Supplemental Materials for Standard 4 – Life Science

The materials on the following pages are supplemental to the core. Each objective in Standard 4 has a sheet of information vital to student learning of science and the scientific processes inherent in the core. They are intended to give guidance to the teacher on the following topics:

- The Big Ideas go beyond discrete facts or skills to focus on larger concepts, principles, or processes (Grant Wiggins and Jay McTighe*, Understanding by Design,* 1998, p. 10). Big Ideas are cumulative, meaning that students revisit ideas that are previously developed, but in more and more complex ways at each successive grade level. This allows teachers to anchor learning at the beginning of the grade level to "concepts and reasoning abilities that young children bring with them" (NRC, 2008).

- Indicators provide both Measureable Outcomes framed by Standard 1objectives and Big Ideas and measurable indicators of student content knowledge and scientific processing for teachers.

- Science language is the language that students should use when conversing on each objective within the standard. Students may not be expected to spell and read each and every term.

- Guidance for combining Content and Process are suggested strategies teachers may use to teach the core. One-letter abbreviations (L, M, A, S) are included to show how the science learning may be integrated into Language Arts, Mathematics, Arts, and Social Studies concepts. Science content should never be taught as content alone, but should be taught through the process of scientific practice, embedding content into inquiry, hands-on learning, experimentation, interpretation of evidence, and communication of findings. "When students engage in science as practice, they develop knowledge and explanations of the natural world as they generate and interpret evidence." *(Ready, Set, Science: Putting Research to Work in K-8 Science Classrooms, pg. 34)*

- According to the National Science Education Standards, it is important to help students "establish connections between the natural and designed worlds." Guidance for combining Science, Technology, and Society provide support to teachers in this area.

- A key for interpreting the abbreviations used in the supplementary materials is found at the bottom of the page.

Important Note: A guide for reading the supplementary materials is found in Appendix B.

Subject	Grade	Standard	Objective
Science	**First**	**4. Life Science**	**1. Communicate observations about the similarities and differences between offspring and between populations.**

Content Big Ideas	Standard 1 Big Ideas – Intended Learning Outcomes	Science, Technology, and Society Big Ideas
(CT) All kinds of living things have offspring, usually with two parents involved. (CT) Offspring are very much alike, but not exactly, like their parents and like one another. (CT) Some animals and plants are alike in the way they look and things they do, and others are very different from one another.	(PoS) People can often learn about things around them by just observing those things carefully, but sometimes they can learn more by doing something to the things and noting what happens (raise questions about the world around them, be willing to seek answers to some of those questions by making careful observations and trying things out). (CoS) When doing science activities, it is often helpful to work with a team and to share findings with others. In this sharing, describing things as accurately as possible is important in science because it enables people to compare their observations with those of others (draw pictures that correctly portray at least some features of the thing being described, describe and compare things in terms of number, shape, texture, size, weight, color, and motion). (NoS) When people give different descriptions of the same thing, it is usually a good idea to make some fresh observations instead of just arguing about who is right.	(T) People use appropriate tools and models to investigate the world. (A) People working alone or in groups often invent new ways to solve problems and get work done. (S) Students understand that tools and ways of doing things that people have invented affect all aspects of life.

Indicators: Measureable Outcomes framed by Standard 1 Big Ideas

Indicator 1. Communicate observations about plants and animals, including humans, and how they resemble their parents.
Indicator 2. Analyze the individual similarities and differences within and across larger groups.

Science language students should be able to use correctly: populations, similarities, differences.

Guidance for Combining Content and Process	Guidance for Combining Science, Technology, and Society
Suggested Strategies Students can create a family tree poster with photographs or drawings (FA). Working in groups, students can identify similarities and differences in characteristics when comparing offspring to parents and siblings to siblings. (FA) (SS) (CoS) (NoS) Using two different kinds (e.g., White pumpkin, Cinderella pumpkin) of pumpkins (or other faster growing vegetable), students can investigate the relationship of seeds to pumpkins by dissecting seeds, planting seeds, and producing pumpkins. Students can compare the original pumpkins (parent) to the new pumpkins (offspring) to determine which offspring belongs to which parent. Record similarities and differences between generations as well as between the two different kinds. (L) (M) (PoS) (CoS) (NoS) Students can collect and analyze the different characteristics (e.g., eye color, hair color, skin color, height, and handedness) within and across classes. The students can graph and interpret the characteristics. (M) (PoS) (CoS) (NoS)	(T) Students can use age-appropriate tool to better observe populations. (A) Students can identify their inherited characteristics. (S) Students understand that offspring may or may not look like their parents.

Life Sciences	Curriculum Connections		Processes, Communication, and Nature of Science	Applications: Science, Technology, and Society
(CT) Changes over time	(M) Mathematics	(FA) Fine Arts	(PoS) Processes of science	(T) Tools of science
(N) Nature of Living Things	(L) Language Arts	(SS) Social Studies	(CoS) Communication of science	(A) Applications of science
			(NoS) Nature of science	(S) Implications of science for people