GARDEN LESSON PLAN

FOURTH GRADE SOCIAL STUDIES

STUDYING TEXAS REGIONS BY GROWING NATIVE PLANTS FROM SEED

*SPECIAL NOTE: You can choose from a wide variety of native plants for this activity. Most natives from our region are very easy to grow here. Seeds can sometimes be bought, but are also readily found in friend’s yards and many other places We have had success with students growing each of the varieties listed below. For excellent guidance on selection, propagation and planting location of these and other native plants, see the Native Plant Database of the Lady Bird Johnson Wildflower Center (*[*http://www.wildflower.org/plants/*](http://www.wildflower.org/plants/)*). Please be aware that many native plants are mildly poisonous if ingested or if there is extensive contact with sap.*

TEKS: §112.6. Science, Grade 4.

(b) (8)  Science concepts. The student knows that adaptations may increase the survival of members of a species. The student is expected to:

(A)  identify characteristics that allow members within a species to survive and reproduce;

(B)  compare adaptive characteristics of various species

§113.6. Social Studies, Grade 4.

(b) (7)  Geography. The student understands the concept of regions. The student is expected to:

(B)  describe a variety of regions in Texas and the Western Hemisphere such as landform, climate, and vegetation regions that result from physical characteristics

NOTE: See extensions below for activities related to additional TEKS from science, social studies and other areas.

 SUPPLIES: planting location – any of the following

* pots + potting soil (for later transplant)
* garden bed (for later transplant)
* final planting site

native plant seeds such as the following

* mountain laurel
* Mexican buckeye
* palo verde
* prickly pear pads
* red yucca
* milkweed (easiest to propagate from cuttings, which will root in water)

sandpaper or area of concrete to scratch hard coating off some varieties of seed

photos or specimens of the mature plant you’ll be growing

You can find this at the website above or in the book Native Plants of Texas, which is in the Casis Library.

WHEN?: This activity can be done any time of year, but is best begun in fall and followed through spring. The variety of plant you choose will depend on what is available. Caring for the plant will be more work when the weather is extreme – especially hot or especially cold.

TIME: Discussing the plants and the regions where they grow then planting the seeds will take approximately 30 minutes. If you choose to gather the seeds with students or to do additional extensions, you will need additional time.

 Some plants take more than a month to sprout, and require several months to reach a size suitable for transplant. They will require a small time commitment for care – mainly watering and protection from freezes -- during this time. They will also require care after transplant until they’re established – mainly watering when rainfall is inadequate.

METHOD: 1. PREPARATION: Gather supplies and seeds. Be sure to have more seeds than you expect to plant, since some will be dropped and lost. Students can gather the seeds themselves, if there are plants available.

 2. DISCUSSION (10 minutes): Discuss the following with students:

* regions of Texas and the climates of each, with an emphasis on our local climate and region
* general needs of plants: water, light, soil
* challenges and benefits for plants in each Texas region
* conditions in our local region, as compared to conditions in other Texas regions
* ways plants might adapt to conditions in different parts of the state (ask the students to brainstorm and to observe the plants you’re working with, then share some examples like those below)

EXAMPLES:

* + Many seeds will form a very hard coating to protect the plant inside and to allow the seed to lie dormant until conditions are favorable – something that might take a very long time.
	+ Many plants adapt their leaves to dry conditions with waxy coatings that hold moisture (mountain laurels), thick leaves that store water (prickly pears), or very small surface area (palo verde).
	+ Many plants will grow extremely long taproots to ensure that they can always reach water. (That also makes them very difficult to transplant after they have grown for more than a few months.)
	+ The palo verde has many fascinating adaptations to its very dry location:
		- Its leaves are extremely small, and fall off in very dry conditions.
		- The tree’s bark is green (palo verde means “green wood” in Spanish), which **allows the plant to photosynthesize through its bark**even when the plant does not have leaves.
		- The plant quickly produces hundreds or thousands of yellow flowers when there is rain after a dry period.
		- It is covered with very sharp, strong thorns to discourage animals from eating it.
* where the plants you are working with come from, their adaptations to their regions, and your expectations for how they will grow in your conditions

3. PLANTING (15 minutes): Plant the seeds according to their requirements and your plan. Be sure to use sandpaper or concrete to scratch part of the hard coating off of seeds such as Mountain Laurel or Mexican Buckeye.

NOTE: Seeds can get very hot from friction when you rub them against concrete. Many kids already know this about the bright red Mountain Laurel seeds, which many kids play with by making them hot and touching each other with them. This is a fun way to engage students in this part of the activity.

4. DISCUSSION (5 minutes): Form a plan to care for the seeds as they sprout and grow. Discuss what you expect to see, and talk about your plan for the seeds after they grow large enough to transplant. If you have planted them in an area where they will remain, discuss what they will need and what you expect to see.

