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KENTUCKY DEPARTMENT OF EDUCATION

CKEC ISLN Instructional Support Leadership Network JANUARY 2014

ckec

central kentucky educational cooperative

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CKEC ISLN January 16th, 2014 Agenda

Introduction – Review Characteristics of Network Participants

Student Voice – Teacher Panel – Monica Osborne

Concurrent Sessions:

--Science Network Update – Terry Rhodes

--Social Studies Network Preview – Debbie Waggoner

--Analyzing Student work – Kelly Philbeck

PGES update – Mike Cassidy

Closure – Planning for Full Scale Implementation

Today's materials can be accessed at:
www.debbiewaggoner.com/jan-2014-isln.html

Join our backchannel today at: www.todaysmeet.com/CKECISLN

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Kentucky Student Voice

Teachers Provide:

Support through rigorous instruction

Transparency through effective communication styles

Understanding through appropriate and varied assessments

Discipline through respectful classroom culture

Engagement through innovative instruction

Nurturing through attentive observation

Trust through teamwork

https://twitter.com/KyPGES

Kentucky Student Voice Survey Questions

Grades K-2

(Response options: Yes, No, Sometimes)

Support:

1. Do you learn many things in your class?
2. Do you work hard in this class?
3. Are you trying your best at school?
4. Do you think you are doing a good job in school?

Transparency:

5. Does {Mr./Ms._____} let you ask questions?
6. Do you know where to find things in your classroom?

Understand:

7. Does {Mr./Ms._____} help you?

Discipline:

8. Are students nice to each other in this class?
9. Does your teacher get mad when people don't follow the rules?
10. Does your teacher use kind words?

Engage:

11. Do you like coming to school?

Nurture:

12. Does {Mr./Ms._____} know if you are happy or sad?
13. Does {Mr./Ms._____} know when you are having a bad day?
14. Does {Mr./Ms._____} tell you when are doing a good job?
15. Is your teacher proud of you when you do a good job?

Trust:

16. Does {Mr./Ms._____} listen to you?

This survey was modified by the Colorado Legacy Foundation; from the Tripod Survey, developed by Cambridge Education, used in the MET project. The complete survey can be found at http://metproject.org/resources.php

Kentucky Student Voice Survey Questions

Grades 3-5

(Response options: no, never; mostly not; maybe/sometimes; mostly yes; yes, always)

Support:

1. My teacher pushes us to think hard about things we read.
2. My teacher pushes everybody to work hard.
3. In this class we have to think hard about the writing we do.

Transparency:

4. In this class we learn to correct our mistakes.
5. This class is neat—everything has a place and things are easy to find.
6. My teacher explains things in very orderly ways.
7. My teacher knows when the class understands and when we do not.

Understand:

8. My teacher takes the time to summarize what we learn each day.
9. When my teacher marks my work, he/she writes on my papers to help me understand.

Discipline:

10. My classmates behave the way my teacher wants them to.
11. Our class stays busy and does not waste time.
12. Students behave so badly in this class that it slows down our learning.

Engage:

13. School work is interesting.
14. We have interesting homework.
15. Homework helps me learn.

Nurture:

16. My teacher in this class makes me feel that he/she really cares about me.
17. If I am sad or angry, my teacher helps me feel better.
18. My teacher seems to know if something is bothering me.
19. My teacher gives us time to explain our ideas.

Trust:

20. My teacher wants us to share our thoughts.
21. Students speak up and share their ideas about class work.
22. My teacher wants me to explain my answers—why I think what I think.

This survey was modified from the Tripod Survey, developed by Cambridge Education, used in the MET project. The complete survey can be found at http://metproject.org/resources.php

Kentucky Student Voice Survey Questions

Grades 6-12

(Response options: totally untrue; mostly untrue; somewhat; mostly true; totally true)

S upport:

1. In this class, we learn a lot almost every day.
2. In this class, we learn to correct our mistakes.
3. My teacher doesn't let people give up when the work gets hard.
4. In this class, my teacher accepts nothing less than our full effort.

T ransparency:

5. My teacher explains difficult things clearly.
6. My teacher has several good ways to explain each topic that we cover in this class.
7. If you don't understand something, my teacher explains it another way.
8. My teacher knows when the class understands and when we do not.

U nderstand:

9. My teacher checks to make sure we understand what s/he is teaching us.
10. The comments that I get on my work in this class help me understand how to improve.
11. We get helpful comments to let us know what we did wrong on assignments.

D iscipline:

12. Students in this class treat the teacher with respect.
13. The students in this class behave the way my teacher wants them to.
14. Our class stays busy and does not waste time.
15. Student behavior in this class is under control.

E ngage:

16. I like the ways we learn in this class.
17. My teacher makes lessons interesting.
18. My teacher makes learning enjoyable.

N urture:

19. My teacher in this class makes me feel that s/he really cares about me.
20. My teacher really tries to understand how students feel about things.
21. My teacher seems to know if something is bothering me.

T rust:

22. My teacher respects my ideas and suggestions.
23. My teacher wants us to share our thoughts.
24. Students speak up and share their ideas about class work.
25. My teacher gives us time to explain our ideas.

This survey was modified from the Tripod Survey, developed by Cambridge Education, used in the MET project. The complete survey can be found at http://metproject.org/resources.php

The Student Voice Survey FAQs

GENERAL BACKGROUND

What is the Student Voice Survey?

The Student Voice Survey is an online survey, developed by the Kentucky Department of Education, that asks K-12 students to give feedback on specific aspects of the classroom experience, organized around seven elements of teaching practice: support, transparency, understanding, discipline, engagement, nurturing and trust. These elements form the acronym STUDENT.

The survey generates information both about how students experience teaching practices and learning conditions in the classroom as well as information about how students assess their own engagement.

Student Voice Surveys are being used by hundreds of schools and thousands of classrooms in more than 25 states nationwide.

The effective use of student voice surveys is featured in the Gates Foundation Measures of Effective Teaching (MET) study of teaching quality. Using a sample of more than 44,500 students, the results of the MET study in December 2010 and January 2012 reinforce a growing consensus that integrating student survey assessment results with high-quality observations and student gain-scores on achievement tests creates a much more valid and reliable teacher evaluation system compared to current standard practices.

Teachers will receive aggregate data of the compiled class responses; teachers will not know how individual students responded to the survey.

What type of questions will be asked on the survey?

The K-2 Student Voice survey is a series of questions such as, "Do you work hard in this class?" to which students may respond yes, sometimes or no.

The 3-12 Student Voice survey focuses on statements such as, "My teacher explains difficult things clearly."

The items used in both the K-2 and the 3-12 Student Voice tools were derived from the Tripod Survey, a survey that has been developed over the past 10 years as a partnership between Cambridge Education and Dr. Ron Ferguson. The K-2 questions from the Tripod Survey were modified by the Colorado Legacy Foundation. The survey questions can be found within the KDE Student Voice Framework survey questions document. These questions are aligned to The Charlotte Danielson *Framework for Teaching*, which has been adapted for the Kentucky Department of Education.

What teachers will participate in the 2013-2014 survey administration?

All teachers are invited to participate in the survey. **K-12 teachers who are participating in the statewide PGES pilot must participate in** the Student Voice Survey.

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Who will take the survey?

K-12 students of teachers within the pilot will take the survey. Each district will decide the Student Voice Survey protocol for their particular district.

How will the data from the pilot be used?

