Second Grade Companion Document

2-Unit 2: Plant Life

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Introduction to the K-7 Companion Document
An Instructional Framework

Overview

The Michigan K-7 Grade Level Content Expectations for Science establish what every student is expected to know and be able to do by the end of Grade Seven as mandated by the legislation in the State of Michigan. The Science Content Expectations Documents have raised the bar for our students, teachers and educational systems.

In an effort to support these standards and help our elementary and middle school teachers develop rigorous and relevant curricula to assist students in mastery, the Michigan Science Leadership Academy, in collaboration with the Michigan Mathematics and Science Center Network and the Michigan Science Teachers Association, worked in partnership with Michigan Department of Education to develop these companion documents. Our goal is for each student to master the science content expectations as outlined in each grade level of the K-7 Grade Level Content Expectations.

This instructional framework is an effort to clarify possible units within the K-7 Science Grade Level Content Expectations. The Instructional Framework provides descriptions of instructional activities that are appropriate for inquiry science in the classroom and meet the instructional goals. Included are brief descriptions of multiple activities that provide the learner with opportunities for exploration and observation, planning and conducting investigations, presenting findings and expanding thinking beyond the classroom.

These companion documents are an effort to clarify and support the K-7 Science Content Expectations. Each grade level has been organized into four teachable units- organized around the big ideas and conceptual themes in earth, life and physical science. . The document is similar in format to the Science Assessment and Item Specifications for the 2009 National Assessment for Education Progress (NAEP). The companion documents are intended to provide boundaries to the content expectations. These boundaries are presented as “notes to teachers”, not comprehensive descriptions of the full range of science content; they do not stand alone, but rather, work in conjunction with the content expectations. The boundaries use seven categories of parameters:

a. **Clarifications** refer to the restatement of the “key idea” or specific intent or elaboration of the content statements. They are not intended to denote a sense of content priority. The clarifications guide assessment.
b. **Vocabulary** refers to the vocabulary for use and application of the science topics and principles that appear in the content statements and expectations. The terms in this section along with those presented

within the standard, content statement and content expectation comprise the assessable vocabulary.

c. **Instruments, Measurements and Representations** refer to the instruments students are expected to use and the level of precision expected to measure, classify and interpret phenomena or measurement. This section contains assessable information.
d. **Inquiry Instructional Examples** presented to assist the student in becoming engaged in the study of science through their natural curiosity in the subject matter that is of high interest. Students explore and begin to form ideas and try to make sense of the world around them. Students are guided in the process of scientific inquiry through purposeful observations, investigations and demonstrating understanding through a variety of experiences. Students observe, classify, predict, measure and identify and control variables while doing “hands-on” activities.
e. **Assessment Examples** are presented to help clarify how the teacher can conduct formative assessments in the classroom to assess student progress and understanding
f. **Enrichment and Intervention** is instructional examples the stretch the thinking beyond the instructional examples and provides ideas for reinforcement of challenging concepts.
g. **Examples, Observations, Phenomena** are included as exemplars of different modes of instruction appropriate to the unit in which they are listed. These examples include reflection, a link to real world application, and elaboration beyond the classroom. These examples are intended for instructional guidance only and are not assessable.
h. **Curricular Connections and Integrations** are offered to assist the teacher and curriculum administrator in aligning the science curriculum with other areas of the school curriculum. Ideas are presented that will assist the classroom instructor in making appropriate connections of science with other aspects of the total curriculum.

This Instructional Framework is NOT a step-by-step instructional manual but a guide developed to help teachers and curriculum developers design their own lesson plans, select useful portions of text, and create assessments that are aligned with the grade level science curriculum for the State of Michigan. It is not intended to be a curriculum, but ideas and suggestions for generating and implementing high quality K-7 instruction and inquiry activities to assist the classroom teacher in implementing these science content expectations in the classroom.

Second Grade Unit:
Plant Life

Content Statements and Expectations

2 – Unit 2: Plant Life

Big Ideas (Key Concepts)

- Plants need air, water, and sunlight to survive.
- Plants have a life cycle that includes seed, seedling or young plant, adult plant, flower, fruit and seed.
- Plants have characteristics that are passed from the parent plant.

