Holland Township School
Sustainable Leading and Learning

Bringing Your Science to Life through STEM Integration

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What is technology?
What does an engineer do?

https://www.hollandschool.org/portalnew/holland-township-school-community-builds-rain-barrels-for-water-conservation/

Facing the Future

GREEN APPLE DAY OF SERVICE

Students do meaningful investigations that promote discoveries. They create and redesign their goals, connect to community and change perceptions. Sustainable practices go into their home life, and there is an increase in staff adopting the student driven sustainable mindset.

Journey North

ECO-SCHOOLS USA
NATIONAL WILDLIFE FEDERATION
FOUNDATION FOR ENVIRONMENTAL EDUCATION

Educational Program
Organizational Culture
Physical Place

Whole School Sustainability Framework

http://centerforgreenschools.org/sites/default/files/resource-files/Whole-School_Sustainability_Framework.pdf

Citizen Science is a part of Sustainable Education

- Reducing WASTE by charting and lunchbox redesign
- Promoting WATER conservation
- Building and Maintaining POLLINATOR and Nutritional, EDIBLE gardens to fostering organism tanks and homes
- ENERGY exploration with a passive solar geodome and garden solar oven promotes large scale observational practices for NGSS...

And sharing all findings with the greater community!

Cultivating a mindset for creating a CULTURE of …

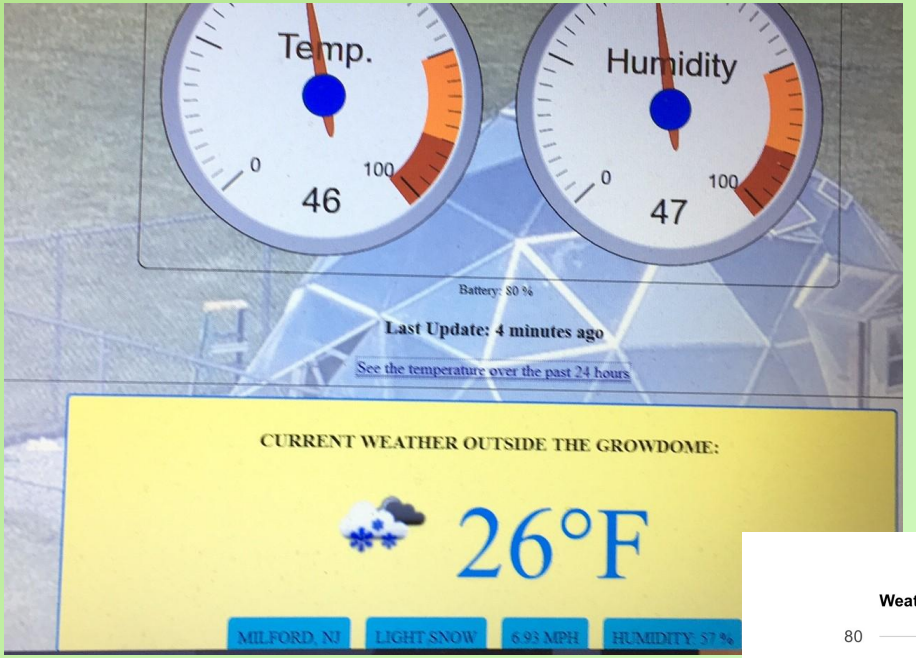
- Project and
- inquiry-based learning
- Collaboration
- Collection
- Analysis of Data
- Inclusion with public
- members and
- professional scientists and experts