- Teachers will use data to inform instruction and classroom practice.
- School and district leaders will use data to determine potential areas for professional learning and teacher support.
- KDE will collect the data to validate the instrument for future use.
- This year's survey results/data will **NOT** be used for teacher evaluation.

How will the data from the survey be used after the 2013-14 school year?

The primary purpose of the survey is to provide valuable information for educators who are working to improve classroom and school learning conditions. Data also can be aggregated to provide school- and district-level feedback. These data can help focus priorities, track improvement and evaluate programs.

SURVEY PREPARATION

How is it determined what classrooms will be surveyed?

Prior to the Student Voice Survey window, the superintendent or district Student Voice Survey coordinator will determine the administration dates during the survey window. The district Student Voice Coordinator will determine the number of classes that will participate per teacher. This decision must be implemented consistently in all participating schools across the district. The building/school principal or Student Voice Survey coordinator will determine the specific schedule for administering the student voice survey.

How will schools receive the survey?

The Student Voice Survey will be loaded into Infinite Campus (IC) shortly before the administration date. The surveys will be made available to districts during the survey administration window.

What is needed for students to have access to the survey?

Students must have a Student Portal account in IC. The K-2 Survey proctor who administers the survey must have username/password for each student responding to the survey. All grade 3-12 students also must have their Campus username and password.

ADMINISTERING THE SURVEY

How many classes will take the survey?

Each district will determine the number of classes per teacher to take the survey.

How will special situations like collaborating teachers, part time teachers, and others be handled?

The superintendent or the district Student Voice Survey coordinator will determine the protocol for specific situations within the district. A different class will take the survey for each teacher in a collaborative classroom. In this case, teachers will identify the class that will respond for each teacher. Students in one class would not take the survey twice for both teachers of that class period.

What information will teachers need to provide for their students to be able to take the survey?

Each teacher will need to ensure that all students and survey proctors in the K-2 survey have the **student usernames** and **passwords.** If students are not regular portal users, a list of usernames and passwords will need to be provided for those students and proctors.

How is student confidentiality protected?

The teacher does not have access to individual student responses within Infinite Campus. The teacher only has access to the results of the compiled responses displayed within the Educator Development Suite (EDS) of the Continuous Instructional Improvement Technology System (CIITS).

How long does the survey take to complete?

Students typically are able to complete the survey in less than 20 minutes.

When will the surveys be administered?

The Student Voice Survey window for the 2013-14 school year is March 19-April 2.

Who will coordinate the survey administration at each school?

The principal and or a building Student Voice Survey coordinator designated by the principal will coordinate the survey administration.

Will parents be notified before the survey is administered?

Prior to the survey administration, schools will send an information and permission letter to parents of students who have teachers participating in the survey. Parents respond to this letter only if they DO NOT want their children to

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participate in the survey. A completed form must be returned to the school by a designated time to opt out of participation.

What accommodations can be made for students with special needs participating in the survey?

When responding to the survey, students with special needs are to use the specific accommodations that are outlined in the IEP for participation in the state assessment.

What do participating schools need to do?

Each participating K-2 student will be assigned a one-on-one student voice proctor to assist the student in data entry of survey responses into Infinite Campus. The student voice survey building coordinator will be responsible for identifying the proctor for each K-2 class.

The student or K-2 proctor will need to access the Infinite Campus Student Portal account to take the survey

When will teachers receive the results of the Student Voice Survey?

Teachers will be able to view the results of the Student Voice Survey within the Continuous Instructional Improvement Technology System (CIITS) in May 2014, approximately 4 weeks after the student voice window closes.

Where can I find more information on student voice surveys?

For more information, go to the PGES web page: http://education.ky.gov/teachers/HiEffTeach/Pages/Designing-PGES.aspx

Information on the Measures of Effective Teaching Research Project is available at: www.metproject.org

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Unity and Diversity

All matter is comprised of the same basic elements, goes through the same kinds of energy transformations, and uses the same kinds of forces to move. Living organisms are no exception. Elementary students begin to observe the macroscopic features of organisms in order to make comparisons and classifications based upon likenesses and differences. Looking for patterns in the appearance and behavior of an organism leads to the notion that offspring are much like the parents, but not exactly alike. In middle school, students begin to compare, contrast and classify the microscopic features of organisms—the cells, as well as investigate reproduction as the essential process to the continuation of all species. Expected patterns of genetic traits are predicted. Distinctions are made between learned behaviors and inherited traits. At the high school level, an in-depth study of the specialization and chemical changes occurring at the cellular level builds upon the foundational ideas developed earlier to investigate DNA and effects of alterations in DNA for an individual organism as well as for a species. Emphasis at every level should be placed upon the understanding that while every living thing is composed of similar small constituents that combine in predictable ways, it is the subtle variations within these small building blocks that account for both the likenesses and differences in form and function that create the diversity of life.

End of Primary	4th Grade	5th Grade
Biological Science		
SC-EP-3.4.1 **Students will explain the basic needs of organisms.** **Organisms have basic needs. For example, animals need air, water and food; plants need air, water, nutrients and light. Organisms can survive only in environments in which their needs can be met.** DOK 2	SC-04-3.4.1 **Students will:** • **compare the different structures and functions of plants and animals that contribute to the growth, survival and reproduction of the organisms;** • **make inferences about the relationship between structure and function in organisms.** **Each plant or animal has structures that serve different functions in growth, survival and reproduction. For example, humans have distinct body structures for walking, holding, seeing and talking. Evidence about the relationship between structure and function should be used to make inferences and draw conclusions.** DOK 3	SC-05-3.4.1 **Students will describe and compare living systems to understand the complementary nature of structure and function.** **Observations and comparisons of living systems at all levels of organization illustrate the complementary nature of structure and function. Important levels of organization for structure and function include cells, tissues, organs, organ systems, organisms (e.g., bacteria, protists, fungi, plants, animals), and ecosystems. Examining the relationship between structure and function provides a basis for comparisons and classification schemes.** DOK 2

SC-EP-3.4.2 *Students will understand that things in the environment are classified as living, nonliving and once living. Living things differ from nonliving things. Organisms are classified into groups by using various characteristics (e.g., body coverings, body structures).*	*SC-04-3.4.2* *Students will understand that things in the environment are classified as living, nonliving and once living. Living things differ from nonliving things. Organisms are classified into groups by using various characteristics (e.g., body coverings, body structures).*	**SC-05-3.4.2** **Students will explain the essential functions of cells necessary to sustain life.** **Cells carry on the many functions needed to sustain life. Models of cells, both physical and analogical, promote understanding of their structures and functions. Cells grow and divide, thereby producing more cells. This requires that they take in nutrients, which provide energy for the work that cells do and make the materials that a cell needs.** DOK 2
SC-EP-3.4.3 **Students will describe the basic structures and related functions of plants and animals that contribute to growth, reproduction and survival.** **Each plant or animal has observable structures that serve different functions in growth, survival and reproduction. For example, humans have distinct body structures for walking, holding, seeing and talking. These observable structures should be explored to sort, classify, compare and describe organisms.** DOK 2	**SC-04-3.4.3** **Students will compare a variety of life cycles of plants and animals in order to classify and make inferences about an organism.** **Plants and animals have life cycles that include the beginning of life, growth and development, reproduction and death. The details of a life cycle are different for different organisms. Models of organisms' life cycles should be used to classify and make inferences about an organism.** DOK 3	*SC-05-3.4.3* *Students will understand that all organisms are composed of cells, the fundamental unit of life. Most organisms are single cells; other organisms, including plants and animals are multicellular.*