EXTENSIONS:

1. Run a controlled experiment based on variables such as the following:
	1. Plant some seeds that were recently collected and some that were collected several years ago. (We will try to create a bank of Mexican Buckeye, Mountain Laurel and Palo Verde seeds in the science portable, labeled by date collected.) Track and calculate the percentage of each that germinates.
	2. Scratch the coating off of some seeds, and leave it intact on others. Track and calculate the percentage of each that germinates.
	3. Give some supplemental irrigation and water others only with whatever rain naturally falls. Track and calculate the percentage of each that germinates.
	4. Plant some seeds from natives that are well adapted to your local region, and others from regions that are very different from yours. Compare their growth to see which thrive and which struggle, and have the students evaluate why that is the case.
	5. Plant several varieties of native plants then track and compare the germinations rates and growth rates of each.

For each of the experiments above, have the students track their data with a graph or chart that explains their observations.

TEKS: §112.6. Science, Grade 4.

(b) (2)  Scientific processes. The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to: (A)  plan and implement descriptive investigations including asking well-defined questions, formulating testable hypotheses, and selecting and using equipment and technology; (B)  collect information by observing and measuring; (C)  analyze and interpret information to construct reasonable explanations from direct and indirect evidence; (D)  communicate valid conclusions; and (E)  construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information.

1. Plant your seeds in the fall and hold a ceremony to transplant them on Earth Day. Use this as a service project by planting your seedlings in a neighborhood park or somewhere on campus.

TEKS: §113.6. Social Studies, Grade 4.

(b) (18)  Citizenship. The student understands the importance of voluntary individual participation in the democratic process. The student is expected to: (A)  explain how individuals can participate voluntarily in civic affairs at state and local levels

1. Create old-fashioned botanical drawings of the plants you’re growing, showing leaves, seeds, flowers and the full plant. You can find many examples of botanical drawings online, often at sites that sell antique prints.

§112.6. Science, Grade 4.

(b) (2)  Scientific processes. The student uses scientific inquiry methods during field and laboratory investigations. The student is expected to: (B)  collect information by observing and measuring; (E)  construct simple graphs, tables, maps, and charts to organize, examine, and evaluate information.

§117.14. Art, Grade 4.

(b) (1)  Perception. The student develops and organizes ideas from the environment. The student is expected to: (A)  communicate ideas about self, family, school, and community, using sensory knowledge and life experiences;

(b) (2)  Creative expression/performance. The student expresses ideas through original artworks, using a variety of media with appropriate skill. The student is expected to: (B)  design original artworks

1. Pick leaves and flowers from the types of plants you’re growing and press them, using waxed paper and heavy books. Mount the pressed plants on a large map of Texas, to show where each type grows. If a number of species grow on your campus, you can adapt this activity to a map of your campus, instead, then can practice speaking and presentation skills by taking another class or a group of parents on a tour of native plants in the area using the map they’ve created.

TEKS: §113.6. Social Studies, Grade 4.

 (b) (6)  Geography. The student uses geographic tools to collect, analyze, and interpret data. The student is expected to: (A)  apply geographic tools, including grid systems, legends, symbols, scales, and compass roses, to construct and interpret maps; and(B)  translate geographic data into a variety of formats such as raw data to graphs and maps.

§110.15. English Language Arts and Reading, Grade 4.

(b) (28)  Listening and Speaking/Speaking. Students speak clearly and to the point, using the conventions of language. Students continue to apply earlier standards with greater complexity. Students are expected to express an opinion supported by accurate information, employing eye contact, speaking rate, volume, and enunciation, and the conventions of language to communicate ideas effectively.

1. Have the students create a guidebook about the native Texas plants they’re growing, including photos or drawings of the plants, maps indicating the regions they come from, and text about requirements, habits, and other key information.

§110.15. English Language Arts and Reading, Grade 4.

(b) (15)  Writing/Writing Process. Students use elements of the writing process (planning, drafting, revising, editing, and publishing) to compose text. Students are expected to: (A)  plan a first draft by selecting a genre appropriate for conveying the intended meaning to an audience and generating ideas through a range of strategies (e.g., brainstorming, graphic organizers, logs, journals); (B)  develop drafts by categorizing ideas and organizing them into paragraphs; (C)  revise drafts for coherence, organization, use of simple and compound sentences, and audience; (D)  edit drafts for grammar, mechanics, and spelling using a teacher-developed rubric; and (E)  revise final draft in response to feedback from peers and teacher and publish written work for a specific audience.

TEKS: §113.6. Social Studies, Grade 4.

(b) (6)  Geography. The student uses geographic tools to collect, analyze, and interpret data. The student is expected to: (A)  apply geographic tools, including grid systems, legends, symbols, scales, and compass roses, to construct and interpret maps; and(B)  translate geographic data into a variety of formats such as raw data to graphs and maps.

1. Give each student a map of Texas, with the various regions outlined. Have the students draw plants that grow in each region.

TEKS: §113.6. Social Studies, Grade 4.

(b) (6)  Geography. The student uses geographic tools to collect, analyze, and interpret data. The student is expected to: (A)  apply geographic tools, including grid systems, legends, symbols, scales, and compass roses, to construct and interpret maps; and(B)  translate geographic data into a variety of formats such as raw data to graphs and maps.

