Ecological Restoration and The Multiple Intelligences

The multiple intelligence theory, first identified by Howard Gardner, states that people do not possess one static type of intelligence (as can be reflected in an IQ score) but rather at least eight different kinds of intelligence.

This theory implies that different people learn in different ways and that the more we can match people to congenial ways of teaching, learning and assessing, the more likely it is that those people will achieve educational success.

The eight intelligences that have been identified are:

- Verbal-Linguistic
- Logical Mathematical
- Body-Kinesthetic
- Musical-Rhythmic
- Interpersonal
- Intrapersonal
- Visual-Spatial
- Naturalist

The following page outlines how these intelligences can be well utilized in the process of a schoolyard ecological restoration project.
**Verbal-Linguistic**

related to words and language, both spoken and written

- read historical literature,
- interview residents,
- research prior land use, signage, articles for newspapers, public presentations

**Logical-Mathematical**

deductive thinking/reasoning, numbers and the recognition of abstract patterns

- develop a species list, seed mix, and project budget, survey existing species, research opportunities

**Musical-Rhythmic**

based on the recognition of tonal patterns, environmental sounds and a sensitivity to rhythm and beats

- create planting celebration, find and perform historical music and dance

**Naturalist**

ability to discern, identify and classify plants and animals, hears and sees links in nature

- create ecosystem design, determine species selection and seed mix, grow transplants, collect seed from remnants, survey existing species

**Visual-Spatial**

relies on the sense of sight and being able to visualize an object; ability to create internal mental images

- map the site, create a planting design, develop educational signs & brochures, design site experiment, conduct site analysis

**Body-Kinesthetic**

related to physical movement and knowings/wisdom of the body

- prepare the site, collect seed from remnants, lay out site design, grow transplants, controlled burn of restoration

**Interpersonal**

operates primarily through person-to-person relationships and communication

- cooperative/team work throughout entire project, create a planting celebration, neighborhood education, signage

**Intrapersonal**

relates to inner states of being, self-reflection, awareness of spiritual realities

- entire process can create sense of purpose, build a personal relationship to the land, opportunity to do something positive for the environment
Ecological Restoration Provides Learning Experiences Throughout the Curriculum

**MATH**
- Create native plant crayon rubbings
- Visualize and describe life as a prairie ant
- Observe butterfly pollination and nectar collecting behavior
- Observe Monarch chrysalis and butterfly
- Dissect and examine soil
- Compare biodiversity in a natural area and lawn
- Collect seed from a restoration or remnant for the project
- Make and use dyes from native plants
- Scavenge hunt for plant adaptations
- Hypothesize and test leaf orientation frequency in Compass Plant
- Examine single ecological niches; fit them back together
- Measure and compare air pollution at potential restoration sites
- Adopt-a-Species: Research, grow and transplant into restoration

**SOCIAL STUDIES**
- Read and listen to accounts from early settlers
- Learn first sounds and letters of native plant names through movement game
- Make and record monthly observations from a single spot
- Create a fictional journal of a Native American or early settler
- Interview area residents about local history
- Study introduction of nonnative plants to the New World
- Design a planting celebration

**SCIENCE**
- Read and listen to accounts from early settlers
- Learn first sounds and letters of native plant names through movement game
- Make and record monthly observations from a single spot
- Create a fictional journal of a Native American or early settler
- Write a poem or Haiku for a plant
- Write a dialogue between a plant and pollinator
- Take a single-sense walk in the prairie
- Write a letter to a great grandparent/child explaining your restoration efforts
- Interview area residents about local history
- Create native habitat newsletter
- Develop materials describing the planting project to the public
- Identify geometric shapes in native plants
- Determine migration route and compute migration miles for monarch chrysalis and butterfly
- Calculate total acreage of different ecosystems consumed by large cities in the state
- Grow a native plant and observe, measure and graph root, shoot and leaf growth
- Determine project price for various planting plans
- Determine height of trees and buildings on restoration sites
- Interview area residents about local history
- Study introduction of specific native plant communities consumed by cities in the state
- Design a planting celebration
- Create a fictional journal of a Native American or early settler
- Interview area residents about local history

**LANGUAGE ARTS**
- Read and listen to accounts from early settlers
- Learn first sounds and letters of native plant names through movement game
- Make and record monthly observations from a single spot
- Create a fictional journal of a Native American or early settler
- Interview area residents about local history
- Study introduction of nonnative plants to the New World
- Design and model a hypothetical "best" seed
- Develop signs describing project to the public
- Discover which instruments best mimic bird calls

**ART & MUSIC**
- Create a planting celebration
- Write observations at the spot through the year
- Introduce native plants with a variation of "Farmer in the Dell"
- Create plant crayon rubbings
- Create an identification booklet with solar graphics
- Model life cycle stages of a Monarch
- Listen to "Flight of the Bumblebee" and create your own insect symphony
- Design and model a hypothetical "best" seed
- Develop signs describing project to the public
- Discover which instruments best mimic bird calls

