



@SJ_Program
#SustainableStateNJ

Innovations in Sustainability Education



2016 NEW JERSEY SUSTAINABLE SUMMIT



PRESENTERS

- Heather McCall
- John Henry
- Lauren Madden





Sustainability in Schools



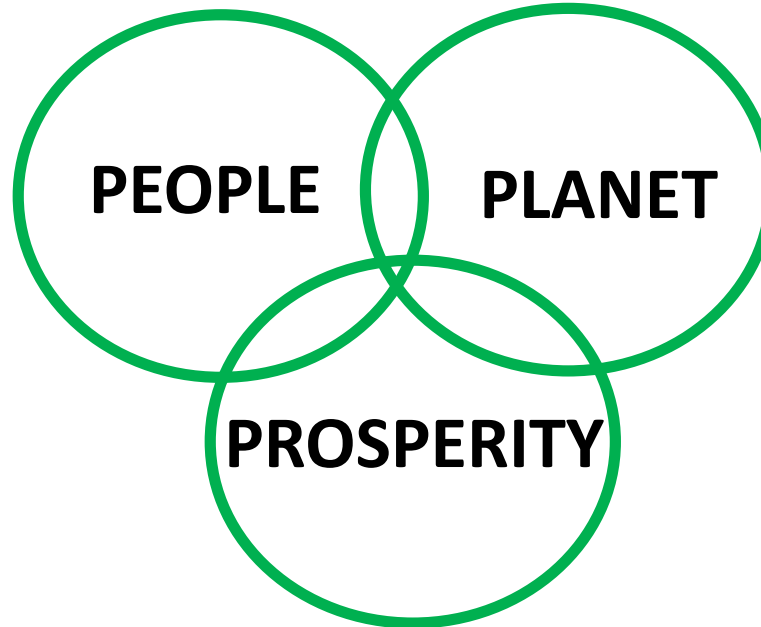
- Move towards a sustainable future
 - Increase recognition and understanding of current and future challenges
 - Arm students with knowledge and insights to make wise choices
 - Connect STEM education with real-life
 - Expose students to future career paths
- Positive impact on school community
 - Cost savings
 - Healthier learning environments
 - Student and staff performance



Certification Action Categories

PEOPLE

- Diversity & Equity
- Food & Nutrition
- Healthy School Environments
- Safe Routes to School
- Student & Community Outreach
- Student & Staff Wellness



Components of Sustainability

PLANET

- Climate Mitigation & Renewable Energy
- Green Cleaning
- Green Design
- Green Purchasing
- School Grounds
- Waste Management & Recycling

PROSPERITY

- Student Learning
- Energy Efficiency
- Innovation Projects
- Leadership & Planning
- Learning Environment



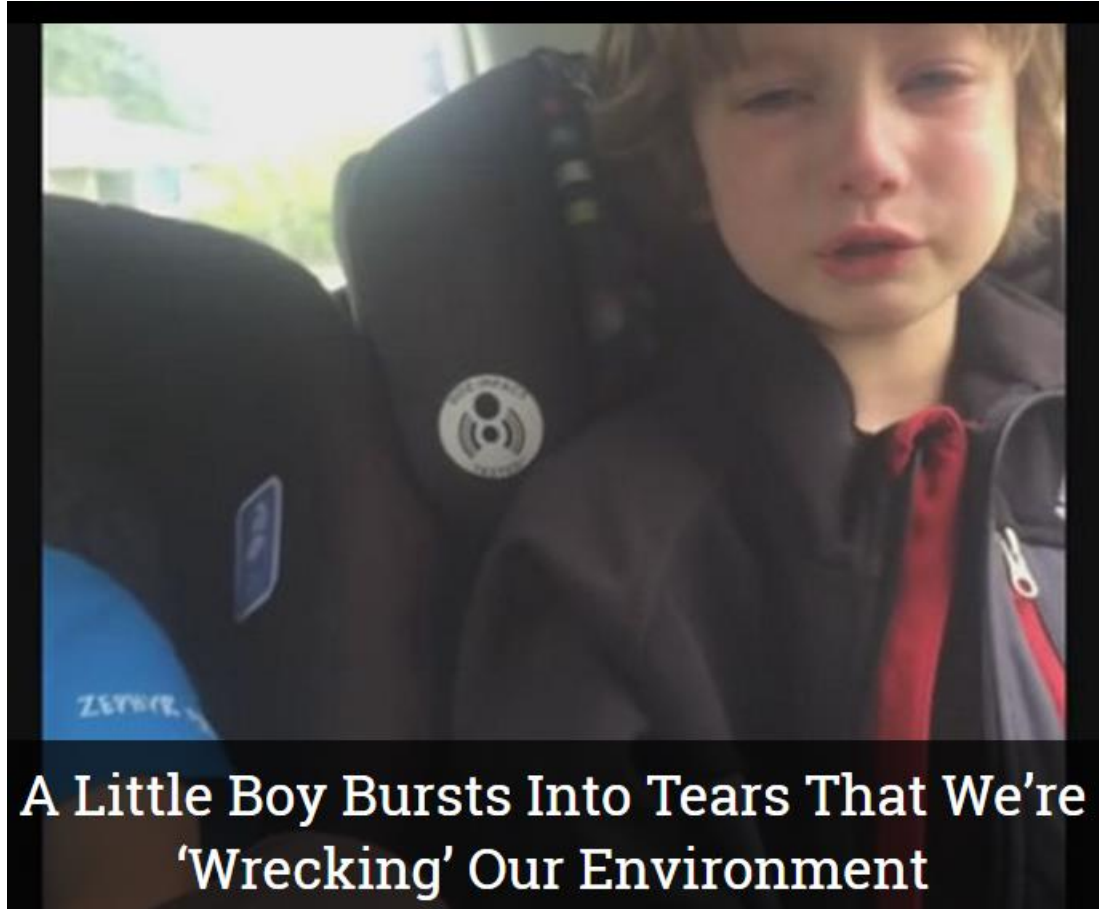
Student Learning Actions

STUDENT LEARNING		
(only one action in this category will be counted toward priority requirements)		
Education for Sustainability Pre K-3 ★		10-50
Education for Sustainability Grades 4-12 Science ★		10
Education for Sustainability Grades 4-12 Math ★		10
Education for Sustainability Grades 4-12 ELA ★		10
Education for Sustainability Grades 4-12 Social Studies ★		10
Education for Sustainability Grades 4-12 Creativity/Arts ★		10
Education for Sustainability Grades 4-12 Health ★		10
Education for Sustainability Grades 4-12 Information Technology ★		10

View the Student Learning actions in more detail: <http://www.sustainablejerseyschools.com/actions-certification/actions/>



How We Teach Matters



<https://www.youtube.com/watch?v=lbjabTS5kac>



Sustainability Topics

- Ecological Systems
- Climate Change
- Waste
- Energy
- Health & Wellness
- Food Systems
- The Built Environment
- Water
- Economic Systems
- Social & Cultural Systems
- We are All Responsible

View the detailed EFS Questionnaire within the “What to Submit” section of an EFS action:

<http://www.sustainablejerseyschools.com/actions-certification/actions/#open/action/92>



Enduring Understandings

- A Healthy & Sustainable Future is Possible
- We are all in this together
- Healthy Systems have limits
- Diversity makes our lives possible
- Reconcile Individual Rights w/ Collective Responsibilities

View the detailed EFS Questionnaire within the “What to Submit” section of an EFS action:

<http://www.sustainablejerseyschools.com/actions-certification/actions/#open/action/92>



Enduring Understandings

- Create Change at the Source, not the Symptom
- Think Far in the Future (1,000 years)
- We are all Responsible
- It All Begins with a Change in Thinking
- Live by the Natural Laws
- Read the Feedback

View the detailed EFS Questionnaire within the “What to Submit” section of an EFS action:
<http://www.sustainablejerseyschools.com/actions-certification/actions/#open/action/92>



Instructional Approaches

Inquiry based

- Students ask questions, plan and carry out investigations, analyze and interpret data, construct explanations and engage in argument based on evidence.