SC-EP-3.4.4 **Students will describe a variety of plant and animal life cycles to understand patterns of the growth, development, reproduction and death of an organism.** **Plants and animals have life cycles that include the beginning of life, growth and development, reproduction and death. The details of a life cycle are different for different organisms. Observations of different life cycles should be made in order to identify patterns and recognize similarities and differences.** DOK 2	SC-04-3.4.4 **Students will identify some characteristics of organisms that are inherited from the parents and others that are learned from interactions with the environment.** **Observations of plants and animals yield the conclusion that organisms closely resemble their parents at some time in their life cycle. Some characteristics (e.g., the color of flowers, the number of appendages) are passed to offspring. Other characteristics are learned from interactions with the environment, such as the ability to ride a bicycle, and these cannot be passed on to the next generation. Explorations related to inherited versus learned characteristics should offer opportunities to collect data and draw conclusions about various groups of organisms.** DOK 2	

Biological Change

The only thing certain is that everything changes. Elementary students build a foundational knowledge of change by observing slow and fast changes caused by nature in their own environment, noting changes that humans and other organisms cause in their environment and observing fossils found in or near their environment. At the middle school level, students study relationships among populations and ecosystems that contribute to the success or demise of a specific population or species. Students construct basic explanations that can account for the great diversity among organisms. The stage is set for high school students to evaluate the role natural selection plays in the diversity of species. Modern ideas of evolution provide a scientific explanation for three main sets of observable facts about life on earth: the enormous number of different life forms we see about us, the systematic similarities in anatomy and molecular chemistry we see within that diversity and the sequence of changes in fossils found in successive layers of rock that have been formed over more than a billion years (*Science for All Americans, p. 67).*

End of Primary	4th Grade	5th Grade
Biological Science		
SC-EP-3.5.1 **Students will describe fossils as evidence of organisms that lived long ago, some of which may be similar to others that are alive today.** **Fossils found in Earth materials provide evidence about organisms that lived long ago and the nature of the environment at that time. Representations of fossils provide the basis for describing and drawing conclusions about the organisms and basic environments represented by them.** DOK 3	SC-04-3.5.1 **Students will use representations of fossils to:** • **draw conclusions about the nature of the organisms and the basic environments that existed at the time;** • **make inferences about the relationships to organisms that are alive today.** **Fossils found in Earth materials provide evidence about organisms that lived long ago and the nature of the environment at that time. Representations of fossils provide the basis for describing and drawing conclusions about the organisms and basic environments represented by them.** DOK 3	SC-05-3.5.1 **Students will describe cause and effect relationships between enhanced survival/reproductive success and particular biological adaptations (e.g., changes in structures, behaviors, and/or physiology) to generalize about the diversity of populations of organisms.** **Biological change over time accounts for the diversity of populations developed through gradual processes over many generations. Examining cause and effect relationships between enhanced survival/reproductive success and biological adaptations (e.g., changes in structures, behaviors, and/or physiology), based on evidence gathered, creates the basis for explaining diversity.** DOK 2

		SC-05-3.5.2 *Students will understand that all organisms must be able to obtain and use resources, grow, reproduce, and maintain stable internal conditions while living in a constantly changing external environment.*

1.Structure, Function, and Information Processing

1.Structure, Function, and Information Processing

Students who demonstrate understanding can:

1-LS1-1. **Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.*** [Clarification Statement: Examples of human problems that can be solved by mimicking plant or animal solutions could include designing clothing or equipment to protect bicyclists by mimicking turtle shells, acorn shells, and animal scales; stabilizing structures by mimicking animal tails and roots on plants; keeping out intruders by mimicking thorns on branches and animal quills; and, detecting intruders by mimicking eyes and ears.]

1-LS1-2. **Read texts and use media to determine patterns in behavior of parents and offspring that help offspring survive.** [Clarification Statement: Examples of patterns of behaviors could include the signals that offspring make (such as crying, cheeping, and other vocalizations) and the responses of the parents (such as feeding, comforting, and protecting the offspring).]

1-LS3-1. **Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.** [Clarification Statement: Examples of patterns could include features plants or animals share. Examples of observations could include leaves from the same kind of plant are the same shape but can differ in size; and, a particular breed of dog looks like its parents but is not exactly the same.] [Assessment Boundary: Assessment does not include inheritance or animals that undergo metamorphosis or hybrids.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Constructing Explanations and Designing Solutions
Constructing explanations and designing solutions in K–2 builds on prior experiences and progresses to the use of evidence and ideas in constructing evidence-based accounts of natural phenomena and designing solutions.

- Make observations (firsthand or from media) to construct an evidence-based account for natural phenomena. (1-LS3-1)
- Use materials to design a device that solves a specific problem or a solution to a specific problem. (1-LS1-1)

Obtaining, Evaluating, and Communicating Information
Obtaining, evaluating, and communicating information in K–2 builds on prior experiences and uses observations and texts to communicate new information.

- Read grade-appropriate texts and use media to obtain scientific information to determine patterns in the natural world. (1-LS1-2)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (1-LS1-2)

Disciplinary Core Ideas

LS1.A: Structure and Function

- All organisms have external parts. Different animals use their body parts in different ways to see, hear, grasp objects, protect themselves, move from place to place, and seek, find, and take in food, water and air. Plants also have different parts (roots, stems, leaves, flowers, fruits) that help them survive and grow. (1-LS1-1)

LS1.B: Growth and Development of Organisms

- Adult plants and animals can have young. In many kinds of animals, parents and the offspring themselves engage in behaviors that help the offspring to survive. (1-LS1-2)

LS1.D: Information Processing

- Animals have body parts that capture and convey different kinds of information needed for growth and survival. Animals respond to these inputs with behaviors that help them survive. Plants also respond to some external inputs. (1-LS1-1)

LS3.A: Inheritance of Traits

- Young animals are very much, but not exactly, like their parents. Plants also are very much, but not exactly, like their parents. (1-LS3-1)

LS3.B: Variation of Traits

- Individuals of the same kind of plant or animal are recognizable as similar but can also vary in many ways. (1-LS3-1)

Crosscutting Concepts

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (1-LS1-2),(1-LS3-1)

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (1-LS1-1)

Connections to Engineering, Technology, and Applications of Science

Influence of Engineering, Technology, and Science on Society and the Natural World

- Every human-made product is designed by applying some knowledge of the natural world and is built by using natural materials. (1-LS1-1)

Connections to other DCIs in first grade: N/A

Articulation of DCIs across grade-levels: **K.ETS1.A** (1-LS1-1); **3.LS2.D** (1-LS1-2) **3.LS3.A** (1-LS3-1); **3.LS3.B** (1-LS3-1); **4.LS1.A** (1-LS1-1); **4.LS1.D** (1-LS1-1); **4.ETS1.A** (1-LS1-1)

Common Core State Standards Connections:

ELA/Literacy –

RI.1.1	Ask and answer questions about key details in a text. (1-LS1-2),(1-LS3-1)
RI.1.2	Identify the main topic and retell key details of a text. (1-LS1-2)
RI.1.10	With prompting and support, read informational texts appropriately complex for grade. (1-LS1-2)
W.1.7	Participate in shared research and writing projects (e.g., explore a number of "how-to" books on a given topic and use them to write a sequence of instructions). (1-LS1-1),(1-LS3-1)
W.1.8	With guidance and support from adults, recall information from experiences or gather information from provided sources to answer a question. (1-LS3-1)

