Transforming Students to Stewards: Fostering Great Lakes Literacy in Schools
SUSTAINING
MICHIGAN’S WATER HERITAGE

Emily Finnell
Michigan Office of the Great Lakes
Michigan Water Strategy

• Roadmap for future water use, enjoyment and conservation of water resources.

• Developed through a statewide listening tour.

• Ecosystem Approach:
  • Encompasses all Michigan’s water resources and their use.
  • Broad and integrated systems perspective.
  • Emphasis on restoring hydrologic connectivity.
  • Integrates ecological, social, economic and cultural values.
Gaps in knowledge

• In many counties across the state, over 60% of the residents didn’t realize they lived in a watershed.

• Knowledge of local water systems provides a relevant and place-based context for learning.

• Integrating freshwater systems into place-based educational experiences is critical to building literacy and stewardship for water.
Building Solutions

- As the Great Lakes state, Michigan must have a unified set of water literacy principles as part of its k-12 curriculum.

- A water-based curriculum linked to STEM/STEAM concepts and the life sciences should be a basic requirement throughout the science curriculum, beginning in kindergarten.

- Grow a water ethic through improved water literacy, volunteerism and civic engagement.

- Build volunteer opportunities and partnerships.
Developing a Pilot Program

• The OGL and partners are developing a funding opportunity to support a pilot program to integrate Great Lakes literacy principles and a freshwater focus into 2020-2021 school improvement plans.
  • Gauge interest in the funding opportunity.
  • Gather feedback to best target this funding opportunity to school needs.

• Help educators understand how water literacy would help schools achieve their school improvement goals.

• Schools, intermediate school districts, regional partners and universities will be eligible to participate.
Top 10 in 10 Focus Areas

Learner-Centered Supports
- Deeper Learning
- Personalized Learning
- Differentiated Supports
- Aligned Curriculum
- Feedback

SYSTEMIC INFRASTRUCTURE

Effective Education Workforce
- Development of New Educators & Leaders
- Support for Practicing Educators & Leaders
- Equity Across the System

Strategic Partnerships
- Parent, Family, & Community Services
- District Partnerships
- Post-Secondary/Higher Education Access
- Workforce Preparation
Flexible Learning Options

- Seat-time waivers
- On-line Learning
- Dual Enrollment
- Testing Out
- Personal Curriculum

Legislated

Encouraged

- Place-Based Education
- Competency Based Learning
- Integration
- Credit for Out of School Learning
- School Calendar Flexibility
Local Control

Districts determine how and where proficiency is measured

Student credit is based on proficiency with the content

Districts determine how graduation requirements are met and issue diploma
Career & College Ready

Michigan

Technology & Tools: Use technology and tools strategically in learning and communicating.

Argument & Reasoning: Use argument and reasoning to do research, construct arguments, and critique the reasoning of others.

Communicate & Collaborate: Communicate and collaborate effectively with a variety of audiences.

Solve Problems: Solve problems, construct explanations and design solutions.
Shared Leadership to Support STEM Education

MiSTEM Network

Executive Director of MiSTEM Network
Executive Assistant
MiSTEM Advisory Council
MiSTEM Region Directors

Governing

Legislators
Department of Technology, Management and Budget
Michigan Department of Education
Michigan Economic Development Corporation
Office of the Governor

Collaborating

Businesses
Parents/Families
Foundations
Not-for-Profits
Mental Health Organizations
Faith-based Organizations

*All potential partners may not be represented
MiSTEM Strategy and Regions

STEM WORKFORCE

Michigan is a world leader in innovation, talent, and technology

Create a STEM culture
Empower STEM teachers
Integrate business and education
Ensure high-quality STEM experiences

Foundation and Infrastructure

[Map of Michigan with numbered regions]
Learning Happens Across Settings

**Everyday Settings & Family Activities**
(e.g., Bell et al., 2006; Callanan & Oakes, 1992; Crowley & Galco, 2001; Goodwin, 2007)

**Classroom Instruction**
(e.g., Barton, et al., 2003; Bell, 2004; Davis, 2003; Linn, 2006; Newton et al., 1999; Reiser et al., 2008)

**Designed Informal Settings**
(e.g., Allen & Gutwill, 2004; Callanan & Jipson, 2001; Rennie & McLafferty, 2002)

**Out-of-School Programs**
(e.g., Halpern, 2002; Noam, et al., 2003; Gibson & Chase, 2002)
Using Water to Power Learning
Building on the Story

• In 1993, Cedarville’s science teacher engaged students in a project to monitor water quality in response to a change in the local sewage treatment facility.

• This analysis has been conducted the same way since 1993, leading to 25 years of data!
Math Connections

• School Improvement Goal: *Improve numeracy and mathematical literacy for all students*

• Throughout the project, students are engaging in math authentically through the application of mathematical practices.