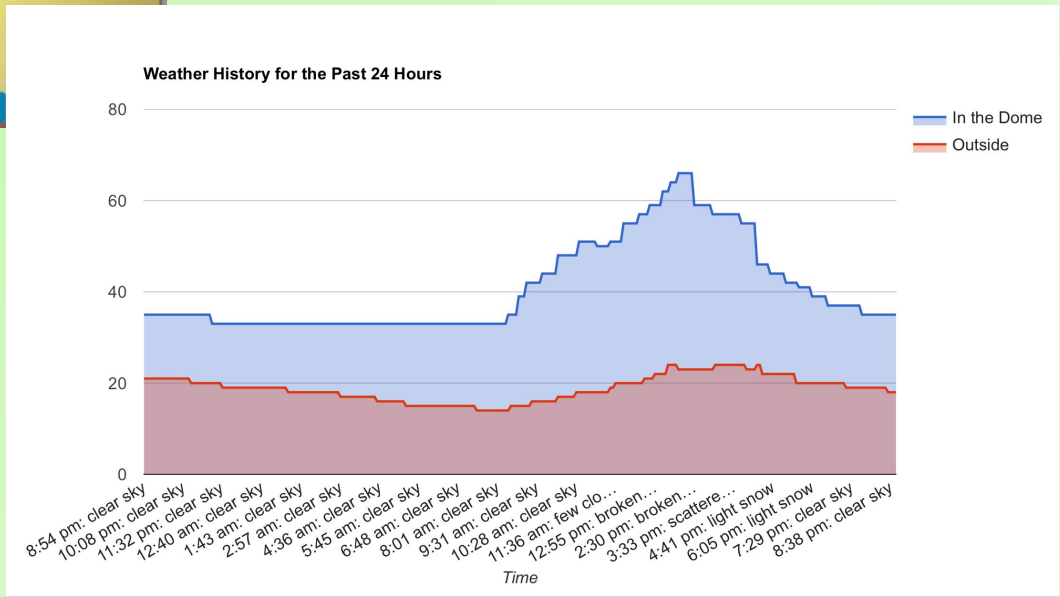
…all related to the natural world.

https://blog.nwf.org/tags/solar-energy/

Monitoring Temperatures

www.hollandschool.org/dome





Mapping your key components to make it work with your class

Interest leads to action!

- **Empathy and Sensory** are the two necessary components to engage students with community in action-based sustainable projects.

- **Math charting increases student engagement and critical thinking**: Scales, student polls, biodiversity index, planting depth, spacing for seeds, time and temperature, water quality, timers

- **DIRECT ENVIRONMENTAL SUSTAINABILITY Stakeholder contribution:** NJ Audubon Eco-Schools, National Wildlife Federation, GM Eco-School partner, Go Hunterdon, Hunterdon County Polytech, Fernbrook, Mad Lavender Farm

What would a practical ES lesson look like? (Timelime for planning)

Engage with evaluation and Summarize over the course of 2-3 seasons (fall, winter, spring) to see the students' impact.

Water: 4 weeks data over 3-4 months

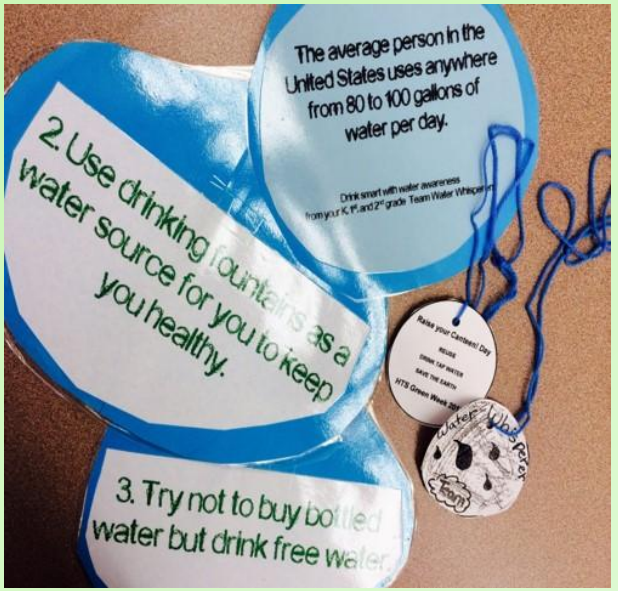
Waste: 4 weeks for promoting the change over 2-4 months

Garden/Geodome: Long-term with harvesting and seed collection, growlabs-short term one season

Solar Oven & Fish Aquaponics : Seasonal with the weather, and 4 weeks data over 3-4 months, throughout the winter

Water

- First Sustainability Success: "Raise Your Canteen" school-wide campaigns
- Increased water conservation in our school garden **by 50%**, with ongoing school community awareness for water conservation with rain barrels



