Environmental STEM in Urban Context

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It happened here ..... [on a 3.2 acre triangular site]

It can happen anywhere...
Correct?
Optimistic take: YES, it can happen anywhere

Key ingredients: Awareness of the community about our environment
Community commitment for project support
How did it happen at Hazel Wolf?

Founding Process:
A strong vision - Unique program educationally
Environmental program as a glue for a K-8 school

Community Support:
Interim condition
Placement on the Bond for a permanent home

Keys to Success:
Teachers on the same page
Teacher training
# How did it happen?

**Founding Process:** Unique program educationally
Environmental program as a glue for a K-8 school

## Accessible for All Ages

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<thead>
<tr>
<th>Grade</th>
<th>Activity</th>
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<tr>
<td>K-2</td>
<td>Soils and geology</td>
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<td>Fallen leaf scavenger hunt</td>
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<td>Sit Spots: observing and sketching</td>
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<td>3-5</td>
<td>History of native cultures</td>
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<td>Jellyfish sculptures</td>
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<td>Earthquake/structures analysis</td>
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<td>Species population statistics</td>
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<td>6-8</td>
<td>Water testing for pollutants</td>
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<td>Soil filtration tests</td>
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<td>Sit Spots: creative writing/poetry</td>
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<td>Native plant cataloguing and web design</td>
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<td>QR code plant tags</td>
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How did it happen?

Founding Process: Unique program educationally
Environmental program as a glue for a K-8 school

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Accessible for All Subjects
How did it happen?

Community Support:
Interim condition
Placement on the Bond for a permanent home
How did it happen?

Keys to Success:
- Teachers on the same page
- Teacher training - connect outdoor indoor teaching
How did it happen?

Keys to Success:

- Teachers on the same page
- Teacher training – connect outdoor indoor teaching
A Mission Driven School

Design Goals:

Provide as many varied multi-sensory individual experiences on the site as possible

Maximize the use of the site for outdoor learning
A Mission Driven School

Design Goals: Maximize the use of the site for outdoor learning

Design Mindset:
Purpose driven custom design
Every unusual solution should be explored
A Mission Driven School

Design Goals: Provide as many varied multi-sensory individual experiences on the site “as possible”
Key Educational Philosophy

“We teach everything through an environmental lens”

“We explain curriculum through understanding of the earth systems”

Research foundation

Empirical evidence
Key Educational Philosophy

Social, emotional, and physical benefits of exposure to nature

Outdoor education is the ultimate teachable moment.
Key Educational Philosophy

Research foundation: Benefits of outdoor learning

Evidence:

- Less crime in housing with trees
- Hospitals patients recover faster in contact with nature
- Prisons with trees are less violent
- Introduction of environmental program in a school in Texas led to less disciplinary reports in the following year
Key Educational Philosophy

social, emotional, physical benefits

nature & child development

- enhances ability to recover from stress, illness & injury.
- improves confidence in children.
- improves attention spans & concentration.
- increased cooperation skills
- reduces behavior problems.
- improved self-esteem & relationships with peers.
Key Educational Philosophy

Selection of Supporting Research


Nature can help us achieve **skill integration** and **social-emotional development**.

Nature can lead to **real-world experience & application** and **better grades**.

Nature increases **engagement & enthusiasm** for learning.
Hazel Wolf planning approach

Design Goals: Maximize the use of the site for outdoor learning

1 - Botanical Garden
2 - Living Wall
3 - Learning Terraces
4 - Nature Cycle Courtyard
5 - Butterfly Garden
Hazel Wolf planning approach

Botanical garden
Informal outdoor learning area
Community park in the off hours
Hazel Wolf planning approach

Botanical garden = informal outdoor learning area = community park in the off hours
Hazel Wolf planning approach

Site as a lab
Rain garden as a teaching station

Outdoor Indoor Program Connection
Hazel Wolf planning approach

Environmental learning outdoors relates to science experiments

Outdoor Indoor Program Connection
Hazel Wolf planning approach

Maximize informal learning spaces
Hazel Wolf planning approach

Variety of teaching stations
Variety of curriculum offering

Create a spirit of the place that stimulates students to pursue their inquiries
Hazel Wolf planning approach

Maximize informal learning spaces

Create a spirit of the place that stimulates students to pursue their inquiries
Hazel Wolf planning approach