Experiential

- Students learn through doing – participating in projects, events, challenges, experiments and other learning activities.

Place-based student learning

- Students participate in investigations and learning activities in school grounds, neighborhoods or natural areas that engage them with real-life scenarios that are tangible, observable and meaningful to them.

Interdisciplinary

- 2 or more teachers covering different academic disciplines design and/or present related lessons that integrate subject matter from 2 or more academic disciplines (e.g. social studies and science).



Sustainability: Not Just for Science Class

- Arts
- Social Studies
- Health/Physical Education
- English Language Arts
- Math
- Technology



Math

Reeds Road Elementary, Galloway NJ

6th Grade Inquiry Based Lesson

The lesson, “The Real Cost of a Water Bottle” was taught to three sixth grade classes on March 21st. Students couldn’t believe the images they saw relating to the water bottles they drink on a daily basis. The Press of Atlantic City also featured an article on the front page relating to the pollution and the ocean on March 21st. They did some research in groups of two and three students. They read four articles and wrote two to three facts for each. As a class we discussed how many water bottles they drink a day, week, and year. Totals were tallied and discussed. The students came up with possible solutions to the water bottle problem. Students decided to try to use more reusable water bottles and to make a point of recycling regular water bottles. Making the students more aware of the pollution water bottles are having on our environment will hopefully allow them to make better choices and recycle!



Math

“Read the Feedback”

We need to pay attention to the results of our behavior on the systems upon which we depend. If we keep our eyes on the feedback, we can adjust our thinking & behavior before we cross detrimental thresholds.

- Write the definitions of each word below.
 Price to put a sign on goods that shows the cost
 Cost the amount of money you must pay in order to buy something
- Research the following three sites and write two facts from each website.

“Bottles, Bottles Everywhere” www.green.yahoo.com/blog/climate411/91/bottles-bottles-everywhere.html

FACTS: In the water bottle company ^{sales} grow 10% each year. The total recycling rate for all bottle is 38%.

“Bottled Water Cartoon” www.treehugger.com/files/2008/02/bottled-water-cartoon.php

FACTS: Americans still buy upward of 28 million bottles of water a year. 80% of the used bottle wind up in landfills, not in recycling.

“Bottled Water” www.container-recycling.org/plasfact/bottledwater.htm

FACTS: Burn 17 million barrels lead to the ^{annual emission} of an estimate ^{of 2.5 (mill)} tons of carbon dioxide. Instead of using disposable bottles, use a reusable.

- Estimate how many bottles of water Americans buy in one year. 1.5 billion
- How many barrels of oil do they use to manufacture plastic water bottles in one year? 17 million
- How does the price of bottled water compare to the price of gasoline? \$3.21
- How does the price of bottled water compare to the price of tap water? \$4.21
- How many water bottles does your family use in a week? 25 a year? 1,000



Math

“We are all responsible”

Everything we do and everything we don't do make a difference.

“A Healthy & Sustainable Future is Possible”

We can learn how to live well within the means of nature. This viewpoint inspires and motivates people to act.



Exit Ticket

1. How do water bottles harm the environment?

They are part of the cause for Global Warming, oil is a cause of fossil fuels.

2. What is the “real” cost of using water bottles versus just the price?

The real cost is barrels of oil which is expensive, shipping which is hundreds and the price is dollars and cents.

3. What are some solutions that you can think of to solve the water bottle problem?

Some solutions are stop buying bottles, make a poster saying no bottle in the house, drink tap.



Arts/Technology: Wind Sculpture

Montclair
Cooperative School,
Montclair, NJ

Wind Powered
Kinetic Sculptures





Arts/Technology





Arts: Mural Project

Washington Elementary,
Trenton NJ

Mural Residency

Students explored
their identities, the
school community,
local community and
environment

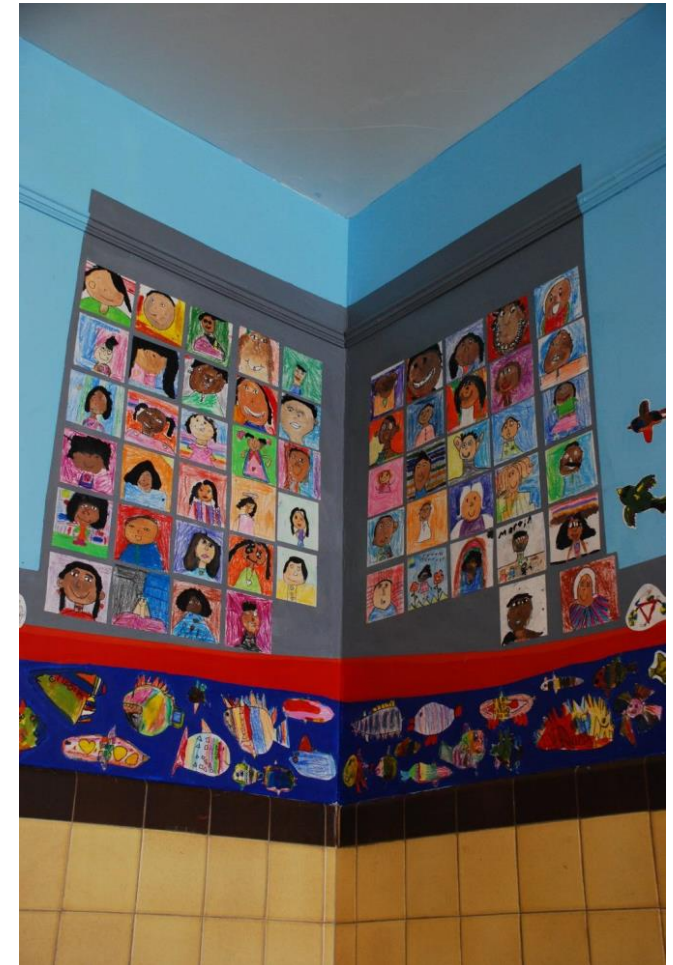


AIE Artist in Education Residency Program (20-Day):

www.njaie.org



Arts: Mural Project

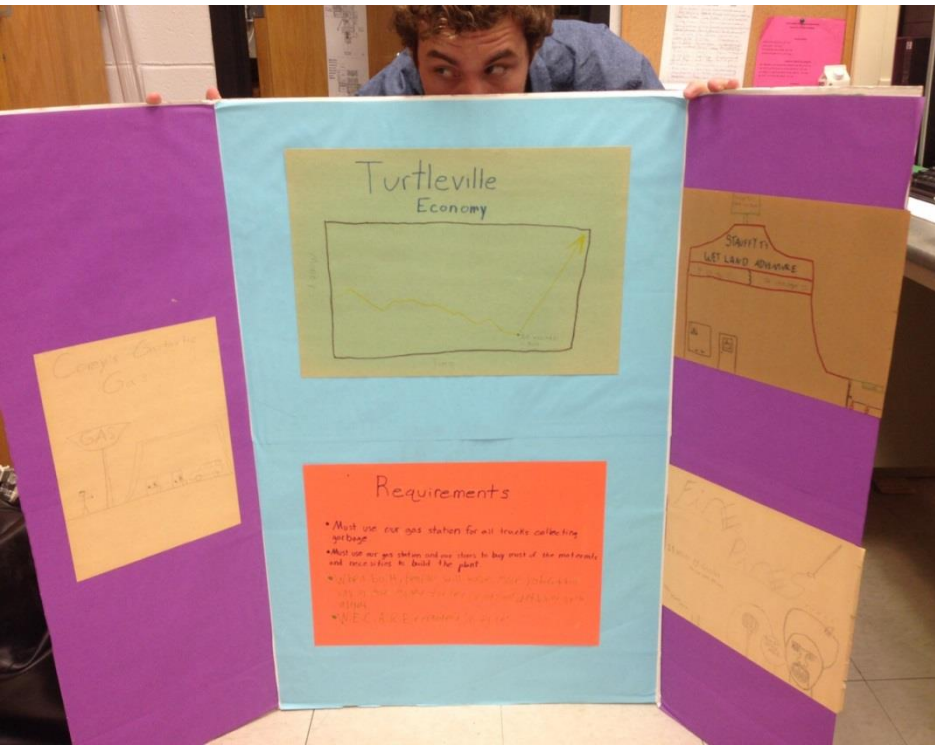




Social Studies/ELA

Egg Harbor High School, Egg Harbor, NJ

“Turtlesville” Waste Management Facility Debate



As part of our unit on water quality and preservation and solid waste unit, we have the students imagine that they live in a fictional town called "Turtlesville". In the town of Turtlesville, they take on the persona of an interested group and are told that a Waste to Energy facility would like to be built in their town. The students decide whether they would want the waste to energy facility be built in their town based on the persona that they took on and they prepare materials to be involved in an debate held within class.