Waste

Food for thought video- Password is "green"

https://vimeo.com/88818695

Second Sustainability Success: Waste reduction in cafeteria through school's *Elementary Enrichment program*-Sorting waste activities and real-world experiences: 2014-2015 Grade 1, 2,3, 4, and 5 students; **Math lessons-recording and analyzing data collection** : 2014-2015 Grade 5 and Grade 4 students

3rd grade student ***Trash We Pass*** ambassadors-earned elementary school finalist recognition for the ***2014 Siemens "We Can Change the World Challenge"***

- School wide classroom recycling supported by Special Education life-skills classes

- Include the facilities staff in the sorting project and integrate various scales for measurement
- COMPOST
- Hold sustainable half day lunch days
- Taiwan Eco-School sharing our zero waste school lunches book
- Vermicomposting (2017-2018)

Garden/Geodome

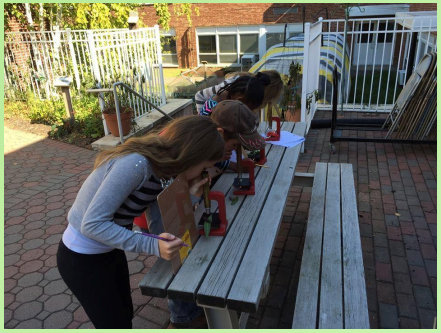
- ★ WASTE reduction and WATER conservation tie into directly with the garden and geodome
- ★ Invite community in to work with students in hands-on projects and to experience the outdoor learning lab space
- ★ Hold a community water

and weed event

- ★ Outside through all the seasons and weather

Extending to Year Round Program: Gardens to Growing Dome

The geodome creates an outdoor learning environment close to 100% of the school year!



Creating a seasonal Biodiversity Index

August- prepping for seeds, young plants

September-Harvesting final summer crop from outdoor beds, composting, cover crop; Planting inside the geodome

October, November-Watering, harvesting, food sampling; Monitoring air flow circulation and extreme heat spikes; Fall harvest and inviting family in for tasting

December-Winterized phrase, observable "water cycle" system; Harvesting fall/winter crop: cabbage, Kale, spinach, lettuce, peas

January-Food sampling of celery, broccoli and other edible plant parts growth such as brussel sprouts

Serving Nutrition to the Community

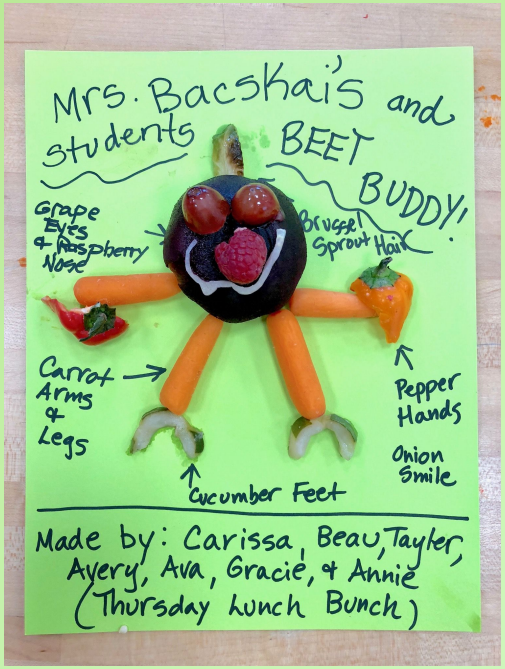
What does healthy eating from our garden and the dome look like?

- On Friday, January 12th, 2018 twenty-nine students from **grades third, fourth and Kindergarten** chose to sample prepared and cooked spinach and kale from the dome. Twenty-two of them really liked what they
- Annual Fall and Spring Gr. 2 and Gr. 1 healthy potluck with families

75% of HTS students who eat food from the garden like or love it!