Social Emotional Learning

Academic benefits of movement
Hazel Wolf planning approach

Outdoor education is the **ultimate teachable moment.**

Social, emotional, and physical benefits of **exposure to nature**
Design Goals
Create school’s own ecosystem

World Examples

Primary School for Sciences & Biodiversity
Boulogne-Billancourt, France
World Examples

Design Goals:
Building envelope as an ecosystem and a teachable moment

Primary School for Sciences & Biodiversity
Boulogne-Billancourt, France
Design Goals

Outdoor education is the ultimate teachable moment

Teaching phenology

World Examples

Primary School for Sciences & Biodiversity
Boulogne-Billancourt, France
Design Goals:
Green school design featuring rainwater harvesting for roof-top gardens.

World Examples

Sidewell Friends Middle School
Washington DC, United States
Design Goals:

Key features include water treatment through onsite wetland and rainwater harvesting for roof-top gardens.

Sidewell Friends Middle School
Washington DC, United States
Design Goals:
Create school's own food growing education

World Examples
Farming Kindergarten
Bien Hoa, Dong Nai, Vietnam
World Examples

Design Goals:
Create school's own food growing education

Farming Kindergarten
Bien Hoa, Dong Nai, Vietnam
World Examples

Design Goals:
Maximize the usage of small site by incorporating sustainable features, such as rooftop playgrounds and storm water retention.

Ogden International School of Chicago
Chicago, United States
World Examples

Ogden International School of Chicago
Chicago, United States
Design Goals:
Provide a significant increase in density within a tight urban site
Design Goals:
Create school's own food growing education

World Examples

First High-Rise High School
New South Wales, Australia
Design Goals:
Create high-rise social infrastructure with wellbeing and playfulness arising out of the integration of the physical and the environmental.

World Examples
First High-Rise High School
New South Wales, Australia
Design Goals:
Create a cooler environmentally friendly building

School of Arts,
Singapore, Singapore
Design Goals:
Create urban oasis to provide outdoor learning in the dense urban living environment
World Examples

Design Goals:
Create a “sustainable learning landscape” to promote optimal learning by establishing a deep connection with the surrounding landscape and local community.

Hong Kong Island School Competition
Hong Kong, China
World Examples

Design Goals:
Create an environment in which students can learn valuable lessons in sustainable living.

Green School,
Stockholm, Sweden
World Examples

Design Goals:
Create an environment in which students can learn valuable lessons in sustainable living.

Green School,
Stockholm, Sweden
A catalyst for an experientially more inspiring learning environments

Space that creates opportunity to spark innovation
Get students to ask questions and pursue those questions

Creativity        Collaboration        Communication        Critical Thinking

STEM standards: New engineering standards
3 Dimensions:

Disciplinary Core Ideas

Science and Engineering Practices

Crosscutting Concepts

**Disciplinary Core Ideas**

PHYSICAL SCIENCES
- PS1: Matter and Its Interactions
- PS2: Motion and Stability: Forces and Interactions
- PS3: Energy
- PS4: Waves and Their Applications in Technologies for Information Transfer

LIFE SCIENCES
- LS1: From Molecules to Organisms: Structures and Processes
- LS2: Ecosystems: Interactions, Energy, and Dynamics
- LS3: Heredity: Inheritance and Variation of Traits
- LS4: Biological Evolution: Unity and Diversity

EARTH AND SPACE SCIENCES
- ESS1: Earth’s Place in the Universe
- ESS2: Earth’s Systems
- ESS3: Earth and Human Activity

ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF SCIENCE
- ETS1: Engineering Design
- ETS2: Links Among Engineering, Technology, Science, and Society

**Science and Engineering Practices**

1. Asking Questions (for science) and Defining Problems (for engineering)
2. Developing and Using Models
3. Planning and Carrying Out Investigations
4. Analyzing and Interpreting Data
5. Using Mathematics and Computational Thinking
6. Constructing Explanations (for sci) and Designing Solutions (for eng)
7. Engaging in Argument from Evidence
8. Obtaining, Evaluating, and Communicating Information

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**Crosscutting Concepts**

1. Patterns
2. Cause and Effect: Mechanisms and Explanation
3. Scale, Proportion, and Quantity
4. Systems and System Models
6. Structure and Function
7. Stability and Change
“what students do”

“what students know”

“how students think”
So others can do it........we can do it....

What are we waiting for?