTA, 2023) recommends strategies that are gestural, oral, pictorial, graphic, and textual, which will ultimately benefit all learners. Teachers should regard native languages and cultures as assets to be embraced, not barriers to be circumvented. Every student is given opportunities to interpret scientific explanations using data and evidence gathered from models, simulations, and hands-on activities. Just like their peers, English Learners possess unique perspectives, eagerness to inquire, and capacity to uncover both new and familiar information. These characteristics may serve as the entry point and driving force for equitable access to high-quality, rigorous instruction tailored to students' linguistic needs. ● Collaboration between general education and special education teachers is essential for determining and meeting individual students' needs. Collaboration creates opportunities for special education students to master science content using accommodations that allow them to learn more effectively, rather than implementing modifications which change content expectations. Working collaboratively, teachers can determine how to incorporate technology and instructional strategies that will implement the specific goals mandated in students' IEPs, 504 Plans, and other applicable educational plans.

High-quality teaching and learning in science require a collaborative classroom environment, an instructional design that promotes exploration, a variety of assessments, and opportunities to make cross-curricular connections. Quality science instruction can look very different from classroom to classroom yet still achieve the goal of developing scientifically literate students. However, there are many common facets that must be considered in designing appropriate science classroom instruction: Student characteristics ● Curiosity - Children are born investigators. Teachers should tap into students' natural curiosity to foster their interest in science at all ages. This is especially vital in the early years, where it provides foundational knowledge for future learning. ● Building on student interest and identity - Learning in science depends not only on the accumulation of facts and concepts but also on the development of an identity as a competent learner of science with motivation and interest to learn more. This should be a consideration when designing lessons (National Research Council, 2012). Instruction ● Classroom environment - The science classroom should be collaborative, student-centered, and connected to the real world for students to be actively engaged learners. The classroom should provide opportunities for creative scientific exploration and engineering design, active learning, immersion in scientific practices, use of critical thinking, and investigative processes.

- **Textbook:**