Inviting school families to visit the growing spaces, work, learn and harvest food to bring home

- http://www.nj.com/hunterdon-county-democrat/index.ssf/2014/06/holland_township_school_celebr.html



- Engaging local businesses-Holland's Mad Lavender Farm visit

- **Third Sustainability Success:** ***Eco-School USA Bronze Award***; communication with global sister ***Hu-shang Elementary School*** , Tainan City, Taiwan; ***Eco-School USA Green Flag Award***, May 2017

Solar Oven

- Energy offset was studied using QR codes
- Students made shoebox models learning about conductors and insulators
- An innovative idea from CO was used create measurements and donation letters were written to local businesses
- Oven was used by entire elementary school in May 2018
- Improvement plan for 2018-2019

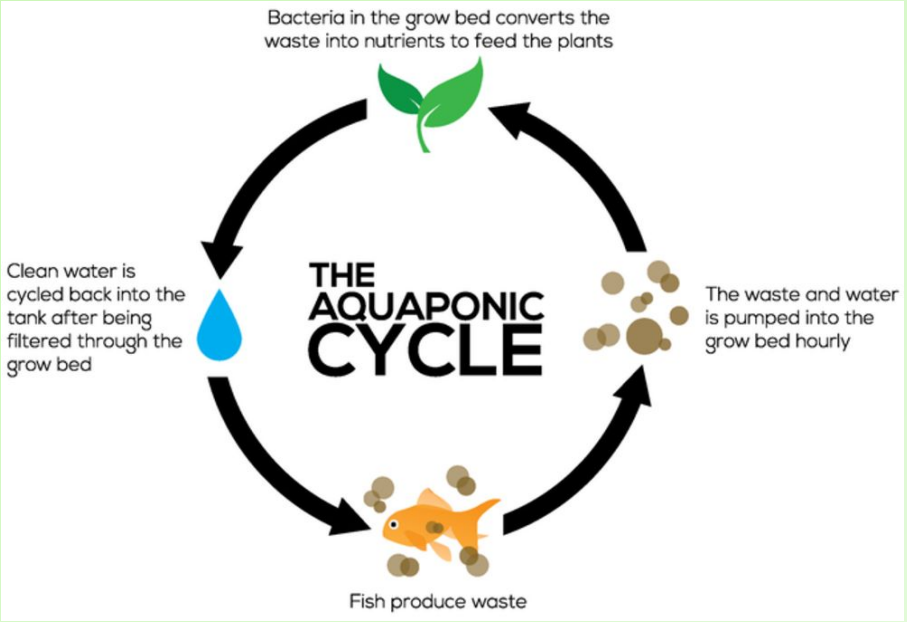
- School Green Team May 2016: Green Fair with 40 vendors and Sustainable Student Leaders reporting on creating a NET-ZERO waste classroom
- https://www.teachengineering.org/activities/view/cub_zero_energy

http://www.hcpolytech.org/pdf/Newsletters//ESE_Program_flyer_025.pdf

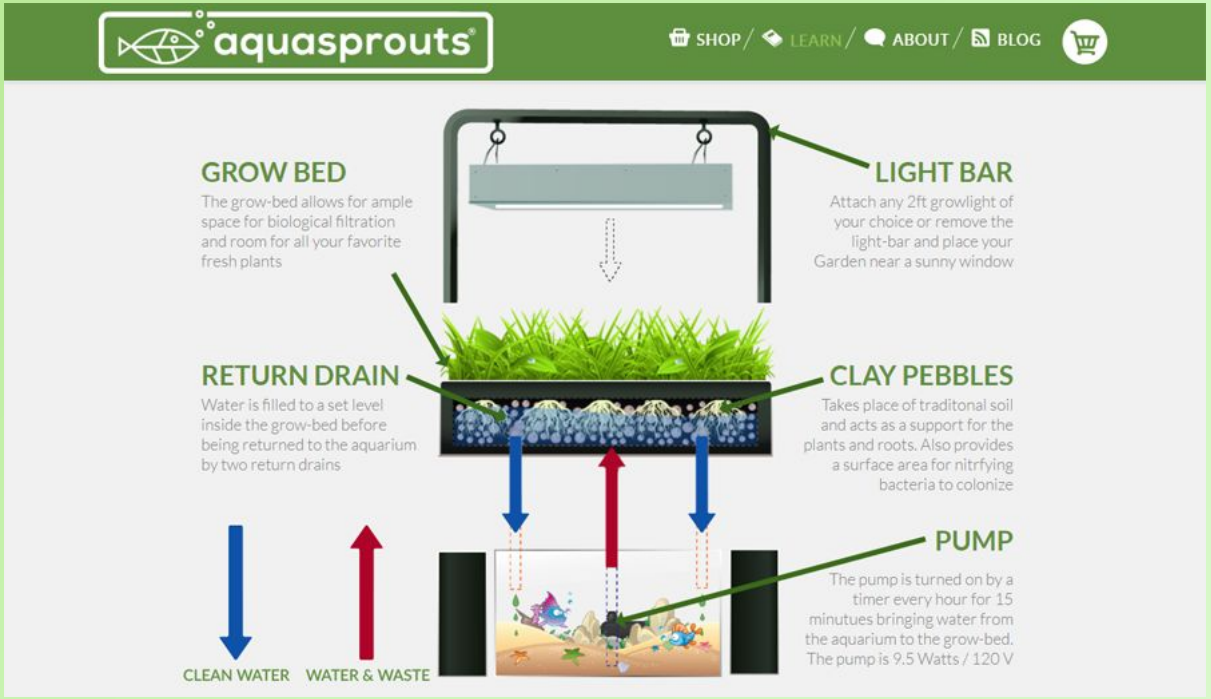
https://www.hcpolytech.org/m/news/show_news.jsp?REC_ID=491523&id=0

