Education for Sustainability – Philly Supporting teachers to develop lessons on Sustainability

Connecting Math Educators to the Wider Community

Victor Donnay
Department of Mathematics
Bryn Mawr College

PHILADELPHIA REGIONAL NOYCE PARTNERSHIP
PRNP

green futures
the school district of philadelphia

Education for Sustainability – Philly

Goal:

1. Create model for STEM Teacher Leadership Development in Education for Sustainability for teachers in the School District of Philadelphia

2. Strengthen and expand an EfS-themed STEM Ecosystem

What are problems facing the nation and the world that you are concerned about?

What are problems facing the nation and the world that you are concerned about?

A goal of our presentation is to see how mathematics education connects to these issues you care about.

Math Modeling and Sustainability: Using Service Learning Projects to Deepen Student Engagement with Modeling.

MS32: Innovative Pedagogical Practices
8:30 – 10:30 am
Oregon Ballroom 204

EFS-Philly Project Overview

THE SCHOOL DISTRICT OF PHILADELPHIA

Community College of Philadelphia

BRYN MAWR COLLEGE

WCU WEST CHESTER UNIVERSITY

The Investigators

Margaret Stephens

Victor Donnay

Paul Morgan

Philadelphia Regional Noyce Partnership

"Doing together what we cannot do alone."

BRYN MAWR COLLEGE

SJU SAINT JOSEPH'S UNIVERSITY

TEMPLE UNIVERSITY

LASALLE UNIVERSITY

Penn UNIVERSITY of PENNSYLVANIA

Drexel UNIVERSITY

HAVERFORD COLLEGE

Philadelphia Education Fund

ARCADIA UNIVERSITY

WCU WEST CHESTER UNIVERSITY

Community College of Philadelphia

What is education *for*?

If we are not currently educating *for* sustainability, what *are* we educating for?

Education for _____?_____.

Once
upon
a
time...

SUSTAINABILITY BOOKS FOR KIDS pg. 11 / GUIDE TO PHILLY RECYCLING pg. 39

Greenworks

PHILADELPHIA

a year in review www.phila.gov/green

Greenworks at a Glance

Catching You Up on Philadelphia's Sustainability Plan

Greenworks is Philadelphia's sustainability plan. In 2016 the Office of Sustainability (OOS) published *Greenworks: A Vision for a Sustainable Philadelphia*, the first major update to the plan since it launched in 2009. The 2016 plan sets eight long-term visions for a sustainable Philadelphia for all:

2018 marks more than a year of progress on the new Greenworks, and the ten-year anniversary of the creation of the Office of Sustainability. OOS is celebrating these occasions with several Greenworks updates.

IN YOUR HAND

Greenworks: A Year In Review
This magazine highlights Philadelphia residents and community groups working together to improve their neighborhoods for today and tomorrow. It also includes resources for individuals and communities to help achieve the Greenworks visions.

FURTHER READING

To learn more about Philadelphia's progress toward the Greenworks visions, visit our website at **www.phila.gov/green**, where you'll find the following information:

- **Greenworks Initiatives Update**
  Greenworks: A Vision for a Sustainable Philadelphia set out actions for OOS and other City departments to help achieve each of the eight visions. To learn about the progress on those actions and new commitments from the City of Philadelphia to advance Greenworks, check out the 2017 Greenworks Initiatives Update.

- **Greenworks Dashboard**
  OOS publishes data on achieving each of the eight Greenworks visions on the Greenworks Dashboard.

- **Greenworks Equity Index**
  This spring OOS will launch the Equity Index, a program to build relationships with communities not currently benefiting from sustainability, and improve outcomes for those Philadelphians.

