

Building a Botanical Outdoor Learning Center

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Biology is an exciting field. Traditionally, learning biological concepts includes research through books, and teachers are continually trying to find ways to motivate students to explore these concepts for themselves and thereby attain a better understanding of them. The many laboratory investigations and demonstrations available motivate and interest students, resulting in greatly enhanced learning. The biology department at Permian High School is committed to meeting the needs of students of all levels. As a result of this enthusiasm and commitment, we seek change through innovative programs.

Through much discussion and careful planning, the biology teachers designed a program to supplement our teaching strategies. Little did we realize the amount of support and assistance we would receive from other departments or that this would grow into a learning center for all disciplines. The purpose of this article is threefold. We will include the ways we used the expertise of other departments at Permian High School as well as the community of Odessa. We will detail naturalistic settings representative of five ecological areas in West Texas. Finally, we will include teaching strategies used by several other disciplines at Permian High School as well as the biology department.

Design & Development

Several departments at Permian High School, along with members of the community, were instrumental in

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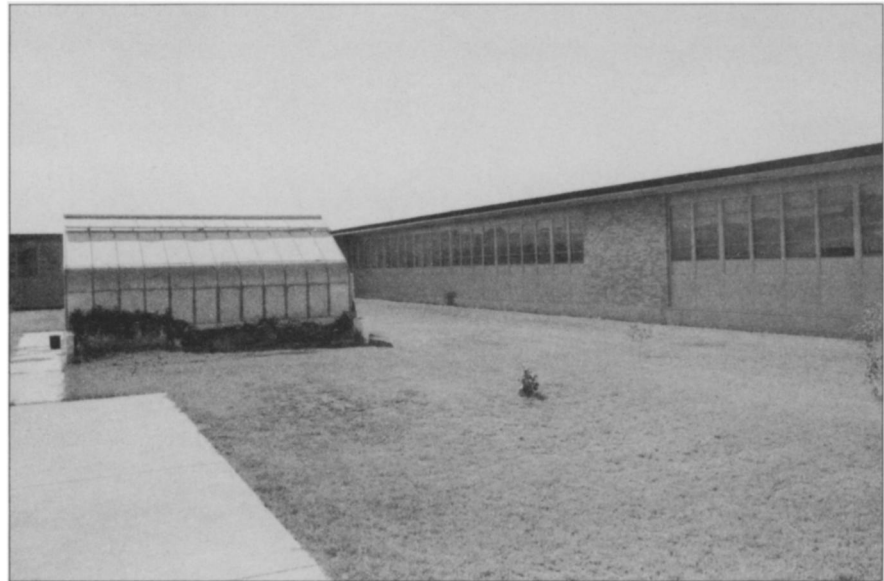


Figure 1. Inner courtyard area that was converted into the botanical garden.



Figure 2. Entry to the botanical garden.