“Reconcile Individual Rights with Collective Responsibilities”



- Hospital-25 squares
- Elementary School-15 squares
- Playground for elementary 10 squares)
- High School-20 squares
- High School Fields-30 squares (needs to be adjacent to the high school)
- Parks and recreational areas around town 100 squares
- City Hall-16 squares
- Fire station-8 squares
- Police station-12 squares
- Powerplant-25 squares
- Sewage Treatment Plant-25 squares
- Landfill/recycling center-100 squares
- Gas station-3 squares
- Wawa-4 squares
- Grocery Store-12 squares
- Restaurant-4 squares
- Residential homes 2-6 squares each (you need at least 50 homes)
- Hardware store-9 squares
- Mall/shopping areas- 80 squares
- Farm-200 squares
- Office building-16 squares





Social Studies/ELA

Egg Harbor High School, Egg Harbor, NJ

“Cap in Trade/Carbon Market Simulation”

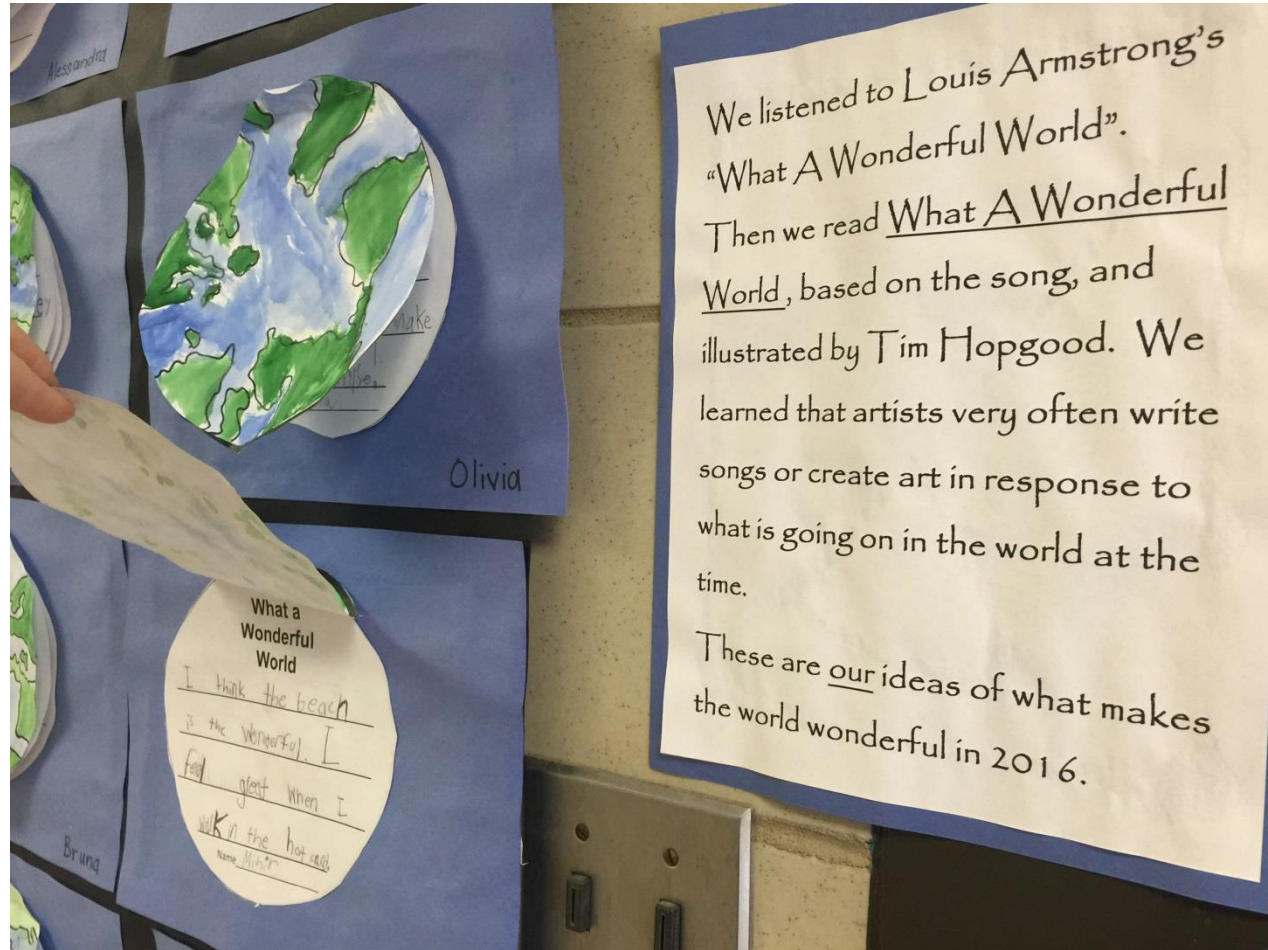
Question Set 1

- 1. Would installing a HTSS at your plant be cost effective? (Meaning would it cost more than the average of 50 million or less or the same)
- 2. Would your plant reduce its carbon emissions by 25%?

An important concept of social studies is to understand how economic systems work. To incorporate this into our lesson on sustainability, we had our students form groups that represented different factories. These factories were put on a cap and trade system. The students had to work within the system financially to understand what situation would work best for them.