Fish Aquaponics

- Begin with selecting a system to study or develop-establish a maintenance plan, have the students create/engineer it/test it
- Collaboration with STEM Hydroponic models in the school
- Utilizing local Polytech for adjusting water basin levels for small vertical gardening with timers set for spray watering



Reverse Engineering and Monitoring



How to build your own:

https://www.youtube.com/watch?v=k-Lc6HefrkM

Successful Environmental Sustainable Education is promoted by the sustainable students teams.

- Holland Farmer's Market-Green Team staff collaboration

Understanding your Resources:

Sustainable and Green Committees should become a part of the student's project in either their learning activity or final assessment

- *Primary Stakeholders (internal, direct engagement):* Superintendent, Board of Education member, administrators, elementary and middle school teachers, facilities manager, lunch service provider and guidance counselor

- *Secondary Stakeholders (external; are affected by or can affect its actions):* PTO, S.E.E.D, general public, communities, NJSSP, NJSBA and the media *(Hunterdon County Democrat),* and the Hunterdon County Polytech Environmental Sustainability Academy.

Tech Ed 8.2 and Career 9.1 Standards

https://www.nj.gov/education/archive/techno/s8at/tab03/tab3b.pdf

9.2.4.A.1 Identify reasons why people work, different types of work, and how work can help a person achieve personal and professional goals.

9.2.4.A.2 Identify various life roles and civic and work-related activities in the school, home, and community.

9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.

Worthy Failures & Lessons Learned

- Determining what to focus on-our suggestion: set one achievable goal for your school year with one focus
- How to make it **easy** in achieving results in our setting
- Getting more students involved only takes a FEW sustainable student ambassadors
- Staff and additional teacher involvement increases over time
- Making data input efficient and student-centered
- Engaging school community and effectively communicating all of our schools eco-actions

Obstacles & Challenges

- **Time** for planning and maintaining progress: Adjust small-group student schedules and creat delivery time for whole-class instruction to all the grade levels

- **Schedule** of the students so every class has to have a driving force to accomplish a task

Resources:

https://www.centerforgreenschools.org/

https://journeynorth.org/

https://www.facingthefuture.org/collections/lesson-and-activities-collection

https://www.globe.gov/globe-data (NWF and NASA)

http://classroomcloseup.org/segments/voices-from-the-land/ (engagement)

https://www.nwf.org/Home/Eco-Schools-USA (sustainability framework)

http://greenapple.org/ (global connection)

https://www.nwf.org/Home/Eco-Schools-USA/Become-an-Eco-School/Steps
(sustainability framework)

https://www.eie.org/eie-curriculum

Questions? Comments? Final Thought…

When designing an Environmental Sustainability system, think of STEM as the POWERFUL key to your design:

https://www.iteea.org/File.aspx?id=137271&v=cb3f06a2

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- Tune in to WDVR "Into the Garden" to listen to the Holland students talk LIVE (for our 4th show!) with host Carl Molter, about about our new fishtank aquaponics and **GM Eco-School** partnership with Polytech on Wednesday, December 12, 2018.