Sustainable Schools Program and Practice: Partnership Building with the Tempe Union High School District

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Overview

- About Our Program
- Tempe Union High School District
- Tempe High School
- Lessons Learned

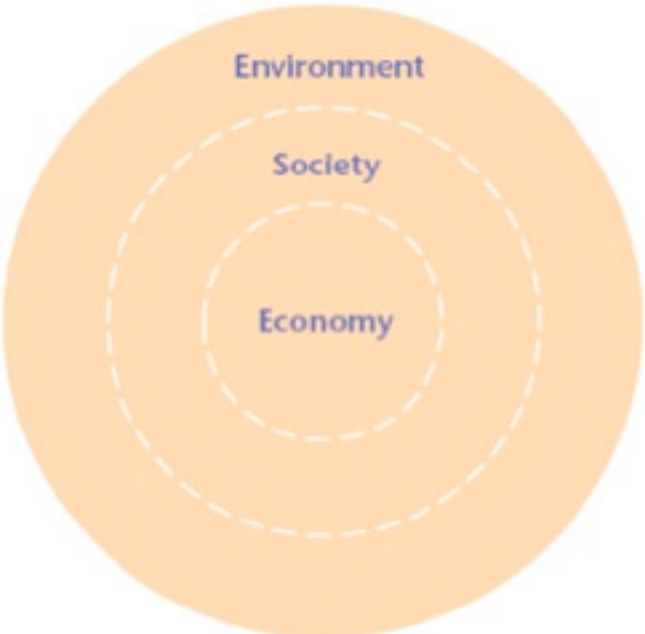
About our Program

http://sustainableschools.asu.edu/

What is Sustainability?

"Meets the needs of the present without compromising the ability of future generations to meet their own needs."

– UN Brundtland Report (1987)



The Sustainability Science for Sustainable Schools program matches ten ASU graduate fellows per year with teams of teachers and school leaders to address sustainable school challenges across the scales of curriculum, campus and community.

ASU's Sustainable Schools Program

A project funded by the National Science Foundation

- National GK-12 Program
- Focus on STEM
- 5 year program awarded to ASU-GIOS in 2009
- Emphasis on Community Partnerships
- Focus on High Schools

Senior Leadership Team

➔ Principal Investigators and Project Coordinator

Indicator Expert Team

➔ Researchers as Thematic Experts and Advisors

Graduate Fellows

➔ Master and PhD Students

What makes us unique

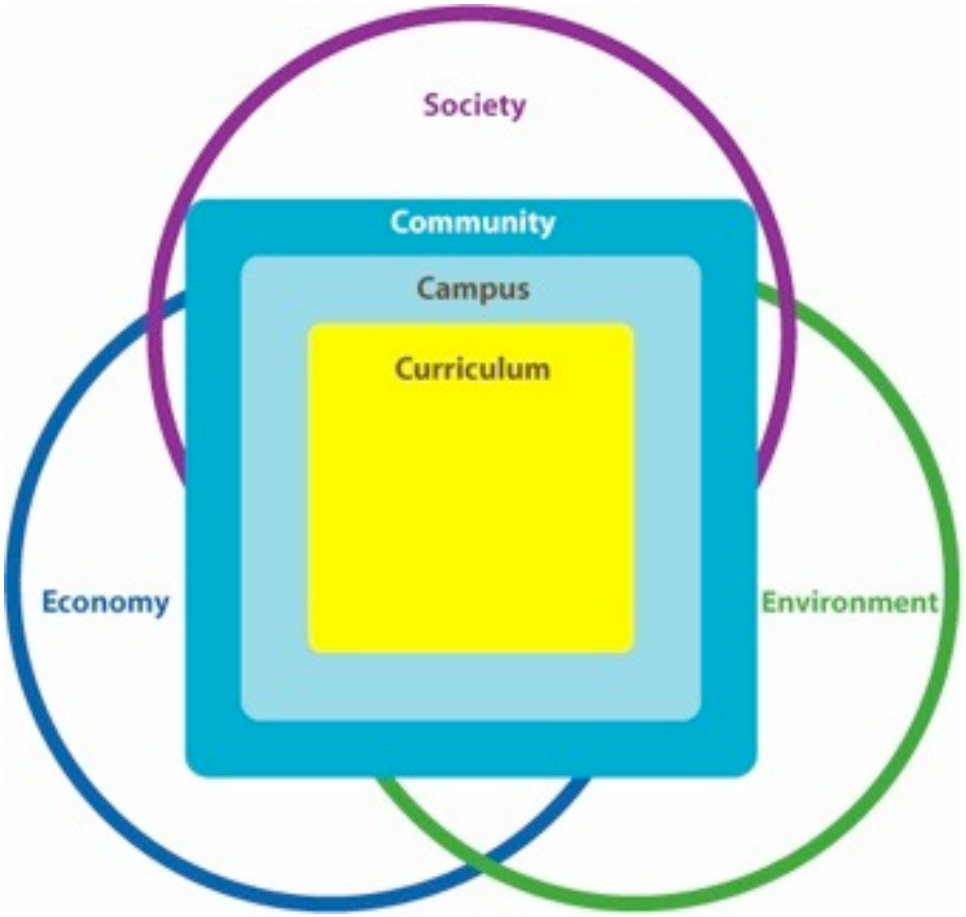
- Conceptual Focus
  - Sustainability Science
  - Emphasis on scientific methods/inquiry state standards
- Unique Characteristics
  - Project-based and inquiry-based learning
  - Emphasis on community partnerships
  - Focus on high schools