1. Study other parts of the world with similar climates and compare the plants that grow there with the plants that grow here.

TEKS: §113.6. Social Studies, Grade 4.

(b) (7)  Geography. The student understands the concept of regions. The student is expected to: (A)  describe a variety of regions in Texas and the Western Hemisphere such as political, population, and economic regions that result from patterns of human activity;(B)  describe a variety of regions in Texas and the Western Hemisphere such as landform, climate, and vegetation regions that result from physical characteristics; and (C)  compare the regions of Texas with regions of the United States and other parts of the world.

1. Research and discuss the ways Native American groups used the plants that grew in your area before European exploration.

TEKS: §110.15. English Language Arts and Reading, Grade 4.

(b) (10)  Reading/Comprehension of Informational Text/Culture and History. Students analyze, make inferences and draw conclusions about the author's purpose in cultural, historical, and contemporary contexts and provide evidence from the text to support their understanding. Students are expected to explain the difference between a stated and an implied purpose for an expository text.

(b) (15)  Writing/Writing Process. Students use elements of the writing process (planning, drafting, revising, editing, and publishing) to compose text. Students are expected to: (A)  plan a first draft by selecting a genre appropriate for conveying the intended meaning to an audience and generating ideas through a range of strategies (e.g., brainstorming, graphic organizers, logs, journals); (B)  develop drafts by categorizing ideas and organizing them into paragraphs; (C)  revise drafts for coherence, organization, use of simple and compound sentences, and audience; (D)  edit drafts for grammar, mechanics, and spelling using a teacher-developed rubric; and (E)  revise final draft in response to feedback from peers and teacher and publish written work for a specific audience.

(b) (23)  Research/Research Plan. Students ask open-ended research questions and develop a plan for answering them. Students are expected to: (A)  generate research topics from personal interests or by brainstorming with others, narrow to one topic, and formulate open-ended questions about the major research topic; and (B)  generate a research plan for gathering relevant information (e.g., surveys, interviews, encyclopedias) about the major research question.

(b) (24)  Research/Gathering Sources. Students determine, locate, and explore the full range of relevant sources addressing a research question and systematically record the information they gather. Students are expected to: (A)  follow the research plan to collect information from multiple sources of information both oral and written, including: (i)  student-initiated surveys, on-site inspections, and interviews; (ii)  data from experts, reference texts, and online searches; and (iii)  visual sources of information (e.g., maps, timelines, graphs) where appropriate; (B)  use skimming and scanning techniques to identify data by looking at text features (e.g., bold print, italics); (C)  take simple notes and sort evidence into provided categories or an organizer; (D)  identify the author, title, publisher, and publication year of sources; and (E)  differentiate between paraphrasing and plagiarism and identify the importance of citing valid and reliable sources.

(b) (25)  Research/Synthesizing Information. Students clarify research questions and evaluate and synthesize collected information. Students are expected to improve the focus of research as a result of consulting expert sources (e.g., reference librarians and local experts on the topic).

(b) (26)  Research/Organizing and Presenting Ideas. Students organize and present their ideas and information according to the purpose of the research and their audience. Students are expected to draw conclusions through a brief written explanation and create a works-cited page from notes, including the author, title, publisher, and publication year for each source used.

TEKS: §113.6. Social Studies, Grade 4.

(b)(1) History. (A)  identify Native-American groups in Texas and the Western Hemisphere before European exploration and describe the regions in which they lived; and (B)  compare the ways of life of Native-American groups in Texas and the Western Hemisphere before European exploration.

1. Discuss the movement of native plants from the regions where they originally grew to larger ranges within the state and beyond, for example, for use in landscaping. Discuss the importation of plants from other regions that are now common in Texas, for example, with food crops from other parts of the world.

TEKS: §113.6. Social Studies, Grade 4.

(b) (7)  Geography. The student understands the concept of regions. The student is expected to: (A)  describe a variety of regions in Texas and the Western Hemisphere such as political, population, and economic regions that result from patterns of human activity;(B)  describe a variety of regions in Texas and the Western Hemisphere such as landform, climate, and vegetation regions that result from physical characteristics; and (C)  compare the regions of Texas with regions of the United States and other parts of the world.

(b) (9)  Geography. The student understands how people adapt to and modify their environment. The student is expected to: (A)  describe ways people have adapted to and modified their environment in Texas, past and present; (B)  identify reasons why people have adapted to and modified their environment in Texas, past and present, such as the use of natural resources to meet basic needs; and (C)  analyze the consequences of human modification of the environment in Texas, past and present.

1. Discuss the palo verde tree, whose name means “green wood” in Spanish. The tree’s name comes from its green bark. This unusual feature is an adaptation to the palo verde’s desert habitat, and allows the tree to conserve water in dry conditions by losing all of its leaves, yet still survive by conducting photosynthesis through its bark. Make up descriptive names for other plants or objects, in English and/or in another language.