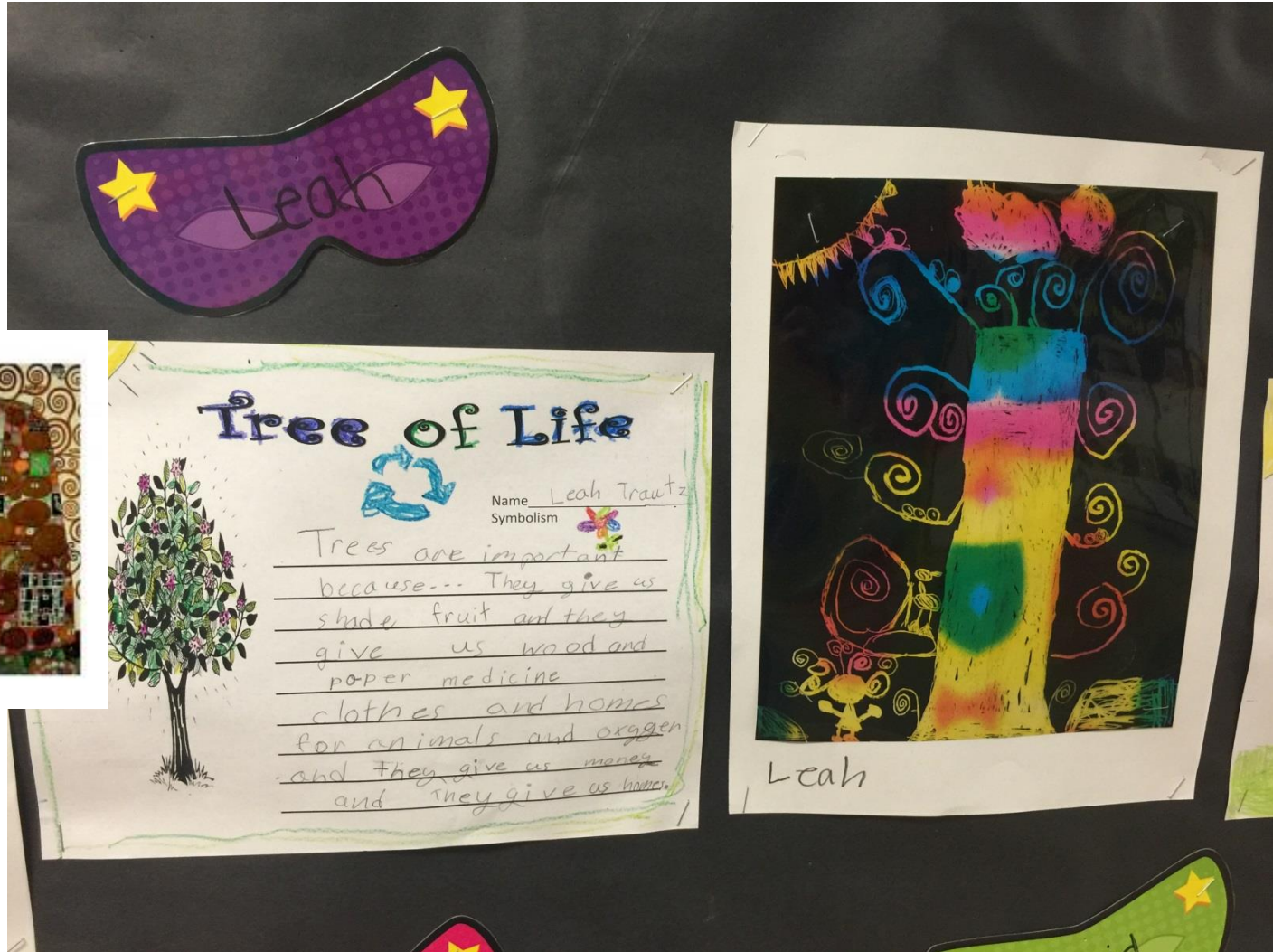
“Healthy Systems Have Limits” Constraints Drive Creativity.

Millbridge
Elementary,
Delran, NJ
“What a
Wonderful
World”



Music/ELA

Millbridge
Elementary,
Delran, NJ
"Tree of Life"





Health & Physical Education

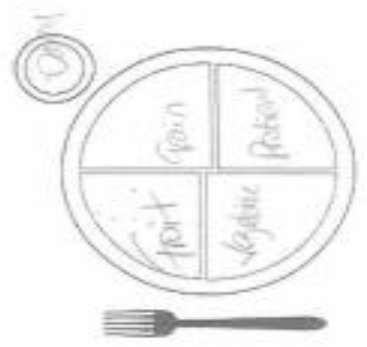
Reeds Road Elementary
Galloway, NJ

Food Source & My Plate

Healthy Eating

Healthy Foods/Sustainable Eating

Name Kristina Carrera Class Stephens Date March 8, 2016

<p style="text-align: center;">Nutrition/Sustainable (Describe & Give Examples)</p> <p>Nutrition ① Eating the the energy</p> <p>Sustainable ② Eating Foods that don't hurt the environment</p> <p>③ Buying from local farms</p>	<p style="text-align: center;">A "Well Traveled Table" (Give examples from the produce and grocery aisles. Ex: Banana - Mexico)</p> <p>Watermelon - Mexico</p> <p>Pineapple - California</p> <p>Cherries - Illinois</p> <p>Pop-tarts - Mass.</p>	<p style="text-align: center;">MYPLATE (Place Food group in the correct location on the plate)</p> 
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Find More Examples

165 Registered Districts 429 Registered Schools 60 Schools Certified

Map view List view

TAUNTON FORGE ELEMENTARY SCHOOL
BURLINGTON COUNTY

Certification Level **Bronze**
Certified On: September 23, 2015
Total Points: 150
Certification Report: [View Report](#)
Applicant: [View Profile](#)

FILTER THIS MAP

BY TYPE

- District
- School
- All

BY STATUS

- Registered
- Bronze Certified
- Silver Certified
- Any Certified
- Any

BY CERTIFIED ACTION

SEE INSTRUCTIONS BELOW

- Food & Nutrition
- Green Cleaning
- Green Design
- Green Purchasing**
 - Green Purchasing Policy
 - Recycled Paper Purchase
 - Energy Efficient Appliances or Equipment
- Healthy School Environments
- Innovation Projects
- Learning Environment

SEARCH FEATURES

Participating Districts and Schools: To see the municipalities participating in the program, their



NJSBA's Commitment to Sustainability

NJGPOS

John Henry
STEAM and Sustainable Schools Specialist
NJ School Boards Association

jhenry@njsba.org

609-330-9218



New Jersey School Boards Association

Sustainability: NJSBA's Goal

Advance student achievement by...

- ... Enabling New Jersey schools to provide safe and healthy learning environments*
- ... Enabling New Jersey school districts to lower operating costs and direct resources to the classroom*



New Jersey School Boards Association

Sustainability: NJSBA's Goal

NJSBA attains its goal through...

- *Training, professional development, research and information-sharing*
- *Sustainable Jersey for Schools*
- *Sustainability services: policy, district goal-setting, strategic planning*



New Jersey School Boards Association

NJSBA's Sustainability Projects and Training

- **The New Jersey Sustainable Schools Project**
- **NJSBA Board Member Academy**
- **Sustainable and Healthy Schools Center at Workshop**
- **Alliance for Competitive Energy Services – ACES and ACES plus**



New Jersey School Boards Association

Partners in Sustainability

Education, Service, Training



**USGBC-NJ 'Kids Speed LEED'
at the Beach**

**Sustainability Symposium
for High School Students**



New Jersey School Boards Association

Partners in Sustainability

Education, Service, Training

- USGBC 'Green Fellow'



Bristol-Myers Squibb

- Sustainability Intern

THE CENTER
FOR GREEN SCHOOLS



- Environmental Education:
The Next Generation



Alliance for New Jersey Environmental Education



New Jersey School Boards Association

Partners in Sustainability



Selection Committee:

USDOE Green Ribbon Schools Award



New Jersey School Boards Association

NJ Green Program of Study



New Jersey School Boards Association

In 2009 the New Jersey Council of County Vocational-Technical Schools (NJCCVTS), the statutory entity representing the state's 21 county vocational-technical school districts, responded to an opportunity from the National Research Center for Career and Technical Education (NRCCTE) to develop a Green Program of Study.



New Jersey School Boards Association

- NJ, one of five states was awarded the grant.
- For 3 years NJCCVTS led a collaborative team of public, private, and government stakeholders to work together to develop the statewide new green program of study
- (NJGPOS) education and training program prepares teachers and students for the green collar careers of today and tomorrow.
- NJSBA managed the NJGPOS for the past 2 years, wrote the final report and strategic plan for the DoE



New Jersey School Boards Association

Pilot Program

- 7 Schools
- 5 years
- 3 pathways

<http://www.njgreenprogramofstudy.org/>



Bergen County Tech: Construction

Camden County Tech: Design

Cape May County Tech: Construction

Hunterdon Polytech: Energy & Const.