Framework: Three C's

Curriculum: Teaching and Learning

Campus: Infrastructure, Administration, Human Resources

Community: Parents, Businesses, Government, Non-profits, Neighborhoods



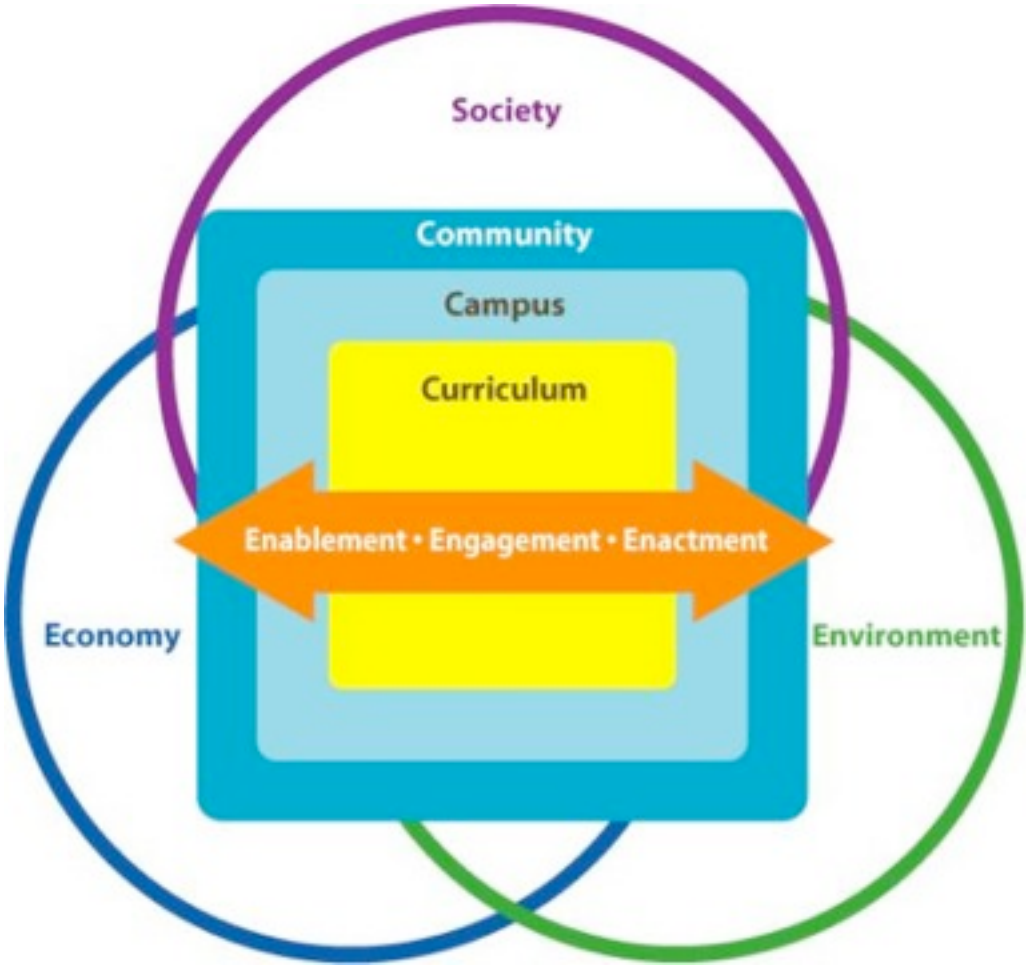
UK Department for Children, Schools and Families / Department for Education and Skills (UK-DCSF). (2008). ***S3: Sustainable School Self-Evaluation for primary, middle and secondary schools***. July 2008 Manual. PDF retrieved Aug. 17, 2009 from www.teachernet.gov.uk/sustainableschools