A Sustainability Plan for the School District of Philadelphia

green futures
the school district of philadelphia

The Plan: Five Years, Five Focus Areas

Education for Sustainability

Consumption and Waste

Energy and Efficiencies

School Greenscapes

Healthy Schools, Healthy Living

Education for Sustainability

EFS is a holistic framework to equip students, schools, administrators, families and community with the skills, knowledge, and habits of mind that will prepare them to create and contribute to a world where economic prosperity, social justice, and responsible citizenship may be strengthened while restoring our health and that of the living systems upon which our lives depend.

THE 9 CORE EfS STANDARDS

Cultural Preservation & Transformation

Responsible Local & Global Citizenship

The Dynamics of Systems & Change

Sustainable Economics

Healthy Commons

Natural Laws & Ecological Principles

Inventing & Affecting The Future

Multiple Perspectives

Strong Sense Of Place

From the Cloud Institute

water

school grounds

energy

sustainable food

healthy schools

healthy living

biodiversity

consumption & waste

climate change

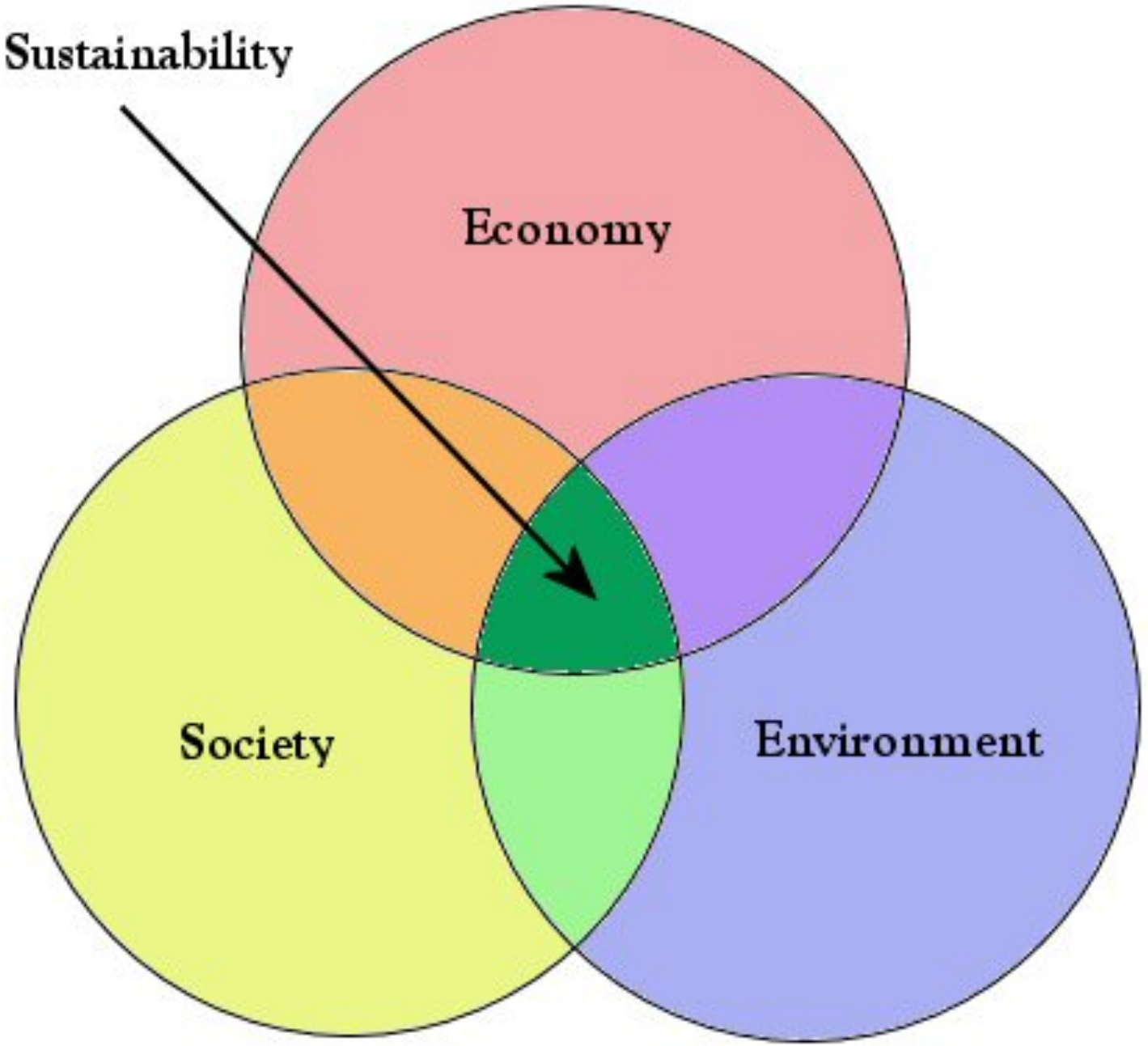
transportation

LEARNING ABOUT FORESTS

Eco-Schools USA

NATIONAL WILDLIFE FEDERATION®

watersheds, oceans & wetlands


Sustainability
Economy
Society
Environment

SUSTAINABLE DEVELOPMENT GOALS

Driving Questions

- To what extent can an EfS focus increase student and teacher engagement with STEM?
- How can teachers be supported to implement EfS in their classes/schools?
- To what extent can EfS serve as a catalyst to improve STEM learning by inspiring and mobilizing a wide range of stakeholders to realize a new vision of STEM education?

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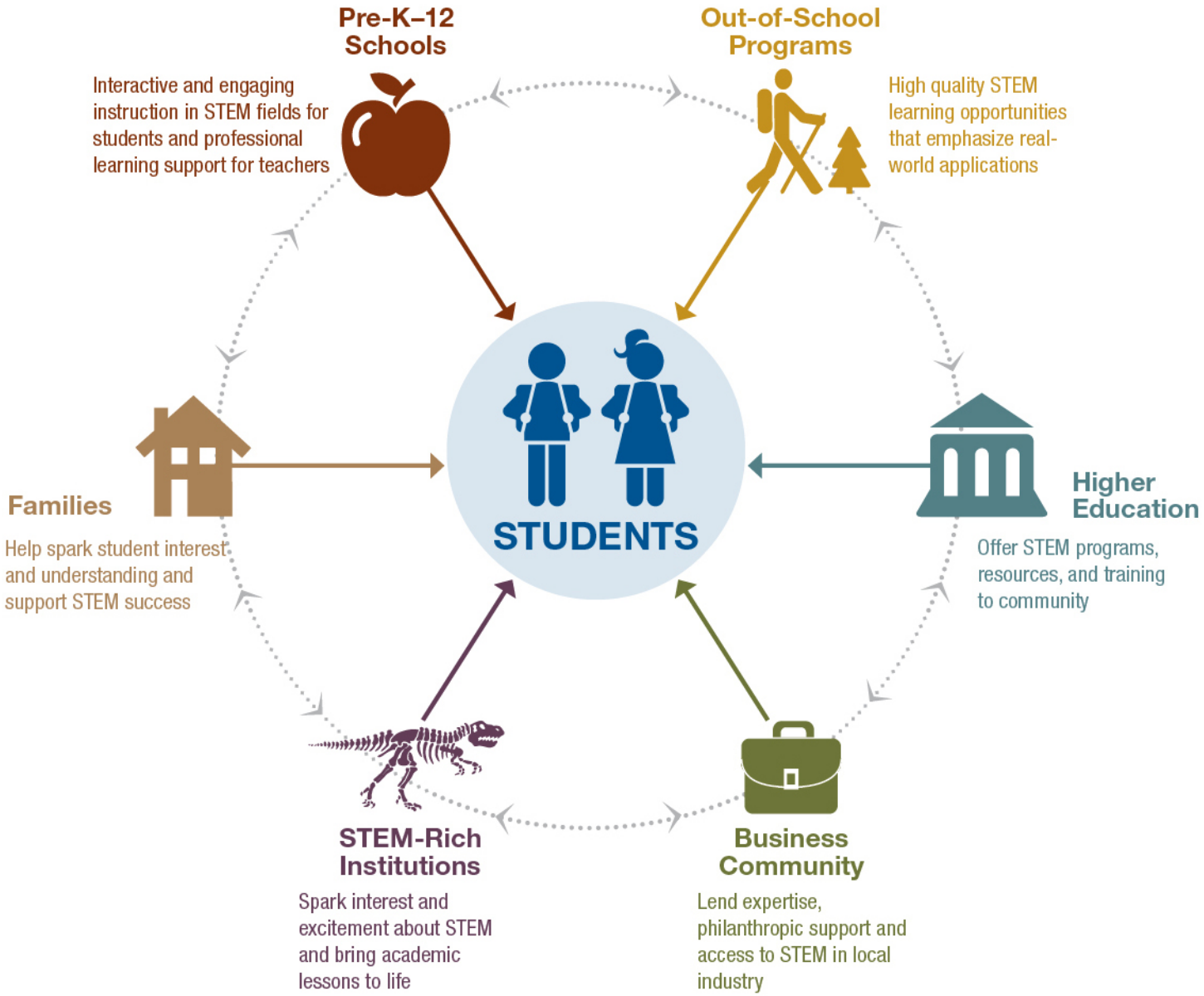
Education for Sustainability STEM Ecosystem