Passaic County Tech: Construction

Willingboro Schools: Construction

Middlesex County Tech: Construction



New Jersey School Boards Association

NJGPOS Collaboration

NJ Council of County Vocational-Technical Schools

NJ Department of Education

NJ School Boards Association

Higher Education

USGBC NJ

AIA-NJ

Corporations

Pilot School Districts



New Jersey School Boards Association

NJ GREEN PROGRAM OF STUDY

For Sustainable Design, Construction & Energy



New Jersey Green Program of Study Takes Root At Hunterdon County Polytech Career Academy

This year more than 40 students from Hunterdon County Polytech's Career Academy participated in Green Program of Study classes that are helping them understand the importance and impact of energy efficiency and sustainable construction practices.

Jessica Cangelosi, supervisor of curriculum and instruction for the school, said the Energy Technologies and Building Science courses' project based and "minds-on" learning practices, both engage and empower students. She said one of the students, Antoni Chrobot, was so motivated by his experience that he decided to apply the sustainability and "real world" theories he learned in the classroom in Peru, where he worked on one of the world's highest wind turbines. You can learn more about Chrobot's international

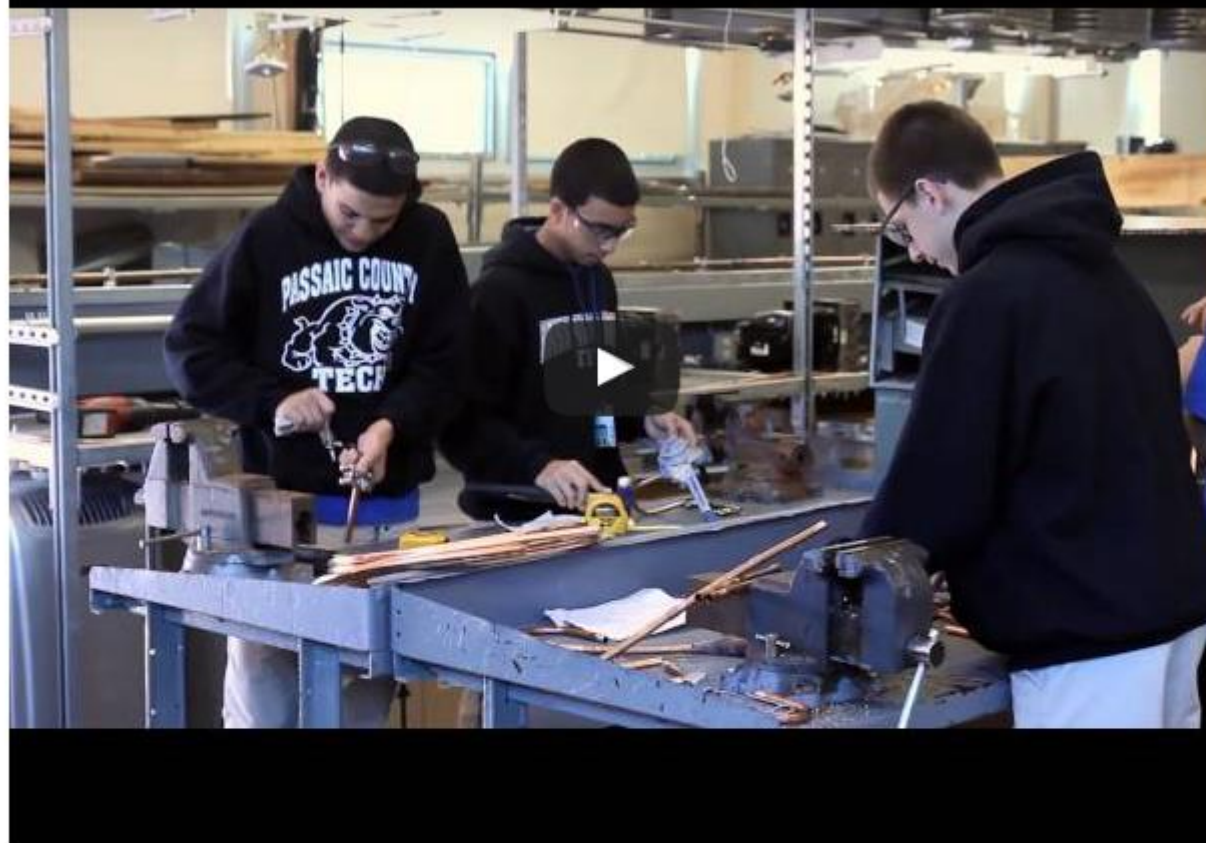
STAY CONNECTED



COLLABORATION TOOLS



RECENT NEWS



STAY CONNECTED



COLLABORATION TOOLS



RECENT NEWS

[NJGPOS Summer Institute 2015](#)

[2014 Summer Institute Next Week: July 1-2](#)

[NJ Green Program of Study \(POS\) Team Pushes Toward Curriculum Completion](#)

[Green POS Partners Identify Curriculum Content and Next Steps for Construction Pathway](#)

[Atlantic City Press highlights how Cape May Technical High School incorporated "green" engineering concepts into its programs.](#)

The New Jersey Green [Programs of Study](#): Sustainable Design, Green Construction and Sustainable Energy are innovative partnerships between education, government and business aimed at expanding educational options that prepare students for a broad range of high-demand careers in New Jersey's emerging "green economy."

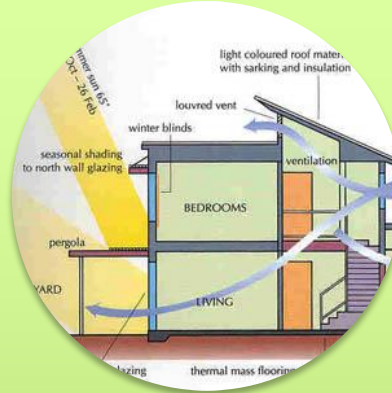
[Learn more.](#)

The New Jersey Green [Program of Study](#) for Sustainable Design, Construction and Energy is an innovative partnership between education, government and business aimed at expanding educational options that prepare students for a broad range of high-demand careers in New Jersey's emerging "green economy." [Learn more.](#)

NJ Green POS Pathways and Goals



Sustainable
Power and
Energy

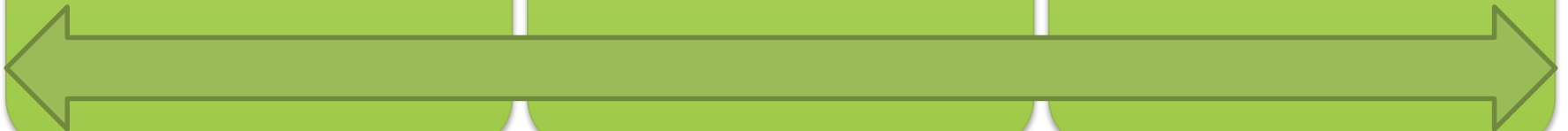


Sustainable
Design



Sustainable
Construction

Uniform Education in Sustainability
Increased Rigor of



Curricula Map

9th Grade:

- Science and Sustainability: Building Connections
- Intro to Pathways: PBL

10th Grade:

- Pathway specific courses

11th Grade:

- Pathway specific courses with options for articulation

12th Grade:

- Pathway specific course or modules
- Articulated Credit

9th Grade

Science and Sustainability

```
graph LR; A[Science and Sustainability] --- B[Energy]; A --- C[Construction]; A --- D[Design];
```

Energy

Construction

Design

Power and Energy

10th Grade:
Photovoltaic
Design

11th Grade:
Alternative
Energy

12th Grade:
Capstone
Project

Articulation
Option with
Community
Colleges (UTI
111 course)