Clarification of Content Expectations

Standard: Organization of Living Things

Content Statement: L.OL.E.1
Life Requirements – Organisms have basic needs. Animals and plants need air, water, and food. Plants also require light. Plants and animals use food as a source of energy and as a source of building material for growth and repair.

Content Expectation

L.OL.02.14 Identify the needs of plants.

Instructional Clarifications:
1. Plants need air, water, and light to survive.
2. Plants use air, water, and sunlight to make their own food.
3. Plants store their own food in various plant parts.
4. Plants do not get their food from the soil.

Assessment Clarifications
1. Identify means recognize the things that plants need to stay alive.
2. Plants need air, water, and light to survive.

Content Statement – L.OL.E.2
Life Cycles – Plants and animals have life cycles. Both plants and animals begin life and develop into adults, reproduce, and eventually die. The details of this life cycle are different for different organisms.

Content Expectation

L.OL.02.22 Describe the life cycle of familiar flowering plants including the following stages: seed, plant, flower, and fruit.

Instructional Clarifications:

1. Describe is to tell or depict in spoken or written words how the life cycle of plants can include various stages.
2. Plants have a life cycle.
3. The plant life cycle includes seed-> plant -> flower -> fruit -> seed
4. Seeds need water and temperature to begin to grow.
5. All flowering plants produce seeds and have a fruit.
6. Seeds, fruits, and flowers come in a variety of shapes, sizes, and colors

Assessment Clarifications:

1. Plants have a life cycle.
2. The plant life cycle includes seed-> plant -> flower -> fruit -> seed

Standard: Heredity

Content Statement – L.HE.E.1
Observable Characteristics – Plants and animals share many, but not all, characteristics of their parents.

Content Expectation

L.HE.02.13 Identify characteristics of plants (for example: leaf shape, flower type, color, size) that are passed on from parent to young.

Instructional Clarifications

1. Identify means recognize the observable physical features of plants that are passed from parent to young.
2. Plants of the same type have the same leaf shape, flower type, color, and size.
3. Leaf shape, flower type, color and size are passed from the parent plant to the young produce from its' seeds.

Assessment Clarifications

1. Plants of the same type have the same leaf shape, flower type, color, and size.
2. Leaf shape, flower type, color and size are passed from the parent plant to the young produce from its' seeds.

Inquiry Process, Inquiry Analysis and Communication, Reflection and social Implications

Inquiry Processes
S.IP.02.11 Make purposeful observations of various objects according to their properties.
S.IP.02.12 Generate questions based on observations of objects according to their properties and of single substances and mixtures.
S.IP.02.13 Plan and conduct simple investigations of objects or substances to determine whether they sink or float and to compare objects using a balance.
S.IP.02.14 Manipulate simple tools (metric rulers and meter sticks) to determine the length of objects and the volume of liquids (measuring cups and measuring spoons)
S.IP.02.15 Make accurate measurements of length of objects in appropriate units (meter, centimeter)
S.IP.02.16 Construct simple charts and graphs from data and observations of properties of objects and substances.
Inquiry Analysis and Communication
S.IA.02.12 Share ideas about the properties of objects and the classification of single substances and mixtures.
S.IA.02.13 Communicate and present findings about the properties of objects or substances and the classification of single substances and mixtures.
S.IA.02.14 Develop strategies and skills for gathering information about the properties of objects or substances.
Reflection and Social Implication
S.RS.02.11 Demonstrate a means of classifying objects as single substances or mixtures through various illustrations, performances, exhibits, or activities.
S.RS.02.13 Recognize that when a science investigation on sinking and floating of objects or substances is done the way it was done before, similar results are expected.
S.RS.02.15 Use evidence when communicating ideas about the classification of single substances and mixtures.
S.RS.02.16 Identify technology used to compare objects that is used in everyday life.

