FLOWERS, FRUITS AND SEEDS COMPARISONS

Performance Standard 12A/11A.F

Students will apply the processes of scientific inquiry to compare plant reproductive structures and adaptive processes accordingly:

- *Knowledge*: Describe the basic features and functions of the reproductive structures of common plants.
- *Application*: Sketch and label applicable reproductive structures of specific fruit and seed specimen from examination.
- *Communication*: Explain and present comparisons between familiar plant reproductive, and their functions and adaptations.

Procedures

1. ***In order to know and apply concepts that explain how living things function, adapt, and change(12A) and the concepts, principles and processes of scientific inquiry (11A),*** students should experience sufficient learning opportunities to develop the following:
   - Formulate cause and effect relationship questions about plant reproductive adaptations, processes and structures.
   - Collect and organize observational data from a large variety of plant specimen.
   - Define and sketch the basic reproductive structures and products of plants (gymnosperms and angiosperms).
   - Identifying examples of historical botanical research and selective breeding processes.
   - Correlate the scientific principles and botanical concepts which can be generalized from the recorded observations.
   - Generate further research questions for study and classroom discussion.

   Note to teacher: This activity relates to knowledge associated with standard 12 A, while addressing the performance descriptors for stage F within standard 11A.

   Preparatory note: Collect samples of over-ripened fruit from local grocery stores or unusable blooms from local florists. The Association for Illinois Soil and Water Conservation Districts and the University of Illinois Extension Service have county representatives who may be able to provide assistance for student research and classroom materials.
2. Have students review and discuss the assessment task and how the rubric will be used to evaluate their work:
3. Begin the inquiry investigation about plant reproductive processes and their adaptive successes. Allow students to begin a classroom listing of COOL FLOWERS, FRUITS AND SEEDS. They will have to create the class definition for "COOL"; it could be "weird", "different", "beautiful", etc. Accept their initial definitions and proceed to list examples. Encourage ideas about the largest or smallest seeds, best or worst tasting fruits, prettiest or ugliest flowers, etc. Provide background information to explain the basic structures and functions of flower, fruit and seeds. Students should create sketches for these basic structures and associated functions on the upper left quadrant of three separate sheets of paper. Provide access to examples of flowers, fruits and seeds which can be dissected to compare to the basic sketch. Advise students of appropriate safety measures in this activity. Students should sketch and label at least four examples of flowers, fruits and seeds on the appropriate sketch pages. Discuss the relationship of basic models to specific examples so that they can realize that not all of the basic components are always present in all specimen exactly, but the functions and processes are very comparable. On the back of each sketch page, students should note the similarities and differences in their examples.
4. Begin discussions about cause and effect relationships in plant reproduction. Provide the "Flowers, Fruits and Seeds Idea" page. Allow students to consider the suggested ideas, add more ideas and choose an idea to research. Students are required to write a 3-5 page report which will focus on their understanding of the cause and effect reproductive relationships of plants. They should find pictures of examples and create appropriate data tables. They should present their research to the class. Similar choices or research should be discussed for common and unique findings.
5. Evaluate each student's work using the Science Rubric as follows and add the scores to determine the performance level:
   - *Knowledge*: The descriptions of plant reproductive features and functions were complete and correct.
   - *Application*: The labeled sketches and comparative components were complete and correct.
   - *Communication*: The reports and presentations were thorough, well-reasoned and accurate.

Examples of Student Work not available

Time Requirements

- One class period

Resources

- Copies of the "Flowers, Fruits and Seeds Ideas" task sheet
- Access to research resources
- Samples of flower, fruits and seeds for examination and dissection
- Dissection tools for plant specimen
- Sketch pages and colored pencils, markers, etc.
- Science Rubric

FLOWERS, FRUITS AND SEEDS

POSSIBLE INVESTIGATION IDEAS TO CONSIDER:

- Match adaptations of special pollinators to their special sources of pollen
- Relate human allergies to plant pollen and a daily pollen count announced in weather reports
- Adaptations of flowers and cones and their seed production
  - variations of sizes
  - variations in dispersal methods
  - variation in attractants and repellants
  - variations in survival adaptations
  - variations in ratio of number of seeds produced to survival rate
  - variations based on habitat conditions
- Special flower, fruit and seed research
  - Historical milestones
  - Multi-cultural connections to world-wide food supplies
  - Current selective breeding examples, such as
    - Explaining corn de-tasseling summer jobs
  - Future possibilities
- Ideas for secondary usefulness of flowers, fruits and seeds
  - Human or animal food supply
  - Medical applications
  - Industrial applications
- Alternative reproduction methods
  - Grafting
  - Artificial pollination