Mathematics –

MP.2	Reason abstractly and quantitatively. *(1-LS3-1)*
MP.5	Use appropriate tools strategically. *(1-LS3-1)*
1.NBT.B.3	Compare two two-digit numbers based on the meanings of the tens and one digits, recording the results of comparisons with the symbols >, =, and <. *(1-LS1-2)*
1.NBT.C.4	Add within 100, including adding a two-digit number and a one-digit number, and adding a two-digit number and a multiple of 10, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning uses. Understand that in adding two-digit numbers, one adds tens and tens, ones and ones; and sometimes it is necessary to compose a ten. *(1-LS1-2)*
1.NBT.C.5	Given a two-digit number, mentally find 10 more or 10 less than the number, without having to count; explain the reasoning used. *(1-LS1-2)*
1.NBT.C.6	Subtract multiples of 10 in the range 10-90 from multiples of 10 in the range 10-90 (positive or zero differences), using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used. *(1-LS1-2)*
1.MD.A.1	Order three objects by length; compare the lengths of two objects indirectly by using a third object. *(1-LS3-1)*

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

2.Interdependent Relationships in Ecosystems

2.Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

2-LS2-1. Plan and conduct an investigation to determine if plants need sunlight and water to grow. [Assessment Boundary: Assessment is limited to testing one variable at a time.]

2-LS2-2. Develop a simple model that mimics the function of an animal in dispersing seeds or pollinating plants.*

2-LS4-1. Make observations of plants and animals to compare the diversity of life in different habitats. [Clarification Statement: Emphasis is on the diversity of living things in each of a variety of different habitats.] [Assessment Boundary: Assessment does not include specific animal and plant names in specific habitats.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in K–2 builds on prior experiences and progresses to include using and developing models (i.e., diagram, drawing, physical replica, diorama, dramatization, or storyboard) that represent concrete events or design solutions.

- Develop a simple model based on evidence to represent a proposed object or tool. (2-LS2-2)

Planning and Carrying Out Investigations

Planning and carrying out investigations to answer questions or test solutions to problems in K–2 builds on prior experiences and progresses to simple investigations, based on fair tests, which provide data to support explanations or design solutions.

- Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question. (2-LS2-1)
- Make observations (firsthand or from media) to collect data which can be used to make comparisons. (2-LS4-1)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Scientists look for patterns and order when making observations about the world. (2-LS4-1)

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Plants depend on water and light to grow. (2-LS2-1)
- Plants depend on animals for pollination or to move their seeds around. (2-LS2-2)

LS4.D: Biodiversity and Humans

- There are many different kinds of living things in any area, and they exist in different places on land and in water. (2-LS4-1)

ETS1.B: Developing Possible Solutions

- Designs can be conveyed through sketches, drawings, or physical models. These representations are useful in communicating ideas for a problem's solutions to other people. *(secondary to 2-LS2-2)*

Crosscutting Concepts

Cause and Effect

- Events have causes that generate observable patterns. (2-LS2-1)

Structure and Function

- The shape and stability of structures of natural and designed objects are related to their function(s). (2-LS2-2)

Connections to other DCIs in second grade: N/A

Articulation of DCIs across grade-levels: **K.LS1.C** (2-LS2-1); **K-ESS3.A** (2-LS2-1); **K.ETS1.A** (2-LS2-2); **3.LS4.C** (2-LS4-1); **3.LS4.D** (2-LS4-1); **5.LS1.C** (2-LS2-1); **5.LS2.A** (2-LS2-2),(2-LS4-1)

Common Core State Standards Connections:

ELA/Literacy –

W.2.7 Participate in shared research and writing projects (e.g., read a number of books on a single topic to produce a report; record science observations). (2-LS2-1),(2-LS4-1)

W.2.8 Recall information from experiences or gather information from provided sources to answer a question. (2-LS2-1),(2-LS4-1)

SL.2.5 Create audio recordings of stories or poems; add drawings or other visual displays to stories or recounts of experiences when appropriate to clarify ideas, thoughts, and feelings. *(2-LS2-2)*

Mathematics –

MP.2 Reason abstractly and quantitatively. *(2-LS2-1),(2-LS4-1)*

MP.4 Model with mathematics. *(2-LS2-1),(2-LS2-2),(2-LS4-1)*

MP.5 Use appropriate tools strategically. *(2-LS2-1)*

2.MD.D.10 Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems. *(2-LS2-2),(2-LS4-1)*

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

3.Interdependent Relationships in Ecosystems

3.Interdependent Relationships in Ecosystems

Students who demonstrate understanding can:

3-LS2-1. Construct an argument that some animals form groups that help members survive.

3-LS4-1. Analyze and interpret data from fossils to provide evidence of the organisms and the environments in which they lived long ago. [Clarification Statement: Examples of data could include type, size, and distributions of fossil organisms. Examples of fossils and environments could include marine fossils found on dry land, tropical plant fossils found in Arctic areas, and fossils of extinct organisms.] [Assessment Boundary: Assessment does not include identification of specific fossils or present plants and animals. Assessment is limited to major fossil types and relative ages.]

3-LS4-3. Construct an argument with evidence that in a particular habitat some organisms can survive well, some survive less well, and some cannot survive at all. [Clarification Statement: Examples of evidence could include needs and characteristics of the organisms and habitats involved. The organisms and their habitat make up a system in which the parts depend on each other.]

3-LS4-4. Make a claim about the merit of a solution to a problem caused when the environment changes and the types of plants and animals that live there may change.* [Clarification Statement: Examples of environmental changes could include changes in land characteristics, water distribution, temperature, food, and other organisms.] [Assessment Boundary: Assessment is limited to a single environmental change. Assessment does not include the greenhouse effect or climate change.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.

- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS4-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed worlds.

- Construct an argument with evidence, data, and/or a model. (3-LS2-1)
- Construct an argument with evidence. (3-LS4-3)
- Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem. (3-LS4-4)

Disciplinary Core Ideas

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- When the environment changes in ways that affect a place's physical characteristics, temperature, or availability of resources, some organisms survive and reproduce, others move to new locations, yet others move into the transformed environment, and some die. *(secondary to 3-LS4-4)*

LS2.D: Social Interactions and Group Behavior

- Being part of a group helps animals obtain food, defend themselves, and cope with changes. Groups may serve different functions and vary dramatically in size. *(Note: Moved from K–2)* (3-LS2-1)

LS4.A: Evidence of Common Ancestry and Diversity

- Some kinds of plants and animals that once lived on Earth are no longer found anywhere. *(Note: Moved from K–2)* (3-LS4-1)
- Fossils provide evidence about the types of organisms that lived long ago and also about the nature of their environments. (3-LS4-1)

LS4.C: Adaptation

- For any particular environment, some kinds of organisms survive well, some survive less well, and some cannot survive at all. (3-LS4-3)

LS4.D: Biodiversity and Humans

- Populations live in a variety of habitats, and change in those habitats affects the organisms living there. (3-LS4-4)

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (3-LS2-1),(3-LS4-3)

Scale, Proportion, and Quantity

- Observable phenomena exist from very short to very long time periods. (3-LS4-1)

Systems and System Models

- A system can be described in terms of its components and their interactions. (3-LS4-4)

Connections to Engineering, Technology, and Applications of Science

Interdependence of Science, Engineering, and Technology

- Knowledge of relevant scientific concepts and research findings is important in engineering. (3-LS4-3)