• From understanding concentration scales to statistical analysis of data, students are using math in the problem solving process.
Science Connections

- School Improvement Goal: Improve the ability to use science to increase knowledge and solve problems

- Students are engaged in the use of Science and Engineering Practices in multiple disciplinary core areas (life science, physical science, earth science)

- The context of water quality/environmental issues grounds learning in a place-based learning space where problem solving is the driving force behind student learning
Technology Connections

- **Michigan Integrated Technology Competencies for Students**

- Personalized Learning and Deeper Learning. Students are exploring a phenomenon within their community by using multiple technologies to:
  - Research the issue and develop a plan
  - Collect and analyze data
  - Formulate understanding and possible solutions
  - Communicate and interpret results
Literacy Connections

• School Improvement Goal: All Students will be able to effectively communicate through writing

• Making Connections to the Common Core
  • Student Practice in Obtaining, Evaluating, and Communicating Information
  • Conducting research and writing a technical paper which incorporates math, science, and social issues is powerful.
Through the Years….

The project has grown to include:

- New technology
- New partnerships
- Stronger curriculum connections
- Emergence of additional projects and opportunities….
Narrow Leaf Cattails
In Cedarville Bay
In Cedarville Bay and the surrounding bays the native cattail is the Broad Leaf Cattail.

Lately there has been an invasive species called the Narrow Leaf Cattail which choke out and kill the natives.

Our mission is to help photograph these cattails for Loyola University.
Bulrush vs Cattail Areas
Bulrush vs Cattail Areas (Left)
Phantom 2 w/ GoPro Hero 3
Links to Learning

Literacy and STEM Integration:

- Students met with invasive weed task force member who communicated the problem and proposed a project concept
- Students created a project charter and scope statement
- The STEM class applied for a community foundation grant to purchase the drone and necessary equipment
- Students conducted research and communicated with the drone company to learn how to use the technology

After conducting the project students:
- Created a report and PowerPoint presentation
- Demonstrated their drone to the task force
- Presented their PowerPoint and communicated their learning to the task force
Student Engagement

• Student voice and choice
• Authentic project with a public product
• Challenging problem linked to an interesting phenomena
• Sustained inquiry driven project with continual student/teacher feedback and revision
• Meaningful contribution: This work prompted natural resource agencies to approach the use of drones in their work and they are now used to monitor natural resources in the region.
Student Perceptions of PBL

"In other classes we look in books and read about the problems or how things happen.

Now we actually deal with working through the problem and fixing it."
Supporting Success

Place-Based Stewardship Education at Washington Middle School
Calumet, Michigan
Washington Middle School: Scientific Investigations

- Multiple Grade Levels
- Long-term Studies & Data Sets (est. 2007)
- Integration of STEM Standards through Community and Classroom Investigations
- Connection to Great Lakes Literacy Principals

- Beach and Water Quality
- Invasive Inventory within Control and Treatment Plots
- Forest Health Survey
Washington Middle School: Stewardship Projects

- Stewardship Projects Build off Identified Needs
- Student voice and choice
- Problem Solving, Critical thinking and other 21st Century Skills

Adopt-A-Beach Clean Up
Forest Management Plan
Signage & Brochure Development
Invasive Species Removal & Planting of Native Species
Washington Middle School: Community Day

- Culminating Event
- Students Educate Community Members
- Assessment Opportunity
Why do all of this?

Student Academic benefits that have been attributed to PBE include:

- Improved academic scores and deeper learning
- Improved critical thinking skills & empowering of students in regard to their own learning
- Increased engagement in school and motivation for achievement
- Increased workplace skills such as leadership, persistence, taking responsibility, teamwork, developing plans to reach a solution, managing time, motivating others, and dealing with unexpected challenges
- Increased awareness of career options
Why do all of this?

School, District and Teacher Benefits

• Opportunity to pursue their interests and advance their values.
• Increased levels of teacher engagement and satisfaction
• Stronger connections with community-based partner organizations
• Access to grants, funders, and recognition
How does this happen?

- The Washington Middle School-Community Team is part of Lake Superior Stewardship Initiative
- LSSI Serves 17 Schools in the 5 Counties of the Western Upper Peninsula
- LSSI is one of 9 hubs Great Lake Stewardship Initiative

“LSSI’s support was the spark igniting our school’s place-based endeavors, and has continued to fan that spark over time.”

—Darrell Hendrickson, teacher
What support elements make Washington MS Successful?

- Sustained Professional Development
- Regional Professional Learning Community
- Foster Community Partnerships
- Mini-Grant funding and other supports
- Teacher Leadership Opportunities

Resources, Expertise, Career Awareness & More!

- Common Planning Time
- Administrator and Parents Value Work
- Teams of teachers
- Cross-curricular projects
- School Professional Learning Community

LSSI Support

Community Support

District Support
Panelist Questions

- How do you envision incorporating a water focus into your classroom activities?
- What would incentivize you/your district to take advantage of an opportunity for freshwater learning?
- What resources, training, or tools would support incorporation of Great Lakes literacy principles into the classroom?
- What would be valuable for us to include in a Request for Proposals?