Students can sit
for CEWD
Energy Industry
Fundamental
Exam

Introduction to Sustainability
3 Credit RSC

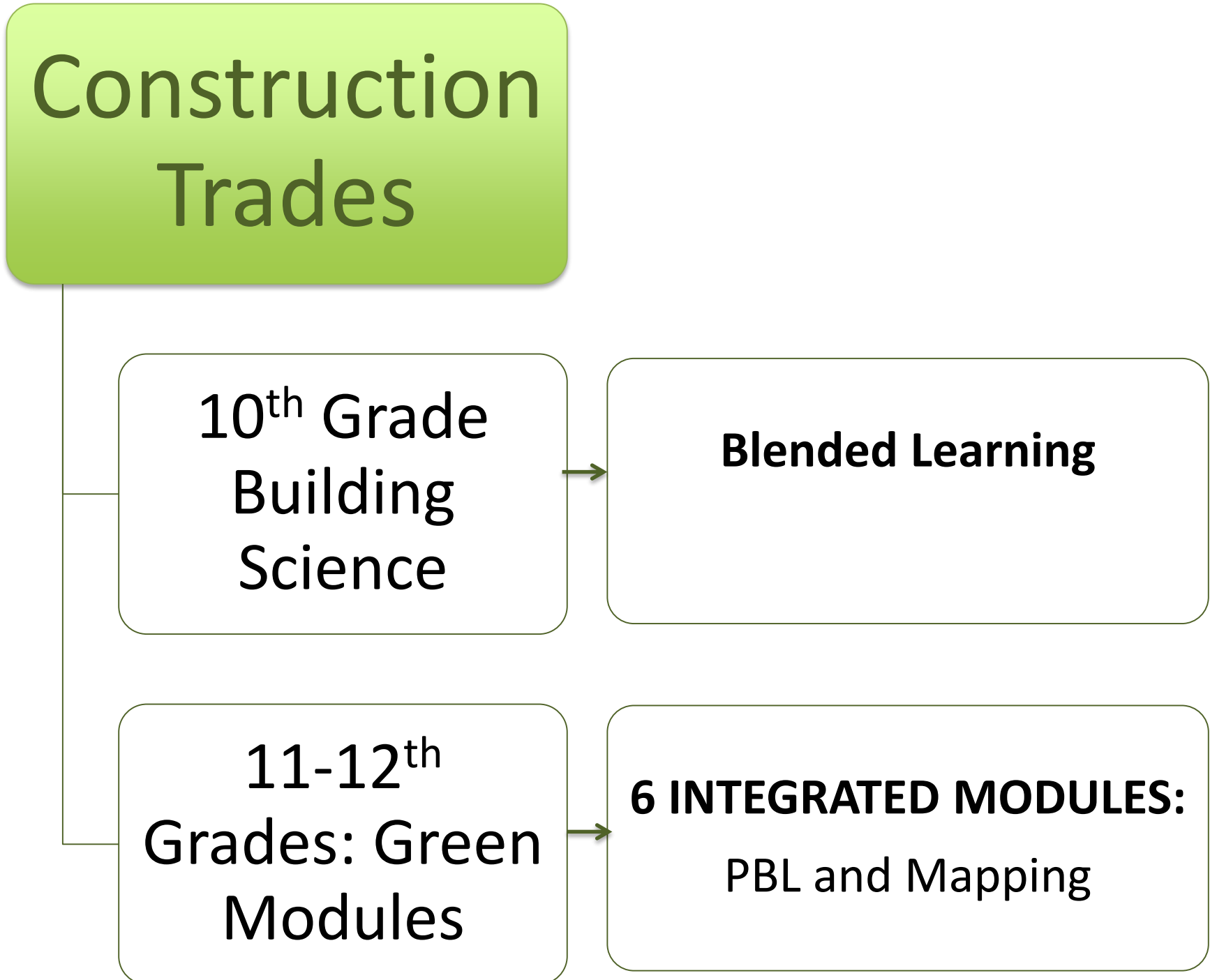
Construction Trades

10th Grade
Building
Science

Blended Learning

11-12th
Grades: Green
Modules

6 INTEGRATED MODULES:
PBL and Mapping



Design

10th Grade Fundamentals
of Sustainable Design

11th Grade: Advanced
CAD Applications for
Architecture and Design

12th Grade Capstone
Project
(life cycle assessment)

Articulation option
through NJIT

Example Project: Cape May Solar Thermal Hot Water Heater Project Video



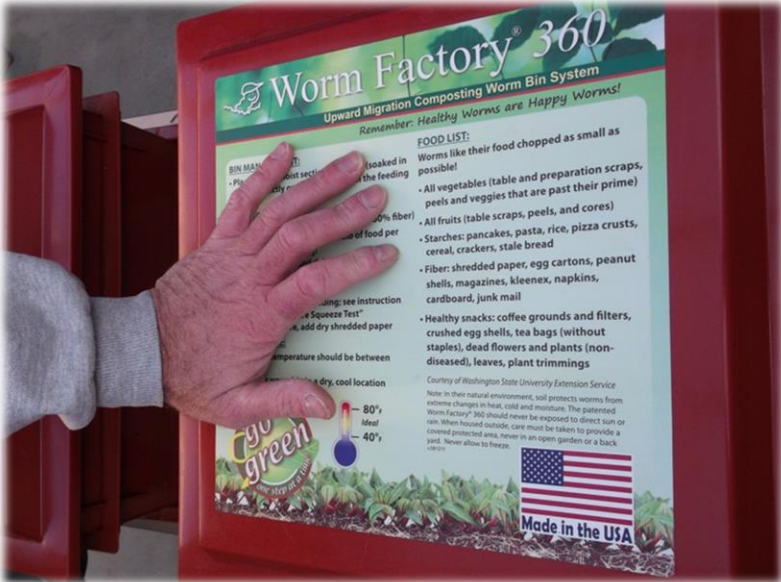
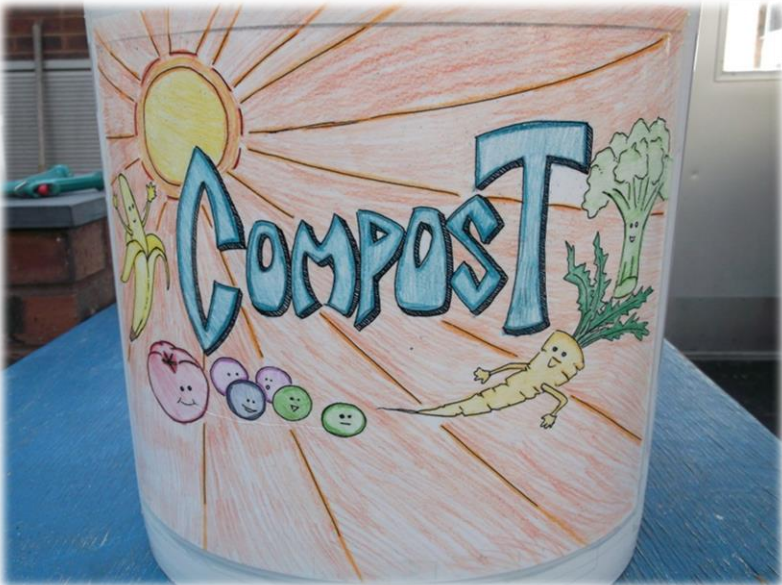
Cape May Tech: Integrated Learning



Cape May Tech: Integrated Applications



Cape May Tech: Integrated Products





Program prepares students for alternative energy systems

By RICHARD DEGENER
Staff Writer

CAPE MAY COURT HOUSE — Cape May Technical High School teacher Joseph Schmidt calls it the "ultimate solar-powered tailgater," but you probably haven't seen one yet in the parking lot before a football game.

It starts with a solar panel on a cart, which feeds into batteries and electrical inverters before powering a Coleman stove and a small refrigerator. Elijah Gandy, 17, a senior from Corbin City, created it.

"It works. It does what it's told to do," Gandy said on Friday.

Whether it catches on or not doesn't really matter as long as Gandy learned some things. The goal at Cape May Tech is to teach green engineering, because that's where future jobs may be. Students could end up in the solar panel or wind turbine fields, working with geothermal systems, or installing energy-efficient heating, ventilation and air conditioning equipment, or HVAC, in homes.