Connections to Nature of Science

Scientific Knowledge Assumes an Order and Consistency in Natural Systems

- Science assumes consistent patterns in natural systems. (3-LS4-1)

Connections to other DCIs in third grade: **3.ESS2.D** (3-LS4-3); **3.ESS3.B** (3-LS4-4)

Articulation of DCIs across grade-levels: **K.ESS3.A** (3-LS4-3)(3-LS4-4); **K.ETS1.A** (3-LS4-4); **1.LS1.B** (3-LS2-1); **2.LS2.A** (3-LS4-3),(3-LS4-4); **2.LS4.D** (3-LS4-3),(3-LS4-4); **4.ESS1.C** (3-LS4-1); **4.ESS3.B** (3-LS4-4); **4.ETS1.A** (3-LS4-4); **MS.LS2.A** (3-LS2-1),(3-LS4-1)(3-LS4-3),(3-LS4-4); **MS.LS2.C** (3-LS4-4); **MS.LS2.D** (3-LS2-1); **MS.LS4.A** (3-LS4-1); **MS.LS4.B** (3-LS4-3); **MS.LS4.C** (3-LS4-3),(3-LS4-4); **MS.ESS1.C** (3-LS4-1),(3-LS4-3),(3-LS4-4); **MS.ESS2.B** (3-LS4-1); **MS.ESS3.C** (3-LS4-4)

Common Core State Standards Connections:

ELA/Literacy –

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. *(3-LS2-1),(3-LS4-1),(3-LS4-3),(3-LS4-4)*
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS4-1),(3-LS4-3),(3LS4-4)*
RI.3.3	Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. *(3-LS2-1),(3-LS4-1),(3-LS4-3),(3-LS4-4)*
W.3.1	Write opinion pieces on topics or texts, supporting a point of view with reasons. (3-LS2-1),*(3-LS4-1)*,(3-LS4-3),*(3-LS4-4)*
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. *(3-LS4-1),(3-LS4-3),(3-LS4-4)*
W.3.9	Recall information from experiences or gather information from print and digital sources; take brief notes on sources and sort evidence into provided categories. (3-LS4-1)
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. *(3-LS4-3),(3-LS4-4)*

Mathematics –

MP.2	Reason abstractly and quantitatively. *(3-LS4-1),(3-LS4-4)*
MP.4	Model with mathematics. (3-LS2-1),*(3-LS4-1),(3-LS4-4)*
MP.5	Use appropriate tools strategically. *(3-LS4-1)*
3.NBT	Number and Operations in Base Ten (3-LS2-1)
3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *(3-LS4-3)*
3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. *(3-LS4-1)*

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

3.Inheritance and Variation of Traits: Life Cycles and Traits

3.Inheritance and Variation of Traits: Life Cycles and Traits

Students who demonstrate understanding can:

3-LS1-1. **Develop models to describe that organisms have unique and diverse life cycles but all have in common birth, growth, reproduction, and death.** [Clarification Statement: Changes organisms go through during their life form a pattern.] [Assessment Boundary: Assessment of plant life cycles is limited to those of flowering plants. Assessment does not include details of human reproduction.]

3-LS3-1. **Analyze and interpret data to provide evidence that plants and animals have traits inherited from parents and that variation of these traits exists in a group of similar organisms.** [Clarification Statement: Patterns are the similarities and differences in traits shared between offspring and their parents, or among siblings. Emphasis is on organisms other than humans.] [Assessment Boundary: Assessment does not include genetic mechanisms of inheritance and prediction of traits. Assessment is limited to non-human examples.]

3-LS3-2. **Use evidence to support the explanation that traits can be influenced by the environment.** [Clarification Statement: Examples of the environment affecting a trait could include normally tall plants grown with insufficient water are stunted; and, a pet dog that is given too much food and little exercise may become overweight.]

3-LS4-2. **Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing.** [Clarification Statement: Examples of cause and effect relationships could be plants that have larger thorns than other plants may be less likely to be eaten by predators; and, animals that have better camouflage coloration than other animals may be more likely to survive and therefore more likely to leave offspring.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop models to describe phenomena. (3-LS1-1)

Analyzing and Interpreting Data

Analyzing data in 3–5 builds on K–2 experiences and progresses to introducing quantitative approaches to collecting data and conducting multiple trials of qualitative observations.

When possible and feasible, digital tools should be used.

- Analyze and interpret data to make sense of phenomena using logical reasoning. (3-LS3-1)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 3–5 builds on K–2 experiences and progresses to the use of evidence in constructing explanations that specify variables that describe and predict phenomena and in designing multiple solutions to design problems.

- Use evidence (e.g., observations, patterns) to support an explanation. (3-LS3-2)
- Use evidence (e.g., observations, patterns) to construct an explanation. (3-LS4-2)

Connections to Nature of Science

Scientific Knowledge is Based on Empirical Evidence

- Science findings are based on recognizing patterns. (3-LS1-1)

Disciplinary Core Ideas

LS1.B: Growth and Development of Organisms

- Reproduction is essential to the continued existence of every kind of organism. Plants and animals have unique and diverse life cycles. (3-LS1-1)

LS3.A: Inheritance of Traits

- Many characteristics of organisms are inherited from their parents. (3-LS3-1)
- Other characteristics result from individuals' interactions with the environment, which can range from diet to learning. Many characteristics involve both inheritance and environment. (3-LS3-2)

LS3.B: Variation of Traits

- Different organisms vary in how they look and function because they have different inherited information. (3-LS3-1)
- The environment also affects the traits that an organism develops. (3-LS3-2)

LS4.B: Natural Selection

- Sometimes the differences in characteristics between individuals of the same species provide advantages in surviving, finding mates, and reproducing. (3-LS4-2)

Crosscutting Concepts

Patterns

- Similarities and differences in patterns can be used to sort and classify natural phenomena. (3-LS3-1)
- Patterns of change can be used to make predictions. (3-LS1-1)

Cause and Effect

- Cause and effect relationships are routinely identified and used to explain change. (3-LS3-2),(3-LS4-2)

Connections to other DCIs in third grade: **3.LS4.C** (3-LS4-2)

Articulation of DCIs across grade-levels: **1.LS3.A** (3-LS3-1),(3-LS4-2); **1.LS3.B** (3-LS3-1); **MS.LS1.B** (3-LS1-1), (3-LS3-2); **MS.LS2.A** (3-LS4-2); **MS.LS3.A** (3-LS3-1); **MS.LS3.B** (3-LS3-1),(3-LS4-2); **MS.LS4.B** (3-LS4-2)

Common Core State Standards Connections:

ELA/Literacy –

RI.3.1	Ask and answer questions to demonstrate understanding of a text, referring explicitly to the text as the basis for the answers. (3-LS3-1),(3-LS3-2),*(3-LS4-2)*
RI.3.2	Determine the main idea of a text; recount the key details and explain how they support the main idea. *(3-LS3-1),(3-LS3-2),(3-LS4-2)*
RI.3.3	Describe the relationship between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text, using language that pertains to time, sequence, and cause/effect. (3-LS3-1),*(3-LS3-2),(3-LS4-2)*
RI.3.7	Use information gained from illustrations (e.g., maps, photographs) and the words in a text to demonstrate understanding of the text (e.g., where, when, why, and how key events occur). *(3-LS1-1)*
W.3.2	Write informative/explanatory texts to examine a topic and convey ideas and information clearly. *(3-LS3-1),*(3-LS3-2),(3-LS4-2)
SL.3.4	Report on a topic or text, tell a story, or recount an experience with appropriate facts and relevant, descriptive details, speaking clearly at an understandable pace. *(3-LS3-1),(3-LS3-2),(3-LS4-2)*
SL.3.5	Create engaging audio recordings of stories or poems that demonstrate fluid reading at an understandable pace; add visual displays when appropriate to emphasize or enhance certain facts or details. *(3-LS1-1)*