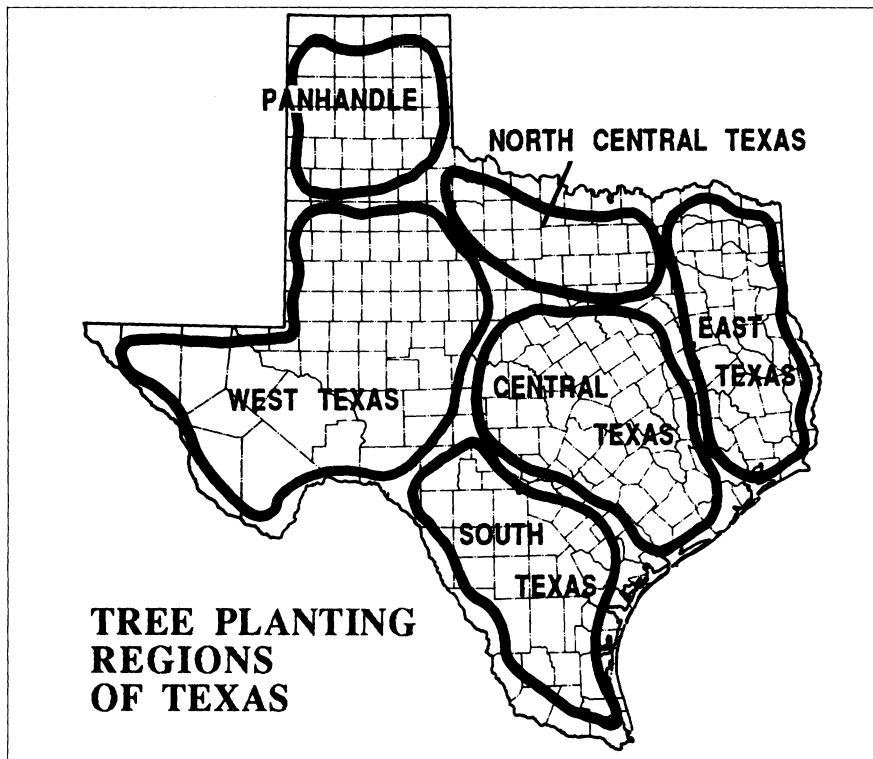


Figure 3. Five ecological areas found in West Texas are represented in the Botanical Garden. (Reproduced from Texas Forest Service Circular No. 203)

designing and developing the botanical garden. Vocational drafting students drew and reproduced plans to be included with a proposal by biology teachers to convert a large inner courtyard area into a naturalistic setting representative of five West Texas ecological areas (Figure 1). When plans were approved, the school district maintenance crews removed Bermuda grass and tilled the area so students could begin work. Community response was immense; we received money, plants and materials for the trail and ponds. Art students developed a logo which is seen on the entry sign to the Permian Botanical Garden (Figure 2). The art students also made ecological area signs to be placed along the trail. Biology students dug ponds and delivered rocks to line them with, constructed a trail of caliche lined with railroad ties, made hills and waterfalls, and installed plants. They also held fundraisers to help pay for the project. Math students measured the ponds to determine how much plastic lining would be needed. Metal shop students constructed metal supports for plant identification plates. The plant identification plates, which list both common and scientific names, were then engraved by JROTC, an armed forces officer training corp consisting of high school students. As a result of

the interest and enthusiasm of teachers and students, the scope of the botanical garden changed to include the collaborative efforts of many Permian supporters.

Ecological Design

The botanical garden is divided into naturalistic settings representative of five ecological areas in West Texas (Figure 3). Only plants native to West Texas have been included.

Chihuahuan Desert

The Chihuahuan Desert is the western- and southernmost part of the Trans-Pecos region of Texas (Figure 4). The plant communities vary considerably from Rio Grande bottomlands to forest vegetation at an elevation of 7700 ft. Most of the land surface of the Big Bend National Park lies below 4000 ft. elevation and the plants represented in this section of the botanical garden are typical of the lower elevations.

Grassland Area

Although overgrazing has greatly reduced the grassland area in West

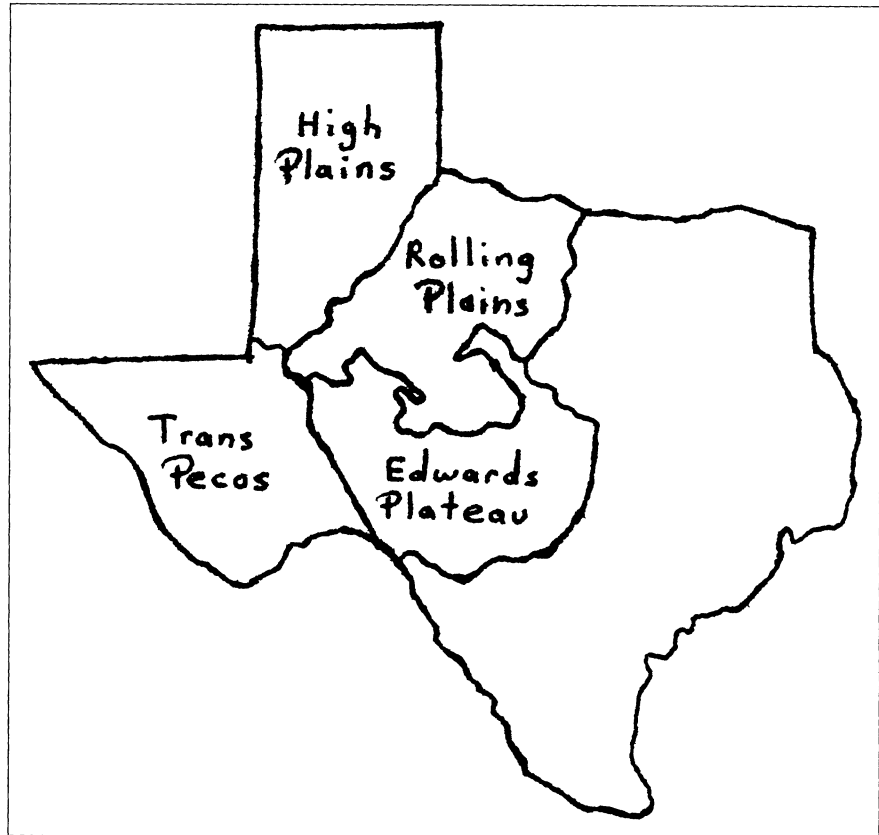


Figure 4. Four vegetational regions found in West Texas.