The school is one of six pilot projects in the state doing this,



Molly Cunningham, 17, of Wildwood, works on a solar oven made from recycled materials for her environmental literacy class.

said Todd Menadier, director of field implementation for the New Jersey Green Program of Study.

Menadier works for the state Department of Education but is assisting the pilot schools as they create curriculums for the program.

□ See Green, C5

In The Schools

We want to hear about what's going on in your school. Email intheschools@pressofac.com

Cape technical high school teaches green engineering

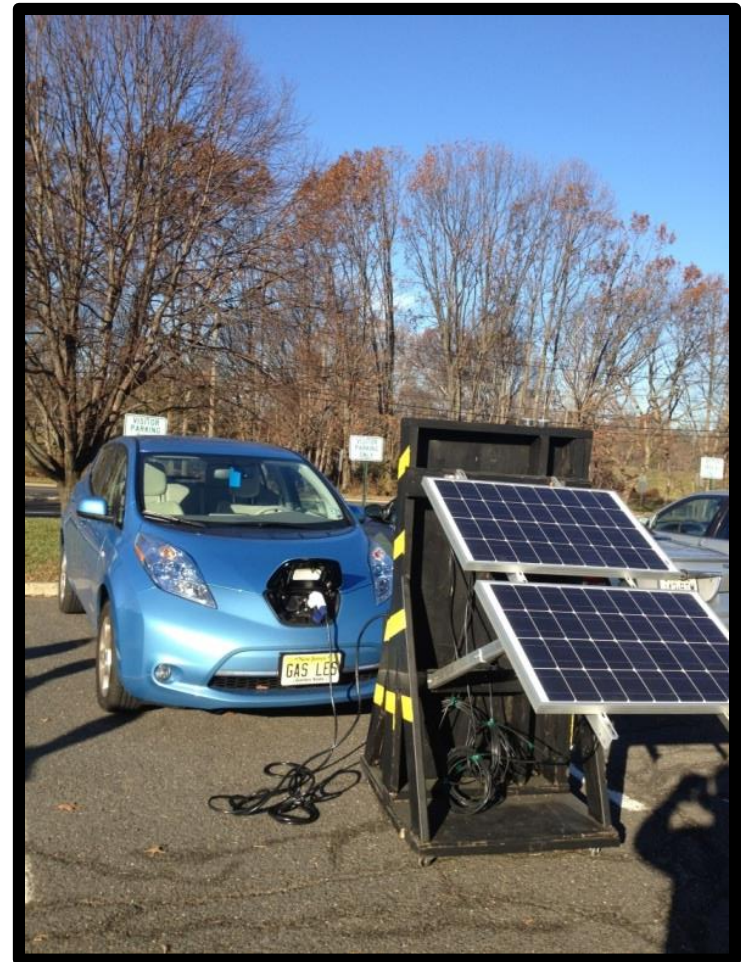


Cape May Technical School students Donny Long, 18, of Wildwood Crest, left, and Elijah Gandy, 17, of Corbin City, work on a solar powered tailgating device for their environmental engineering class. The unit charges a battery that can power a small refrigerator and electric grill.

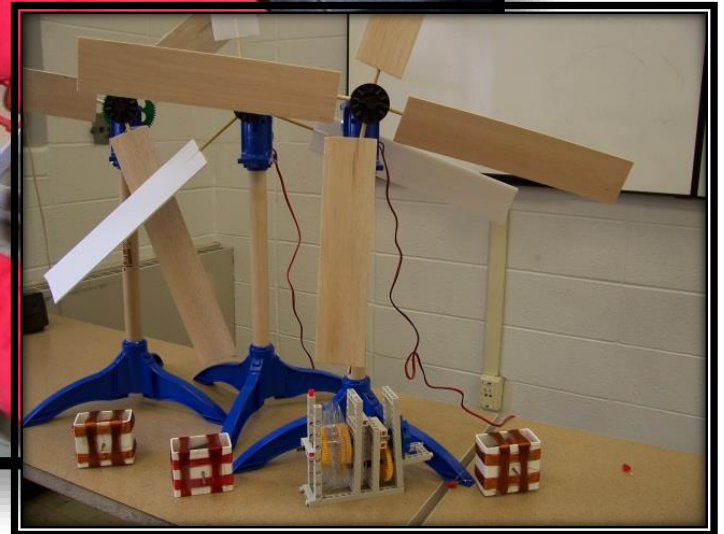
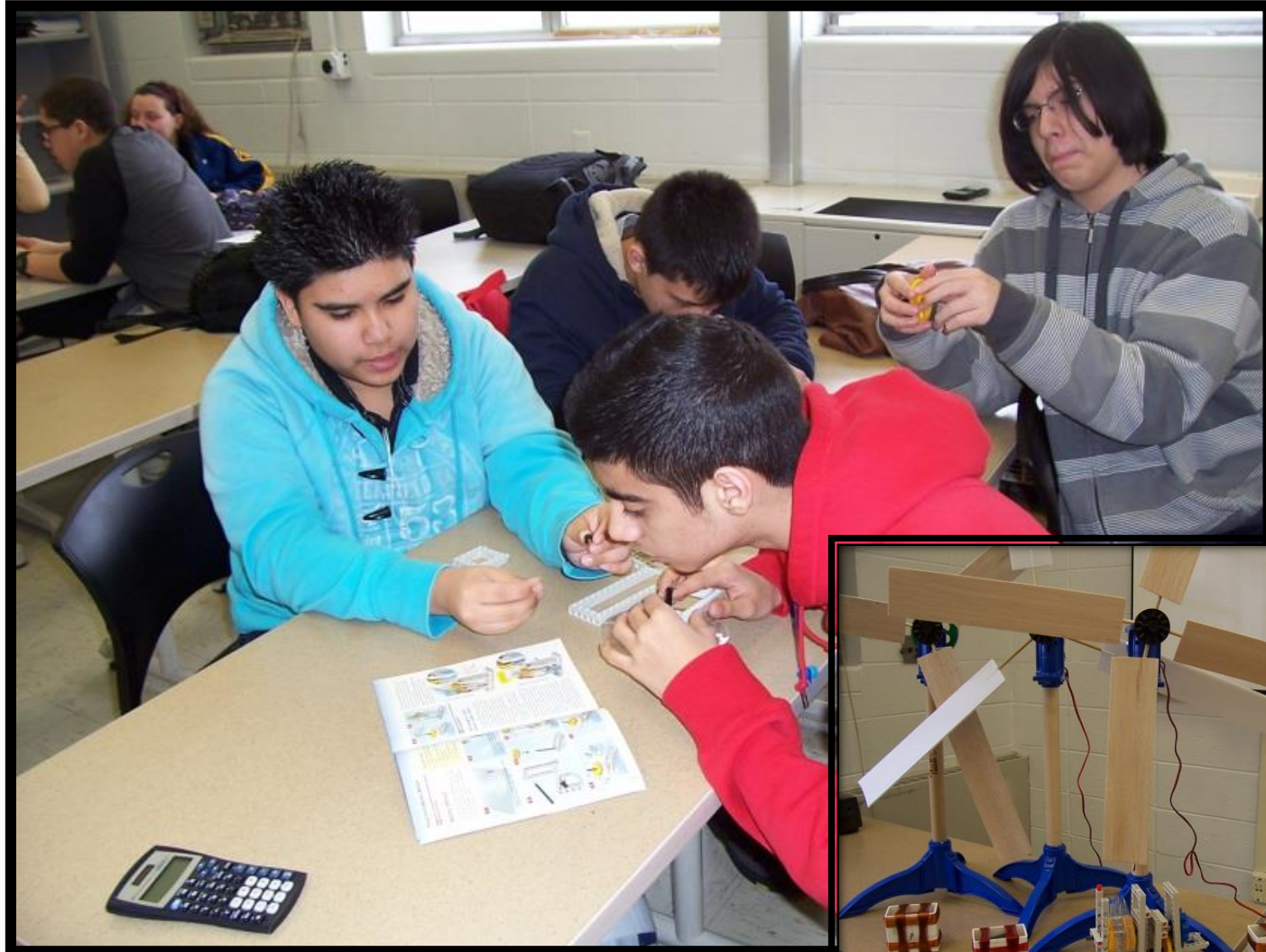