Mathematics –

MP.2	Reason abstractly and quantitatively. *(3-LS3-1),(3-LS3-2),(3-LS4-2)*
MP.4	Model with mathematics. *(3-LS1-1),(3-LS3-1),(3-LS3-2),(3-LS4-2)*
3.NBT	Number and Operations in Base Ten *(3-LS1-1)*
3.NF	Number and Operations—Fractions *(3-LS1-1)*
3.MD.B.3	Draw a scaled picture graph and a scaled bar graph to represent a data set with several categories. Solve one- and two-step "how many more" and "how many less" problems using information presented in scaled bar graphs. *(3-LS4-2)*
3.MD.B.4	Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units—whole numbers, halves, or quarters. *(3-LS3-1),(3-LS3-2)*

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

4.Structure, Function, and Information Processing

4.Structure, Function, and Information Processing

Students who demonstrate understanding can:

4-PS4-2. Develop a model to describe that light reflecting from objects and entering the eye allows objects to be seen. [Assessment Boundary: Assessment does not include knowledge of specific colors reflected and seen, the cellular mechanisms of vision, or how the retina works.]

4-LS1-1. Construct an argument that plants and animals have internal and external structures that function to support survival, growth, behavior, and reproduction. [Clarification Statement: Examples of structures could include thorns, stems, roots, colored petals, heart, stomach, lung, brain, and skin.] [Assessment Boundary: Assessment is limited to macroscopic structures within plant and animal systems.]

4-LS1-2. Use a model to describe that animals receive different types of information through their senses, process the information in their brain, and respond to the information in different ways. [Clarification Statement: Emphasis is on systems of information transfer.] [Assessment Boundary: Assessment does not include the mechanisms by which the brain stores and recalls information or the mechanisms of how sensory receptors function.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Develop a model to describe phenomena. (4-PS4-2)
- Use a model to test interactions concerning the functioning of a natural system. (4-LS1-2)

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Construct an argument with evidence, data, and/or a model. (4-LS1-1)

Disciplinary Core Ideas

PS4.B: Electromagnetic Radiation

- An object can be seen when light reflected from its surface enters the eyes. (4-PS4-2)

LS1.A: Structure and Function

- Plants and animals have both internal and external structures that serve various functions in growth, survival, behavior, and reproduction. (4-LS1-1)

LS1.D: Information Processing

- Different sense receptors are specialized for particular kinds of information, which may be then processed by the animal's brain. Animals are able to use their perceptions and memories to guide their actions. (4-LS1-2)

Crosscutting Concepts

Cause and Effect

- Cause and effect relationships are routinely identified. (4-PS4-2)

Systems and System Models

- A system can be described in terms of its components and their interactions. (4-LS1-1), (LS1-2)

Connections to other DCIs in this grade-level: N/A

Articulation of DCIs across grade-levels: **1.PS4.B** (4-PS4-2); **1.LS1.A** (4-LS1-1); **1.LS1.D** (4-LS1-2); **3.LS3.B** (4-LS1-1); **MS.PS4.B** (4-PS4-2); **MS.LS1.A** (4-LS1-1),(4-LS1-2); **MS.LS1.D** (4-PS4-2),(4-LS1-2)

Common Core State Standards Connections:

ELA/Literacy –

W.4.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (4-LS1-1)

SL.4.5 Add audio recordings and visual displays to presentations when appropriate to enhance the development of main ideas or themes. *(4-PS4-2),(4-LS1-2)*

Mathematics –

MP.4 Model with mathematics. *(4-PS4-2)*

4.G.A.1 Draw points, lines, line segments, rays, angles (right, acute, obtuse), and perpendicular and parallel lines. Identify these in two-dimensional figures. *(4-PS4-2)*

4.G.A.3 Recognize a line of symmetry for a two-dimensional figure as a line across the figure such that the figure can be folded across the line into matching parts. Identify line-symmetric figures and draw lines of symmetry. *(4-LS1-1)*

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

5.Matter and Energy in Organisms and Ecosystems

5.Matter and Energy in Organisms and Ecosystems

Students who demonstrate understanding can:

5-PS3-1. **Use models to describe that energy in animals' food (used for body repair, growth, motion, and to maintain body warmth) was once energy from the sun.** [Clarification Statement: Examples of models could include diagrams, and flow charts.]

5-LS1-1. **Support an argument that plants get the materials they need for growth chiefly from air and water.** [Clarification Statement: Emphasis is on the idea that plant matter comes mostly from air and water, not from the soil.]

5-LS2-1. **Develop a model to describe the movement of matter among plants, animals, decomposers, and the environment.** [Clarification Statement: Emphasis is on the idea that matter that is not food (air, water, decomposed materials in soil) is changed by plants into matter that is food. Examples of systems could include organisms, ecosystems, and the Earth.] [Assessment Boundary: Assessment does not include molecular explanations.]

The performance expectations above were developed using the following elements from the NRC document *A Framework for K-12 Science Education*:

Science and Engineering Practices

Developing and Using Models

Modeling in 3–5 builds on K–2 experiences and progresses to building and revising simple models and using models to represent events and design solutions.

- Use models to describe phenomena. (5-PS3-1)
- Develop a model to describe phenomena. (5-LS2-1)

Engaging in Argument from Evidence

Engaging in argument from evidence in 3–5 builds on K–2 experiences and progresses to critiquing the scientific explanations or solutions proposed by peers by citing relevant evidence about the natural and designed world(s).

- Support an argument with evidence, data, or a model. (5-LS1-1)

Connections to Nature of Science

Science Models, Laws, Mechanisms, and Theories Explain Natural Phenomena

- Science explanations describe the mechanisms for natural events. (5-LS2-1)

Disciplinary Core Ideas

PS3.D: Energy in Chemical Processes and Everyday Life

- The energy released [from] food was once energy from the sun that was captured by plants in the chemical process that forms plant matter (from air and water). (5-PS3-1)

LS1.C: Organization for Matter and Energy Flow in Organisms

- Food provides animals with the materials they need for body repair and growth and the energy they need to maintain body warmth and for motion. *(secondary to 5-PS3-1)*
- Plants acquire their material for growth chiefly from air and water. (5-LS1-1)

LS2.A: Interdependent Relationships in Ecosystems

- The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as "decomposers." Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem. (5-LS2-1)

LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment. (5-LS2-1)

Crosscutting Concepts

Systems and System Models

- A system can be described in terms of its components and their interactions. (5-LS2-1)

Energy and Matter

- Matter is transported into, out of, and within systems. (5-LS1-1)
- Energy can be transferred in various ways and between objects. (5-PS3-1)

Connections to other DCIs in fifth grade: **5.PS1.A** (5-LS1-1),(5-LS2-1); **5.ESS2.A** (5-LS2-1)

Articulation of DCIs across grade-levels: **K.LS1.C** (5-PS3-1),(5-LS1-1); **2.PS1.A** (5-LS2-1); **2.LS2.A** (5-PS3-1),(5-LS1-1); **2.LS4.D** (5-LS2-1); **4.PS3.A** (5-PS3-1); **4.PS3.B** (5-PS3-1); **4.PS3.D** (5-PS3-1); **4.ESS2.E** (5-LS2-1); **MS.PS3.D** (5-PS3-1),(5-LS2-1); **MS.PS4.B** (5-PS3-1); **MS.LS1.C** (5-PS3-1),(5-LS1-1),(5-LS2-1); **MS.LS2.A** (5-LS2-1); **MS.LS2.B** (5-PS3-1),(5-LS2-1)