Vocabulary

Critically Important-State Assessable	Instructionally Useful
flowering plants needs of plants air water light food life cycle seed plant flower fruit characteristics leaf shape flower type color size parent young	makes its own food food storage

Instruments, Measurements, Representations

Instrument	Measurement/Observation	Representation
Metric ruler/tape	Plant growth	Centimeters
Measuring cup, measuring spoons, graduated cylinders and beakers	Soil, water	milliliters
Hand lens	Plant parts, seeds, plant growth	Drawings and observations

Instructional Framework

The following Instructional Framework is an effort to clarify possible units within the K-7 Science Grade Level Content Expectations. The Instructional Framework provides descriptions of instructional activities that are appropriate for inquiry science in the classroom and meet the instructional goals. Included are brief descriptions of multiple activities that provide the learner with opportunities for exploration and observation, planning and conducting investigations, presenting findings, and expanding thinking beyond the classroom. The Instructional Framework is ***NOT*** *a step-by-step instructional manual, but a guide intended to help teachers and curriculum developers design their own lesson plans, select useful and appropriate resources and create assessments that are aligned with the grade level science curriculum for the State of Michigan.*

Instructional Examples

Life Requirements: L.OL.02.14
Life Cycles: L.OL.02.22
Heredity: L.HE.02.13

Objectives

- Make observations of plants and their interactions within habitats.
- Focus on their needs and how they help them survive.
- Make observations on the patterns plants follow from being born to growing up and getting old.
- Make observations on parental and young characteristics.
- Compare the physical characteristics of offspring and parent.

Engage and Explore

- Students study a plant's growth from seed to seed. L.OL.02.22, S.IP.02.11, S.IP.02.12
- In pairs, have students observe a variety of seeds using the hand lens. Allow sufficient time for students to sort, discuss, and ask questions about the seeds. S.IP.02.11, S.IP.02.12, S.IP.02.14, S.IA.02.12, S.IA.02.13
- Go outside on a seed hunt. Using the plants in the schoolyard, observe and collect a variety of seeds in the wild. S.IP.02.11, S.IP.02.12, S.IP.02.14, S.IA.02.12, S.IA.02.13
- As a class, brainstorm student ideas of where seeds come from. Ask students to apply what they know about living and non-living things to seeds. S.RS.02.15, S.IA.02.14
- Discuss what the students think seeds need to sprout and grow. L.OL.02.14, S.IA.02.12, S.IA.02.13

- Have students choose seeds to plant and grow in the classroom. S.IP.02.13

Explain and Define

- Record students' initial ideas about the stages in the growth of a plant on chart paper. Ask students for their ideas of how they can find out if their ideas are correct. L.OL.02.22,
- Have students plan an observation and recording schedule to observe the growth of their seeds/plants in the classroom. S.IP.02.13, S.IP.02.14, S.IP.02.15, S.IA.02.12, S.IA.02.13, S.IA.02.14
- Plant a baggie seed garden to observe and record the growth of a seed. Graphs should be made to display data. S.IP.02.14, S.IP.02.15, S.IP.02.16
- Review the needs of plants and have students decide on a watering schedule and where the plants should be located to grow. L.OL.02.14, S.IP.02.13
- Write the term life cycle on the board. Brainstorm for student ideas of the meaning of the term. Explain that all living things start from an egg or a seed, grow into an adult, and then have babies or offspring. Note: This may be a review from the life cycle of animals unit in the first grade. L.OL.02.22
- Read a book about the life cycle and growth of a plant from seed to seed, such as *The Pumpkin Circle*. L.OL.02.22

Elaborate and Apply

- Ask students to compare and contrast the life cycle of a plant to the life cycle of an animal. L.OL.02.22
- Share multiple examples of passed characteristics and life cycles with the students. L.HE.02.13.RS.02.15
- Students talk about characteristics passed from parent to offspring, such as leaf shape, size and color, flower color, shape, and size, stems, roots, and seeds. L.HE.02.13, S.RS.02.11

Evaluate student understanding

Formative Assessment Examples
- Check student observation/picture journal to determine if observations are appropriate/applicable. L.OL.02.14
- Student conversations in their groups can be used as basis for monitoring understanding. L.OL.02.14

Summative Assessment Examples
- Circle the needs of plants. L.OL.02.14
- Draw a picture of a plant and its seeds. L.HE.02.13
- Circle a characteristic that is shared by these plants. L.HE.02.13
- Draw the next stage of life for this plant. L.OL.02.22

Enrichment

- Students study another plant of their choice to show in a drawing the life cycle, characteristics passed from parent to offspring, life needs and habitat should be incorporated for their chosen plant.