Texas, many ranchers have decreased their stocking rates and large grassland areas can be found. Grasses for this section of the botanical garden were chosen because of their desirability as range grasses or their value as soil stabilizers. The state grass of Texas, *Bouteloua curtipendula*, is also represented.

Odessa Area

Near Odessa four vegetational regions merge: Edwards Plateau, Rolling Plains, High Plains and Trans-Pecos (Figure 4). It is a disturbed grassland, and much of the desert scrub formation of the Chihuahuan Desert has also extended to this area. Where these vegetational regions merge, many vegetation types exist; this lends a uniqueness that is represented in the third section of the botanical garden.

Oak-Juniper Woodland Area

Oak-juniper plant types can be found on slopes and in canyons of all major mountain formations in West Texas at elevations above approximately 4000 ft. Sumacs, oaks and certain ground covers provide lovely fall colors.

Pine Forest Area

Remnant forests are found in mountainous areas of West Texas above approximately 6500 ft. elevation. This represents the highest type of plant community in West Texas and includes such plants as piñon and ponderosa pines, maples, blue flax, columbines and many others that are not typically associated with West Texas.

Educational Studies

Biology students maintain the botanical garden for the use of all disciplines. Aside from the continued development of the botanical garden, biology students are also involved in native plant propagation studies in the greenhouse (Figure 5). Although the botanical garden is used for ecological studies, it is also the site of classification studies for biology students of all levels. Students observe and keep records on tortoise and other reptile behavior, owl and hummingbird sightings, and plant/insect relationships. Monarch butterflies, known for their migratory habits, are observed in large numbers in the botanical garden each fall. In conjunction with Mildred Fly Garden Club, Permian High School garden clubs



Figure 5. Students performing native plant propagation studies in the greenhouse.

hold an Arbor Day celebration each year.

Other departments have enthusiastically included the botanical garden as an enhancement to their curriculum. Journalism students from both The Panther Yearbook and The Permian Press give the botanical garden extensive coverage to increase school and community awareness of the project. Home economic students constructed a solar oven and gave a demonstration on baking brownies in the grassland area. English classes use the botanical garden as inspiration for theme papers. The communications graphics class arranged the concept layout and pasteup for the trail guide book. The final design was produced by the Ector County Independent School District Communications Department. These teachers and others plan to continue using the botanical garden as part of their instructional programs. Other schools are invited to bring their classes on field trips and to use the botanical garden as an outdoor learning center to supplement their own curriculum.

Summary

The Permian Botanical Garden has grown from a desire to provide students with the opportunity to observe various ecological relationships in West Texas to a reality as an outdoor learning center. With continued faculty and community support, future

plans include an irrigation system, a brick or cement patio and seating in the student orientation area, a sculptured waterfall and metal bridge in the pine forest area, and a herbarium collection of botanical garden plants. We look forward to sharing the product of our efforts with our students, with students in area schools, members of the community and other interested individuals.

Acknowledgments

We gratefully thank our colleagues Nate Hearne, Paul Briones and Barbara Starnes, whose expertise and contribution to this project have been invaluable. Also, we thank the Permian High School teachers, staff and administration. Without their support and the assistance of significant others in the community, the Permian School Botanical Garden would not be a reality.

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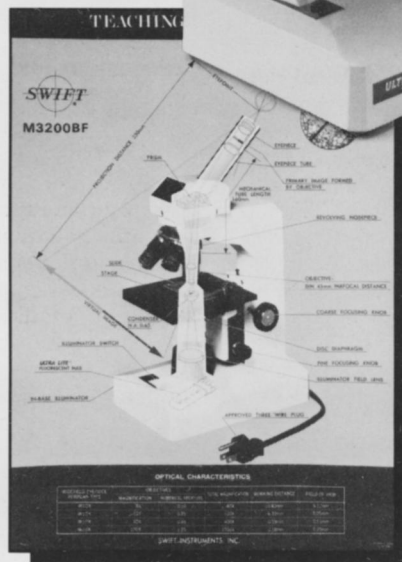
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