The Process

- **Spring 2017: Recruit and Select Participants**
  - High School Teachers (STEM & Non-STEM) (14)
    8 Science, 2 Math, 4 Non-STEM
  - Community College of Philadelphia Faculty (3)

- **August 2017: 3-Day Intensive Institute**
  - Introduction to Sustainability (ATD Symposium)
  - Introduction to EfS (Jaimie Cloud)
  - Introduction to Place-Based Education (Field Experiences)

- **Sept 2017 – June 2018: Monthly 6-Hour PD on Saturdays**

Logistics

- Used our network to advertise to teachers in the SDP
- Application with letter of interest and Principal support
- Stipend ($2400)

Monthly PD Sessions

- **September -** EfS Standards Part I
- **October** – EfS Standards Part II + Biomimicry
- **November -** Pedagogy: Place-Based Education
- **December** – Workshop with Team Members
- **January** – Engaging Students (Ken Hamilton, Green-Allies)
- **February** – Community Connections & Assets (Field Experiences)
- **March** – Teacher Leadership & Change Agent Skills
- **April** – SDP Teacher Symposium Presentations
- **May** – Unit Presentations to Peers
- **June** – EfS-Philly Symposium (Public Presentations w/SDP)

Year-Long Project:
Instructional Unit Development

- EFS & District Standards
- Pedagogy (Place-Based & Project-Based Learning)
- Collaborative Learning & Networking
- Student Engagement
- Teacher Leadership & Change Agent Skills
- Field Studies (Out-of-Classroom Experiences)
- Map Community Assets & Pursue Collaborations
- School as a System – Eco-Schools Pathways
- Authentic Assessment

3-Day EfS Summer Institute

Awakening the Dreamer

Changing the Dream

Pachamama
Alliance

BIOMIMICRY

WHAT IS PLACE-BASED EDUCATION AND WHY DOES IT MATTER?

GETTING SMART in partnership with eduInnovation & Teton Science Schools

GETTING SMART

eduInnovation

tss
teton science schools

Students participating in Project Flow.
Photograph courtesy of the Fairmount Water Works