Framework: Three E's

Engagement: Academic study and analysis

Enablement: Values and attitudes

Enactment: Project and system implementation



The program goals are to:

- INCREASE integration of sustainability and interdisciplinarity in curriculum and instructional development
- ENHANCE fellows' graduate experience and career trajectories
- IMPROVE graduate students' communication and teaching skills
- EXPAND university outreach and relationships with high schools

Goal #1:

Increase integration of sustainability concepts into high school curriculum

Within the last two years, **46 lessons** have been taught to **179 classes** touching over **5,762 students**, and **68 sustainability projects** have been accomplished across **10 school sites**.

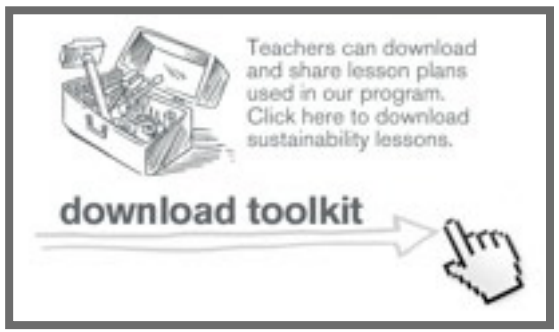
BioScience High School Hybrid Car Project

Carl Hayden HS Planter Box Project

Goal #1:

Increase integration of sustainability concepts into high school curriculum

Tempe High School has also piloted a new year-long introduction to sustainability course, our on-line teacher's course has been piloted and our new **Toolkit for Teaching** has been posted on our website.