Bergen County Technical Schools Inspired Collaboration

- Meaningful Collaboration Between CTE and Academic Teachers
- Provides Natural Connection to STEM
- Relevant and Authentic Projects for Science Class



Inspired Collaboration



Bergen Tech: Flexible Projects

- Well-Developed Projects Provide a Strong Foundation
- Adaptable to the Needs of the Existing Program
- Provide for High Level Connections



Bergen Tech: Implementation Challenges



- Scheduling and Coordination
- Not a Prescribed Program



Hunterdon Polytech: Advances in Learning

- “Minds-On” Learning



Hunterdon Polytech: On Going Support

- On-Site PD and Mentor Support



Hunterdon Polytech: Challenge in Change



Benefit: Model Articulation



Richard Stockton College



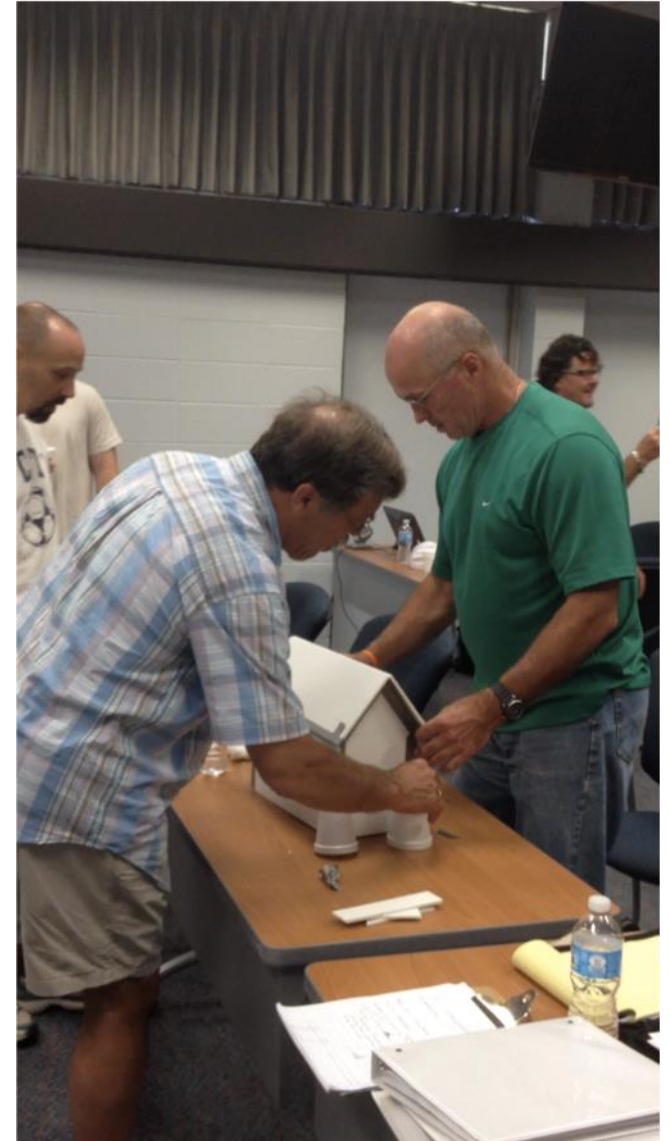
NJIT



Community Colleges

Continuing Professional Development

- **Covering New Content**
- **On-Site Technical Assistance**
- **State and District Professional Learning Communities**



Benefits

- **Growing Green Job Market 2-5%**
- Creating a Culture of Sustainability
- **Capital investment in clean technology grew 800% '05-'10 (career opportunities)**
- Critical Skills can not be outsourced
- **Career and Workplace Readiness skills**
- Motivates and Engages
- **Strong Career Pathway**
- Higher Ed STEM Pathways



The Future of the NJGPOS

- **Further Enhancement and Curriculum additions**

<http://www.njgreenprogramofstudy.org/curriculum/>

- **Greater Proliferation to CTE schools and comprehensive HS**



New Jersey School Boards Association

Environmental Sustainability Education at The College of New Jersey

Lauren Madden, Ph.D.

Coordinator, Environmental Sustainability
Education Initiatives



TCNJ is a state college with 5000 undergrads & 1000 grad students. Approximately 1/3 of students are in education related programs.



95% of students are from New Jersey. The School of Education is largely female, middle class, and white.



What We Knew

- Few undergraduate teacher preparation programs directly geared toward Environmental Sustainability Education exist
 - Environmental Science
 - Environmental Studies
 - Environmental Policy
- Efforts are being made at the state and national level to support environmental education
- On our campus we have an “Environmental Studies” interdisciplinary concentration, but no education majors have participated



A BRIGHTER
FUTURE




- Launching on October 28, 2014
- Voluntary certification program for schools and to include curricular and non-curricular actions to teach for sustainability
- Includes guidance, support, and financial incentives for participating schools
- *This creates a need for teachers prepared to teach for sustainability*

Where did we start?

Spring 2014

- Formed an ad-hoc advisory committee
 - SOE faculty, students, practicing teachers & administrators
- Collaborated with colleagues across campus
 - Environmental Studies minor director, interested faculty in the school of science, Sustainable Jersey Staff
- Agreed to develop a 5-course minor in Environmental Sustainability Education
 - Would be the framework for an education strand in an environmental studies BA program ~10 years down the line
 - Would also provide a framework for an ESE option in a new M.Ed. in integrative STEM

The logo is a yellow, cloud-like shape with a scalloped border. Inside, the text "THE CLOUD INSTITUTE FOR SUSTAINABILITY EDUCATION" is written in a serif font. "THE" is small and above "CLOUD". "CLOUD" is the largest word. "INSTITUTE" is below "CLOUD", with "FOR" in a smaller font to its right. "SUSTAINABILITY" and "EDUCATION" are stacked below "INSTITUTE".

THE
CLOUD
INSTITUTE FOR
SUSTAINABILITY
EDUCATION

- NJ School Boards is working with the Cloud Institute
- Jamie Cloud provided PD for the ad hoc advisory committee

Development of the Minor

- Preservice and practicing teachers strongly urged us to keep the core of our minor grounded in teaching and learning
- 3 “core” courses
- 3 enrichment courses
 - 1 in the natural or physical sciences
 - 1 in the social sciences, arts, or humanities
- Culminating project

Environmental Sustainability in Education: An Introduction

- To be offered for the first time in Spring 2015
- Advertising & registration is currently ongoing
- Provides a broad scope of what environmental sustainability looks like in schools
- Will include field trips, guest lectures, online and face-to-face discussions
- Connections to CCSS



Environmental Science for Educators

- Aligned tightly with the NGSS
 - counts as a MS science endorsement course
- Offered three times thus far
 - twice blended, once face-to-face
- Research on development of eco-literacy in students has been presented at multiple conferences; publication in press



Sustainability & Society

- To cover environmental sustainability in arts, humanities, and social sciences instruction
- Developed by 2 project team members
- Offered for the first time this summer
 - Previous students have taken course as an independent study
- Meets global LL requirement



So, where are we now?

- Three students have graduated with the minor
- Seven additional students are enrolled
- Research by students involved with the minor has been presented internationally



Moving Forward

- Seeking external funding to grow research and teaching in our program
- Developing a series of workshops for practicing teachers to compliment the work we're doing to prepare future teachers
- Continuing to analyze data collected through a variety of projects
- Working in the Career and Community Studies program to promote sustainable living