Intervention

- Break students into research groups that focus on one aspect of the life cycle e.g. Seed group, Plant group, flower group, fruit group, and have students cycle through each of these groups studying many different plants. Students will then rotate through the other groups to experience all of them.

Examples, Observations, and Phenomena (Real World Context)

Most students, at this time in their education have had some experiences with planting seeds and growing plants. They observe plant life cycle and characteristics of plants without attaching scientific terms or observations. The purposeful study of the plant life cycle in the classroom relates to the planting of gardens and farmland. Through comparison of students' outdoor experiences and observations to the in class investigations, students gain an understanding of the life cycle of all living things.

In first grade, students learned about the life cycle of animals. Comparison between the life cycle of all living things, plants and animal, is the first introduction into cycles throughout nature. Students recognize that all living things start as a seed or egg, grow to an adult, reproduce, and then die.

Young learners build understanding of life science concepts through direct experience with living things, their life cycles, and long-term observations.

Literacy Integration

Reading

R.WS.02.11 in context, determine the meaning of words and phrases including objects, actions, concepts, content vocabulary, and literary terms, using strategies and resources including context clues, mental pictures, and questioning.

R.IT.02.02 discuss informational text patterns including descriptive, sequential, enumerative, and compare/contrast.

R.IT.02.04 respond to individual and multiple texts by finding evidence, discussing, illustrating, and/or writing to reflect, make connections, take a position, and/or show understanding.

R.CM.02.01 make text-to-self and text-to-text connections and comparisons by activating prior knowledge, connecting personal knowledge, experience, and understanding of others to ideas in text through oral and written responses.

R.CM.02.04 apply significant knowledge from grade-level science, social studies, and mathematics texts.

Examples of trade books available for learning about plants, their life cycle, and characteristics passed from parent to young:
The Pumpkin Circle, George Levenson, 1999
The Tiny Seed, Eric Carle, 1970
Jack's Garden, Henry Cole, 1997

- Activate prior knowledge about plants, seeds, and growing gardens.
- Connect personal knowledge, experience, and understanding of plants and growing plants to ideas in the text and through oral and written response.
- Retell relevant details of the life cycle of a plant as described in the book.

Writing

W.GN.02.03 write an informational piece including a magazine feature article using an organizational pattern such as description, enumeration, sequence, or compare/contrast that may include graphs, diagrams, or charts to enhance the understanding of central and key ideas.

W.GN.02.04 use the writing process to produce and present a research project, develop two research questions related to a teacher-selected topic; gather electronic or print resources and organize the information using key ideas with teacher assistance.

W.GR.02.01 in the context of writing, correctly use more complex complete sentences, nouns, and verbs, commas, contractions, colons to denote time, and capitalization of proper nouns.

- Write about a planting experience and use data from observations in the writing piece.
- Write an article about the importance of plants and how the life cycle of plants ensures the re-growth of plants.
- Write a story about a seed from the time it was planted to the time it produced seeds of its own. Include illustrations and labels. Write the story from the point of view of the seed and describe its surroundings.

Speaking

S.CN.02.02 explore and use language to communicate effectively with a variety of audiences and for different purposes including questions and answers, discussions, and social interactions.

S.DS.02.01 engage in substantive conversations, remaining focused on subject matter, with interchanges building on prior responses in book discussions, peer conferencing, or other interactions.

S.DS.02.03 respond to multiple text types by reflecting, making connections, taking a position, and/or showing understanding.

- Present their stories to different audiences beyond the classroom.

Write and perform a play about the life cycle of a plant from seed to seed.

Mathematics Integration

M.UN.02.01 Measure lengths in meters, centimeters, inches, feet, and yards approximating to the nearest whole unit and using abbreviations: cm, m, in, ft. yd.

M.UN.02.02 Compare lengths; add and subtract lengths (no conversion of units).

M.PS.02.10 Solve simple word problems involving length and money.

- Measure plant growth in centimeters.

- Measure water and soil in cups and milliliters when planting seeds and seedlings.