Name: Paul Turk

Grade Level: 11/12

Subject Area: Chemistry

Duration: 1 class periods (90 minutes)

**Rationale:** Students need to understand under what conditions native animals survive and/or thrive, how animal populations are inseparably connected to plant communities, and how environmental conditions affect the soil conditions in an area.

**Objectives:** Students will:

* Know how to do a simple soil analysis
* Understand what the readings mean in terms of plant survival
* Understand the interdependence of plant communities and the composition of the soil

**SDA Standards addressed:**

CHM.2.1 Develop critical and creative thinking skills (analysis, evaluation, divergent questioning, modeling)

CHM.2.2 Understand and utilize the scientific method of problem solving

CHM.2.3 Utilize the principles and methodologies of cooperative learning

CHM.3.3 Read, write, and interpret scientific documents (lab write-ups, journals, scientific publications)

CHM.3.4 Conduct research in the content area

CHM.3.5 Engage in various uses of technology

CHM.7.3 Implement chemical principles to chemistry-related issues in society

**Pre-Assessment:** Students have already learned in class about basic needs of animals in their habitat; in the initial presentation (native pollinators) students will be encouraged to share what they already know about animals in their habitats.

**Procedure:**

Introduction: Slide show on soil chemistry and soil analysis

Discussion: In groups of three, students will choose three spots in the proposed native plant garden

Research: Student groups will take spoil samples in all three areas and return to the lab to analyze them for all of the following:

* water permeability
* pH
* N/P/K
* hardness

As students obtain results, they will record them on a shared map with the rest of the class for use in determining the best location for each of the proposed plant communities.

Conclusion: Each group will record their measurements on the map; conditions will be compared to requirements for each plant community (provided by the biology class) and decisions will be made regarding the most appropriate locations for each plant community in the garden.

**Differentiation:** students will be allowed to choose the group that they work with; each group will make the same tests, but in different places. Hands-on activities allow the kinesthetic learners to thrive.

**Technology needed:** The only requirement is the soil test kits, which will have been purchased before the project begins.

**Estimated time required:**

Introduction/discussion/group selection: 15 minutes

Research/walking to garden area/collecting soil samples: 40 minutes

Returning to lab/testing of samples: 30 minutes

Recording on map: 5 minutes

**Assessment:**

Evaluation criteria will be primarily based on participation; if each group successfully takes the soil sample and analyzes it, they will receive full credit for the project; ultimately evaluation will be based on the success of the native plant garden, but that is several years down the road.

**Lesson extension:**

It seems unlikely that any group will finish their analysis and recording in the class period allotted for this activity; if several of the groups are finishing, they will be directed to the requirements for the different plant communities (provided by the biology class) to start making recommendations as to which plants are most likely to thrive in the designated area.

**Connections:** Students will be encouraged to make connections between setting up native habitat here at school and the possibility of creating microhabitats at home; they will also have opportunity to recognize the importance of maintaining habitat that already exists to prevent loss of species that are at risk, and to recognize the importance of species that may seem insignificant.

**Project rubric:**

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| --- | --- | --- | --- |
|  | **Adequate (C)** | **Good (B)** | **Excellent (A)** |
| **Soil analysis**  **(60%)** | 70-79% | 80-89% | 90-100% |
| **Completeness**  **35%**  Collection  Analysis  Recommend. | Some of the required activity completed  24-27 | Most of the required activity completed  28-31 | All required activity completed  32-35 |
| **Accuracy**  **35%** | Some inaccurate data  24-27 | Mostly accurate  28-31 | Completely accurate  32-35 |
| **Map**  **(30%)** | Present  21-23 | Most required information on map  24-26 | All required information on map  27-30 |
| **Total** |  |  |  |