Common Core State Standards Connections:

ELA/Literacy –

RI.5.1 Quote accurately from a text when explaining what the text says explicitly and when drawing inferences from the text. *(5-LS1-1)*

RI.5.7 Draw on information from multiple print or digital sources, demonstrating the ability to locate an answer to a question quickly or to solve a problem efficiently. *(5-PS3-1),(5-LS2-1)*

RI.5.9 Integrate information from several texts on the same topic in order to write or speak about the subject knowledgeably. (5-LS1-1)

W.5.1 Write opinion pieces on topics or texts, supporting a point of view with reasons and information. (5-LS1-1)

SL.5.5 Include multimedia components (e.g., graphics, sound) and visual displays in presentations when appropriate to enhance the development of main ideas or themes. *(5-PS3-1),(5-LS2-1)*

Mathematics –

MP.2 Reason abstractly and quantitatively. *(5-LS1-1),(5-LS2-1)*

MP.4 Model with mathematics. *(5-LS1-1),(5-LS2-1)*

MP.5 Use appropriate tools strategically. *(5-LS1-1)*

5.MD.A.1 Convert among different-sized standard measurement units within a given measurement system (e.g., convert 5 cm to 0.05 m), and use these conversions in solving multi-step, real world problems. *(5-LS1-1)*

*The performance expectations marked with an asterisk integrate traditional science content with engineering through a Practice or Disciplinary Core Idea.

Deconstructing Science Performance Expectations

Kentucky Department of Education
Office of Next Generation Learners

Read the Performance Expectation (PE)
Discuss the PE; refer to the foundation boxes related to the practices, DCI's and XCC for the PE; Refer to the NGSS progression matrices (Appendices E-J).

Is there agreement on the meaning/intent of the PE?
Ask:
What is the intent of the PE/learning? What depth is intended?
What are the key concepts for learning?
What will students need to know or do to show mastery?

YES

NO

Discuss the PE further; engage in additional research; consider seeking the advice of a content 'expert.'

Identify Underpinning Targets
Ask:
1. What will students need to know to master the PE?
2. What key skills (reasoning and/or performance) are needed?
3. Is some student generated product needed to ascertain competency?

Review all targets collectively; will they move students toward mastery of the PE as intended by the Framework and the NGSS?

YES

NO

Is the target basically in "student friendly" terms?

YES

NO

Add "I can" or "I will be able to"

Work with students to identify words that need to be defined or translated into more appropriate language; identify success criteria when needed

DCI Collaboration Plan

Co-op	PS1.A Structure and Matter	PS4.A Wave Properties	LS2.A Interdependent Relationships	ESS1.C History of Planet Earth
NKCES	K-8, HS	HS	HS	HS
GRREC	HS	K-8,HS	HS	HS
KEDC	HS	HS	HS	K-8,HS
SESC	K-8,HS	HS	HS	HS
KVEC	HS	K-8,HS	HS	HS
OVEC	HS	HS	HS	K-8,HS
WKEC	HS	HS	K-8,HS	HS
CKEC	HS	HS	K-8,HS	HS

High School teachers will work within their content specialty

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Teachers as Leaders Pages 74-77

Ten Roles for Teacher Leaders

Cindy Harrison and Joellen Killion

The ways teachers can lead are as varied as teachers themselves.

Teacher leaders assume a wide range of roles to support school and student success. Whether these roles are assigned formally or shared informally, they build the entire school's capacity to improve. Because teachers can lead in a variety of ways, many teachers can serve as leaders among their peers.

So what are some of the leadership options available to teachers? The following 10 roles are a sampling of the many ways teachers can contribute to their schools' success.

1. Resource Provider

Teachers help their colleagues by sharing instructional resources. These might include Web sites, instructional materials, readings, or other resources to use with students. They might also share such professional resources as articles, books, lesson or unit plans, and assessment tools.

Tinisha becomes a resource provider when she offers to help Carissa, a new staff member in her second career, set up her classroom. Tinisha gives Carissa extra copies of a number line for her students to use, signs to post on the wall that explain to students how to get help when the teacher is busy, and the grade-level language arts pacing guide.

2. Instructional Specialist

An instructional specialist helps colleagues implement effective teaching strategies. This help might include ideas for differentiating instruction or planning lessons in partnership with fellow teachers. Instructional specialists might study research-based classroom strategies (Marzano, Pickering, & Pollock, 2001); explore which instructional methodologies are appropriate for the school; and share findings with colleagues.

When his fellow science teachers share their frustration with students' poorly written lab reports, Jamal suggests that they invite several English teachers to recommend strategies for writing instruction. With two English teachers serving as instructional specialists, the science teachers examine a number of lab reports together and identify strengths and weaknesses. The English teachers share strategies they use in their classes to improve students' writing.

3. Curriculum Specialist

Understanding content standards, how various components of the curriculum link together, and how to use the curriculum in planning instruction and assessment is essential to ensuring consistent curriculum implementation throughout a school. Curriculum specialists lead teachers to agree on standards, follow the adopted curriculum, use common pacing charts, and develop shared assessments.

Tracy, the world studies team leader, works with the five language arts and five social studies teachers in her school. Using standards in English and social studies as their guides, the team members agree to increase the consistency in their classroom curriculums and administer common assessments. Tracy suggests that the team develop a common understanding of the standards and agrees to facilitate the development and analysis of common quarterly assessments.

4. Classroom Supporter

Classroom supporters work inside classrooms to help teachers implement new ideas, often by demonstrating a lesson, coteaching, or observing and giving feedback. Blase and Blase (2006) found that consultation with peers

enhanced teachers' self-efficacy (teachers' belief in their own abilities and capacity to successfully solve teaching and learning problems) as they reflected on practice and grew together, and it also encouraged a bias for action (improvement through collaboration) on the part of teachers. (p. 22)

Marcia asks Yolanda for classroom support in implementing nonlinguistic representation strategies, such as graphic organizers, manipulatives, and kinesthetic activities (Marzano et al., 2001). Yolanda agrees to plan and teach a lesson with Marcia that integrates several relevant strategies. They ask the principal for two half-days of professional release time, one for learning more about the strategy and planning a lesson together, and the other for coteaching the lesson to Marcia's students and discussing it afterward.

5. Learning Facilitator

Facilitating professional learning opportunities among staff members is another role for teacher leaders. When teachers learn with and from one another, they can focus on what most directly improves student learning. Their professional learning becomes more relevant, focused on teachers' classroom work, and aligned to fill gaps in student learning. Such communities of learning can break the norms of isolation present in many schools.

Frank facilitates the school's professional development committee and serves as the committee's language arts representative. Together, teachers plan the year's professional development program using a backmapping model (Killion, 2001). This model begins with identifying student learning needs, teachers' current level of knowledge and skills in the target areas, and types of learning opportunities that different groups of teachers need. The committee can then develop and implement a professional development plan on the basis of their findings.

6. Mentor

Serving as a mentor for novice teachers is a common role for teacher leaders. Mentors serve as role models; acclimate new teachers to a new school; and advise new teachers about instruction, curriculum, procedure, practices, and politics. Being a mentor takes a great deal of time and expertise and makes a significant contribution to the development of a new professional.