Eco-Schools USA

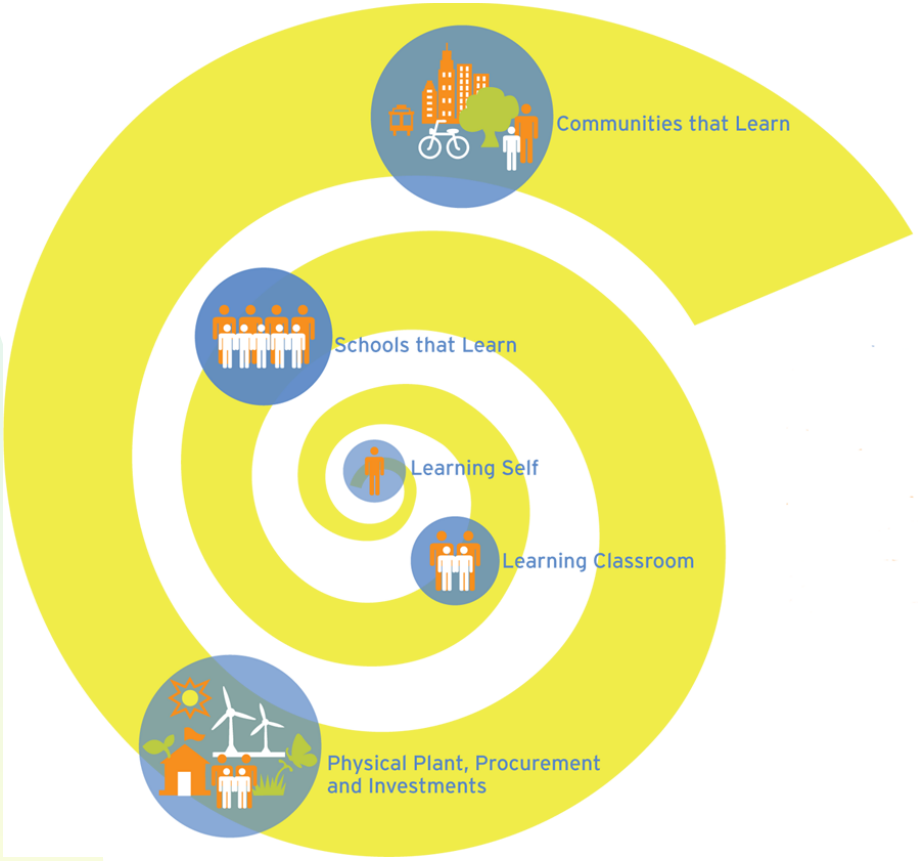
NATIONAL WILDLIFE FEDERATION®

Student Engagement

Ken Hamilton

The Cloud Institute

Education for Sustainability Framework



Community Connections

- Schools & communities learn and work together in partnership
- Schools serve as resources to the community
- Communities serve as resources to the schools
- Schools and communities reflect and celebrate together

NKCDC

NEW KENSINGTON COMMUNITY DEVELOPMENT CORPORATION

City of Philadelphia

MuralArtsProgram

KENSINGTON
DBHIDS
IMPACT

Community Asset Map

VAUX HIGH SCHOOL

Associations
4-H Workforce Development
Opera Philly
Habitat for Humanity
Pappajohn Woodworking
Power Corps
MANTIZ

Local Economy
La Colombe Torrefaction
Honeygrow
Fair Food Farmstand
Bar Hygge
Common Market

Community Agency
Church of the Advocate
Free Library at Cecil B Moore
Habitat for Humanity
Martin Luther King Recreation Center
Mighty Writers
Parent-Child Home Program
Philabundance Community Kitchen
Project Home
Sultan Ahmad Community Foundation
Vaux Alumni Association
YMCA
26th Street Recreation Center

Physical Space
PHA
Morris Arboretum
Awberry Arboretum
Penn State Univ. Extension Horticultural Center
Fairmount Park
Greener Partners
Schyulkill River Heritage Area

Religious Institutions
Celestial Word Ministries
Haven Peniel
Miller Memorial
United Missionary

Institutions
Henry Got Compost! (Saul HS)
Fairmount Water Works
S.E. Water Treatment Plant
NMAJH
Chemical Heritage Foundation
TU Nursing Department
Wagner Free Institute of Science
Franklin Institute
Cradle to Grave
CHOP
PHA
SDP
PFT
CCP
MELC
EducationWorks
PHMC