Kindergarten through Fifth Grade
Ecological Restoration Provides Learning Experiences Throughout the Curriculum

<table>
<thead>
<tr>
<th>MATH</th>
<th>SOCIAL STUDIES</th>
<th>SCIENCE</th>
<th>ARTS &amp; MUSIC</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Examine and calculate the grass to forb ratio in an ecosystem</em></td>
<td><em>Read and listen to accounts from early settlers</em></td>
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<td><em>Create a video or slide show to document restoration effort</em></td>
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<tr>
<td><em>Calculate the percentage of &quot;edge&quot; in a remnant</em></td>
<td><em>Create a fictional journal of a Native American or early settler</em></td>
<td><em>Create a plant purchase plan based on project budget and desired seed list</em></td>
<td><em>Develop a pictorial species key</em></td>
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<tr>
<td><em>Compare a diet based on an ecosystem to your own</em></td>
<td><em>Make and use dyes from native plants</em></td>
<td><em>Examine and calculate the grass to forb ratio in an ecosystem</em></td>
<td><em>Create an identification booklet with solar graphics</em></td>
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<td><em>Test leaf orientation frequency in Compass Plant</em></td>
<td><em>Compare diets based on a native ecosystem to your own</em></td>
<td><em>Calculate the percentage of &quot;edge&quot; in a remnant</em></td>
<td><em>Design and model a hypothetical &quot;best&quot; seed</em></td>
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<td><em>Insect Galls: survey frequency, host plant, height, and size</em></td>
<td><em>Research local settlement and land use</em></td>
<td><em>Calculate total acreage of different ecosystems consumed by large cities in the state</em></td>
<td><em>Listen to &quot;Flight of the Bumblebee&quot; and create an insect symphony</em></td>
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<td><em>Observe and record phenology sequences including color, blossoming and insect life</em></td>
<td><em>Find local town and landmark names which reflect a region’s heritage</em></td>
<td><em>Graph seed weight and total seed set</em></td>
<td><em>Create a video or slide show to document restoration effort</em></td>
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<td><em>Examine single niches; fit them together</em></td>
<td><em>Determine Monarch migration route and compute miles</em></td>
<td><em>Graph phenological sequences</em></td>
<td><em>Produce a photo essay of a plant’s life cycle</em></td>
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<td><em>Measure biodiversity in an native ecosystem and lawn</em></td>
<td><em>Interview longtime area residents about local history</em></td>
<td><em>Estimate biomass; compare to other ecosystems</em></td>
<td><em>Develop a video or slide show to document restoration effort</em></td>
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<td><em>Adopt-a-Species: Research, grow, transplant, tag and follow in restoration</em></td>
<td><em>Compare various seeding rate recommendations</em></td>
<td><em>Map proposed restoration site</em></td>
<td><em>Produce signs and pamphlets describing the restoration project to the public</em></td>
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<td><em>Experiment with site preparation methods and weed control</em></td>
<td><em>Examine and calculate the grass to forb ratio in an ecosystem</em></td>
<td><em>Compute Monarch migration miles</em></td>
<td><em>Produce a newsletter</em></td>
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<td><em>Produce a photo essay of an plant’s life cycle</em></td>
<td><em>Compare a diet based on an ecosystem to your own</em></td>
<td><em>Correlate insect gall presence with plant height and size</em></td>
<td><em>Develop a newsletter</em></td>
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</table>

Ecological Restoration Through the Curriculum

Sixth Grade through Twelfth Grade
Activities Associated with Ecological Restoration

Study the Model
• Explore the question, “What is an Ecosystem?”
• Study prairies, wetlands and woodlands
• Visit native habitat gardens

Investigate Site History
• Find the original land survey
• Locate historical maps and diaries
• Determine past vegetation types and land use
• Interview residents

Make Community Connections
• Involve businesses and neighbors
• Develop signs, brochures, videos
• Write a newsletter
• Hold community-wide events

Perform Site Analysis
• Determine current vegetation types and land use
• Note physical and biological characteristics
• Map the site

Plan the Restoration
• Create and layout a design
• Develop a project budget
• Select species
• Determine equipment needs

Prepare the Site
• Prepare the planting bed
• Identify and remove unwanted species

Plant the Site
• Decide on planting technique
• Collect seed and grow transplants
• Hold a planting celebration

Manage the Site
• Monitor plant and animal species
• Conduct burns
• Remove invasive species
• Keep records

Conduct Research
• Make observations
• Ask questions
• Design and conduct experiments
• Analyze data
• Share results

Earth Partnership for Schools Program, Dyck Arboretum of the Plains