Ming is a successful teacher in her own 1st grade classroom, but she has not assumed a leadership role in the school. The principal asks her to mentor her new teammate, a brand-new teacher and a recent immigrant from the Philippines. Ming prepares by participating in the district's three-day training on mentoring. Her role as a mentor will not only include helping her teammate negotiate the district, school, and classroom, but will also include acclimating her colleague to the community. Ming feels proud as she watches her teammate develop into an accomplished teacher.

7. School Leader

Being a school leader means serving on a committee, such as a school improvement team; acting as a grade-level or department chair; supporting school initiatives; or representing the school on community or district task forces or committees. A school leader shares the vision of the school, aligns his or her professional goals with those of the school and district, and shares responsibility for the success of the school as a whole.

Joshua, staff sponsor of the student council, offers to help the principal engage students in the school improvement planning process. The school improvement team plans to revise its nearly 10-year-old vision and wants to ensure that students' voices are included in the process. Joshua arranges a daylong meeting for 10 staff members and 10 students who represent various views of the school experience, from nonattenders to grade-level presidents. Joshua works with the school improvement team facilitator to ensure that the activities planned for the meeting are appropriate for students so that students will actively participate.

8. Data Coach

Although teachers have access to a great deal of data, they do not often use that data to drive classroom instruction. Teacher leaders can lead conversations that engage their peers in analyzing and using this information to strengthen instruction.

Carol, the 10th grade language arts team leader, facilitates a team of her colleagues as they look at the results of the most recent writing sample, a teacher-designed assessment given to all incoming 10th grade students. Carol guides teachers as they discuss strengths and weaknesses of students' writing performance as a group, as individuals, by classrooms, and in disaggregated clusters by race, gender, and previous school. They then plan instruction on the basis of this data.

9. Catalyst for Change

Teacher leaders can also be catalysts for change, visionaries who are "never content with the status quo but rather always looking for a better way" (Larner, 2004, p. 32). Teachers who take on the catalyst role feel secure in their own work and have a strong commitment to continual improvement. They pose questions to generate analysis of student learning.

In a faculty meeting, Larry expresses a concern that teachers may be treating some students differently from others. Students who come to him for extra assistance have shared their perspectives, and Larry wants teachers to know what students are saying. As his colleagues discuss reasons for low student achievement, Larry challenges them to explore data about the relationship between race and discipline referrals in the school. When teachers begin to point fingers at students, he encourages them to examine how they can change their instructional practices to improve student engagement and achievement.

10. Learner

Among the most important roles teacher leaders assume is that of learner. Learners model continual improvement, demonstrate lifelong learning, and use what they learn to help all students achieve.

Manuela, the school's new bilingual teacher, is a voracious learner. At every team or faculty meeting, she identifies something new that she is trying in her classroom. Her willingness to explore new strategies is infectious. Other teachers, encouraged by her willingness to discuss what works and what doesn't, begin to talk about their teaching and how it influences student learning. Faculty and team meetings become a forum in which teachers learn from one another. Manuela's commitment to and willingness to talk about learning break down barriers of isolation that existed among teachers.

Roles for All

Teachers exhibit leadership in multiple, sometimes overlapping, ways. Some leadership roles are formal with designated responsibilities. Other more informal roles emerge as teachers interact with their peers. The variety of roles ensures that teachers can find ways to lead that fit their talents and interests. Regardless of the roles they assume, teacher leaders shape the culture of their schools, improve student learning, and influence practice among their peers.

References

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Authors' note: The 10 roles are described in more detail in *Taking the Lead: New Roles for Teachers and School-Based Coaches* by J. Killion and C. Harrison, 2006, Oxford, OH: National Staff Development Council. Although the names have been changed, all examples are based on actual teachers we encountered in our research.

Characteristics of the "Right" Network Participants

Commits to the Work -

- volunteers – someone who finds this work engaging and exciting
- completes tasks, readings or homework assignments in order to engage fully in network
- focuses on the goals -- learning, implementing, reflecting and guiding others

Displays Leadership Skills -

- has the ability and the opportunity to lead a professional learning team
- is viewed as a leader in the school/department/district
- influences and inspires others
- knows how to do the "right thing," not just how to do the thing right
- knows how to facilitate learning

Exhibits effective interpersonal skills -

- is trustworthy and dependable
- listens for understanding
- values the contributions and thinking of others
- is pleasant and comfortable interacting with others
- is not afraid of conflict and works toward resolution
- loves to read and learn
- adapts to situations -- even those that are challenging
- takes initiative to accomplish what must be done

Exemplifies Productive Team Membership -

- develops authentic relationships in order to facilitate real change
- works effectively with others and uses those strengths to accomplish group goals
- communicates with others without being intimidating or condescending
- shows professional respect for those with whom they work
- plans and organizes strategically based on group needs

Seeks to Enhance Pedagogical Skills -

- has a strong background in content knowledge and knowledge of the standards
- desires to improve their own practices
- has instructional competence (recognizes/implements highly effective teaching & learning)
- accesses current research in pedagogical content knowledge
- has been a special education collaborator/co-teacher

Advances Innovation and Creativity -

- is willing to try new approaches in the classroom
- has a vision for what education *can* be
- spends time thinking deeply about how to accomplish the vision
- is willing to take risks and to move forward beyond what is comfortable

- thinks critically and is able to solve problems
- is creative and thinks out of the box, refusing to be confined by tradition

So, who is **NOT** a good candidate?

- a person already overloaded with extra –curricular duties and responsibilities
- a person who is assigned to attend the meetings without consideration of the above characteristics
- a teacher *lacking an understanding of content knowledge or teaching to standards*
- a central office employee who is not involved in the routine of daily instruction and practice
- a person who typically resists change
- a teacher selected primarily because they happen to teach in an "assessment grade/course"
- ***be cautious of designating those specifically involved with the PGES Pilot work as doing that and the networks may be overwhelming.*

What must a network participant commit to do?

Each network participant (including teacher, school, and district reps) will be expected to attend all scheduled meetings (eight days per year — six during the academic year; two during the summer). Participants will be given readings and other 'assignments' (e.g., trying a new strategy, bringing examples of student/teacher work, collecting student data) that will need to be completed between face-to-face meetings. To support this work, network members will also be linked in electronic communities of practice. Finally, network members will be expected to participate on a **district leadership team*** that will figure out how to 'scale up' the practices that they are learning and honing and then actually bring them to scale in the district. Because it is systemic and intensive work, participants should be willing to commit to this process for at least three years.

It is important to keep in mind that each network is a community, but the power comes from the members also facilitating and participating in learning communities at the local level. As members learn in an authentic, social, action-oriented, ongoing team with their fellow network members, they will help other colleagues in their own schools and districts learn using those same strategies.

**The DISTRICT LEADERSHIP TEAM should be comprised of all teacher, school and district leader members—and it is recommended that the Mathematics and ELA Teacher Leaders who have worked in the previous 3 years CONTINUE to be included and involved as Science and Social Studies standards are implemented. After all, both Science and Social Studies are explicitly mentioned in the ELA Literacy standards, and ELA and Mathematics are explicitly linked in the new Science and Social Studies standards documents. Additionally, it is important to remember that the TEACHER LEADERS are only as effective as the SCHOOL and DISTRICT leaders that are supporting them. They need to be given prioritized and regular time to work with other teachers in their buildings and districts if capacity is to be built.*