Community Development
Brewerytown-Sharswood NAC
Fairmount CDC

Individuals
Mayor Kenney
City Council President Dwight Clark
State Representative Donna Johnson Bullock
State Senator Sharif Street
Congressman Dwight Evans

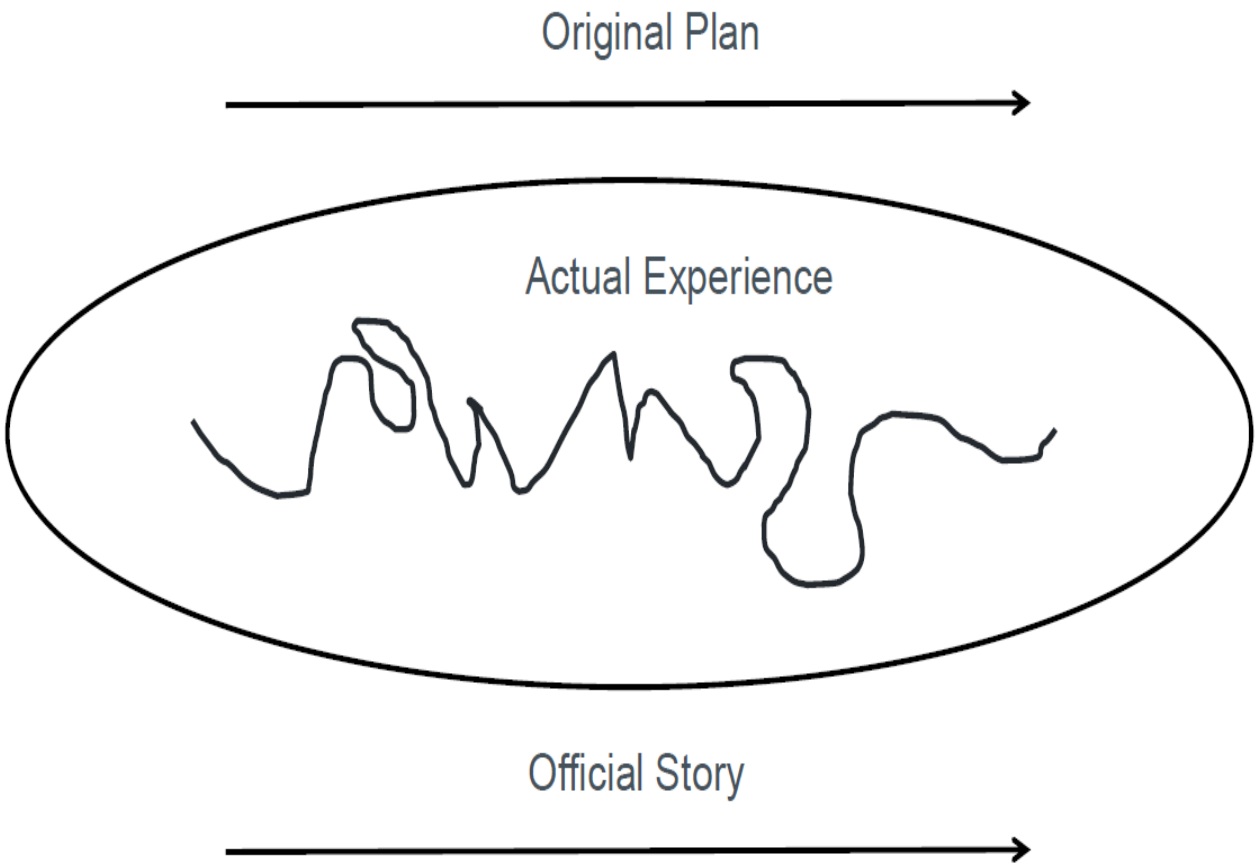
Teacher Leadership/Change Agent Skills

What's your story about . . .

- An experience with change (system)

- Experiences with
  - Learning how the bureaucracy works
  - Identifying key levers of change (people, etc.)
  - Using outside experts strategically
  - Top Down and/or Bottom Up change
  - Being opportunistic
  - Effectively collaborating (not a lone hero)
  - Other?

The Change Leadership Dilemma



"Disconnect between how new things get done and the Official Story" by Isharp is licensed for open sharing and adapting under Creative Commons CC BY-AS 4.0

Culminating Presentations

- **April 28th**: SDP Teacher Symposium Presentations
- **May 19th**:Presenting Units to the EFS-Philly group
- **June 9th**: School District *GreenFutures* Symposium

EFS-Philly Participant Stories

Math Teachers

Sridevi Somireddy

- Energy use in building, ways to reduce usage
- Can we get solar panels on our building?
- Calculate Carbon Footprint of your breakfast.

Breakfast Footprint

Date _____

Choose item from each category

Cereal	Origin*	Miles**	Size (ft^3)	Carbon Cost+		
Cheerios			0.17	0.0000	lbs. of $C0_2$	
Kellogg Flakes			0.17	0.0000	lbs. of C02	
Oreo O's			0.17	0.0000	lbs. of C02	
Frosted Mini-Wheats			0.17	0	lbs. of C02	
Milk						
Whole Milk			0.1	0	lbs. of C02	
Organic			0.10	0.0000	lbs. of $C0_2$	
Local Store Brand			0.10	0.0000	lbs. of $C0_2$	
Fruit						
Oranges			0.08	0	Llbs of co2	
Fresh Strawberries			0.08	0.0000	lbs. of $C0_2$	
Tangerine						
Fresh Raspberries			0.04	0.0000	lbs. of $C0_2$	
Juice						

Initial Assumptions	
22.27	lbs. per gallon
5.2	miles per gallon
3200	ft^3 trailer

Donovan Hayes

- Goal: Get students excited and engaged with where they ARE (place based education, respecting cultural context)
- Sustainable Geometry: Harnessing Joy in the Math Classroom. Symmetry – rotations, translations. Choreograph transformation dances.
- https://geometricfunctions.org/fc/present/nctm2018/
- Engagement levels through the roof

Amanda Fiegel
ESL Teacher

THE FACTS
ON FOOD WASTE

1/3 of ALL food produced IN THE WORLD IS WASTED

or

1.3 BILLION — pounds — → ENOUGH — to feed — 3 BILLION PEOPLE

IN A WORLD WHERE 805 MILLION GO HUNGRY every year

FOOD WASTE DOESN'T MAKE SENSE

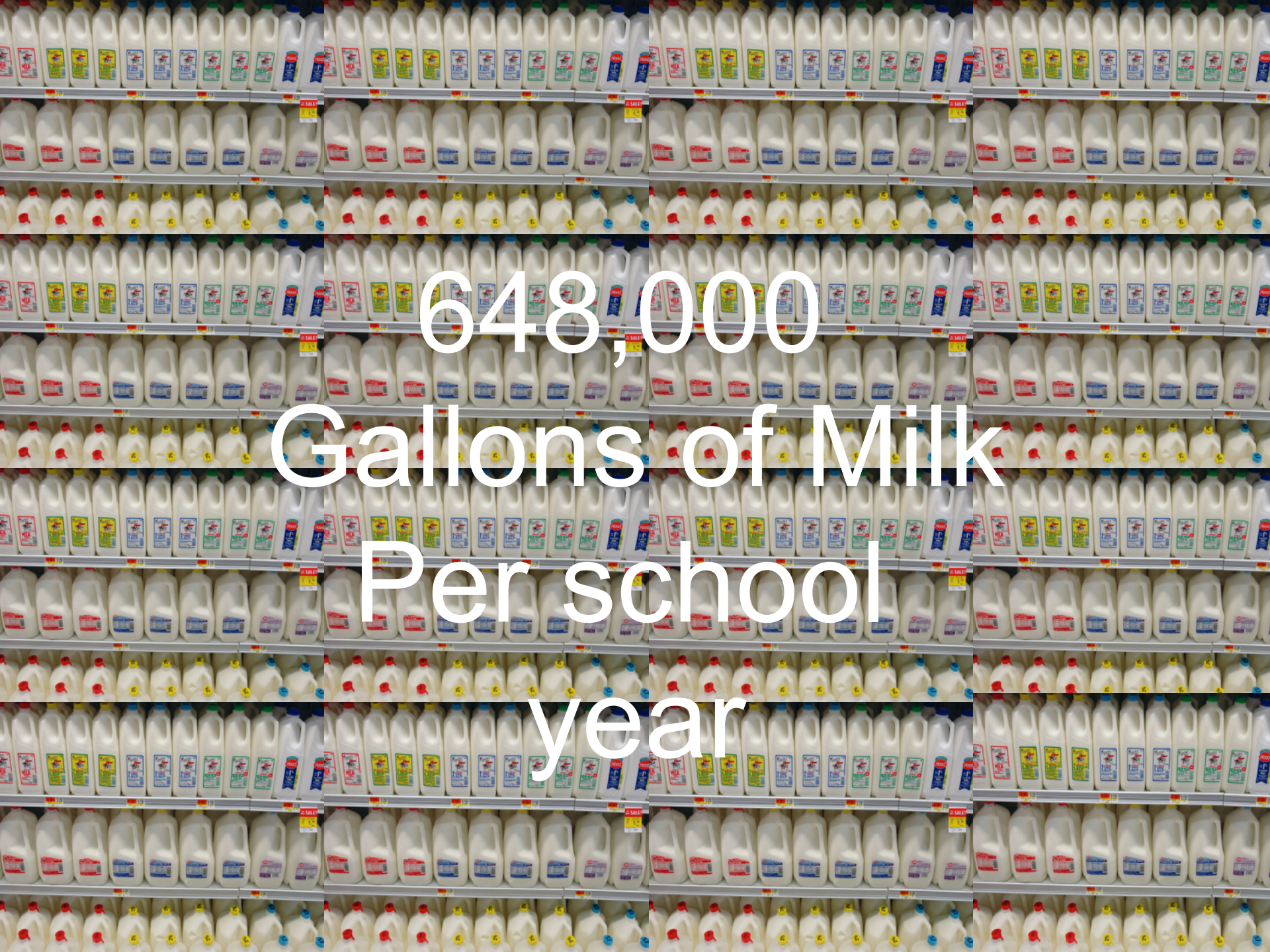
12 Gallons of Milk Per Day

x 180 Days

Days of School

1	2	3	4	5	6	7	8	9	10	11	12
13	14	15	16	17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32	33	34	35	36
37	38	39	40	41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70	71	72
73	74	75	76	77	78	79	80	81	82	83	84
85	86	87	88	89	90	91	92	93	94	95	96
97	98	99	100	101	102	103	104	105	106	107	108
109	110	111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130	131	132
133	134	135	136	137	138	139	140	141	142	143	144
145	146	147	148	149	150	151	152	153	154	155	156
157	158	159	160	161	162	163	164	165	166	167	168
169	170	171	172	173	174	175	176	177	178	179	180

x 300 Philly Schools


648,000
Gallons of Milk
Per school
year

3,240,000
pieces of
fruit per
school year

Meraki Gets Innovative

Meraki Helps Veterans

“Wasted food makes me feel hurt because I know it can be used for a better purpose. Because I was raised in Haiti and know how it feels to not have food, I can relate and want to help.”

Duveltsanders Thomas

Next Steps?

Thank You!

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Paul Morgan
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Education for Sustainability - Philly
http://prnp.org/efs-philly-education-for-sustainability-philly

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