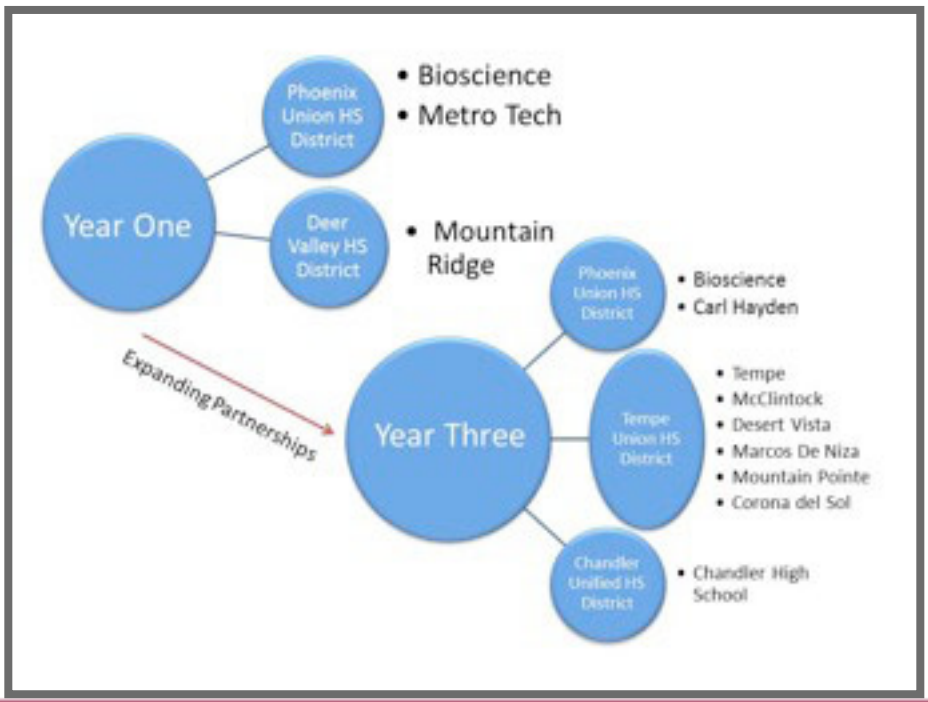


Core Sustainability Areas of Study	Subject Area	Classroom Project	Classroom Activity	Example Reading or related key concept
Food System	Nutrition	Calculating food miles for a sandwich	Farm to Table Lesson	"Omnivore's Dilemma"
Energy System	Renewable and nonrenewable energy sources	Creating a camp energy portfolio	Research sustainability impacts of different sources	Urban Planning
Water System	Water Cycle Unit	Determine how much water your school uses	Research non-point versus point pollution	Water conservation in the desert
Outdoor Ecosystem (Landscape)	Math Unit: Collection, display & analysis of data	Do a campus grounds audit (two months)	Research costs – benefits of different types of plants	"Landscape watering by the numbers"

Goal #2:

Expand university outreach with local high schools

We have expanded our partners **from 3 schools in two districts in year one**, to **9 schools in three districts in year 3**, with significantly more growth and positive impacts expected in the next three years.



Goal #2:

Expand university outreach with local high schools

In year three, our outreach fellows co-hosted the local CEFPI symposium in February 2012 called "What's Next for Sustainable Schools and Communities?", and an article was published on our program in the journal, *School Planning and Management.*

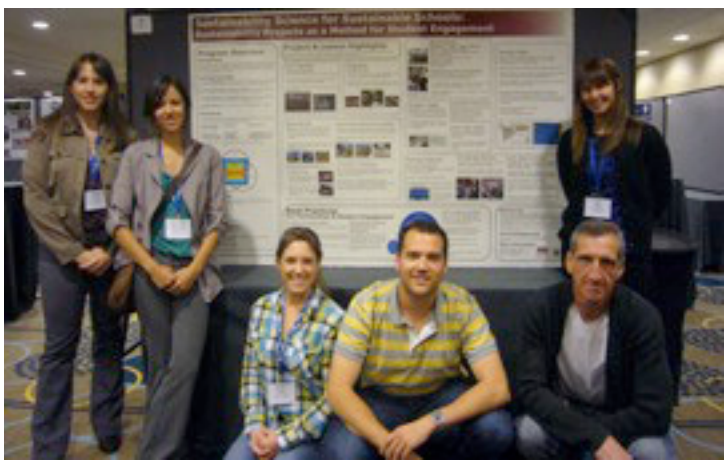
Auriane Koster, Outreach Fellow, presents at the February 2012 local CEFPI Symposium held at Arizona State University.

Featured article in *School Planning and Management*

Goal #3:

Enhance graduate fellows' experience and career trajectories

Our program has **supported 20 graduate MA and PhD fellows** over the last three years, with 7 Fellows returning for a second year of service.



Fellows present poster at March 2012 GK-12 conference in Washington D.C.

Erin Frisk presents at 2010 NSTA Conference

Goal #4:

Improve graduate student's communication and teaching skills

We have focused on placing our Fellows in school settings that support sustainability through delivery of curriculum and special sustainability projects.

We now participate in all 7 schools within the Tempe Union High School District.

Goal #4:

The TUHSD Summer 2012 Sustainability Workshop

Our Tempe Fellows assisted in facilitating teacher discussions about incorporating sustainability into their schools during two summer teacher workshops hosted by the Tempe Union High School District and partners.

Interactive session on Day 2

Solar power hot dog cooker for lunch

A lighting lab break-out session

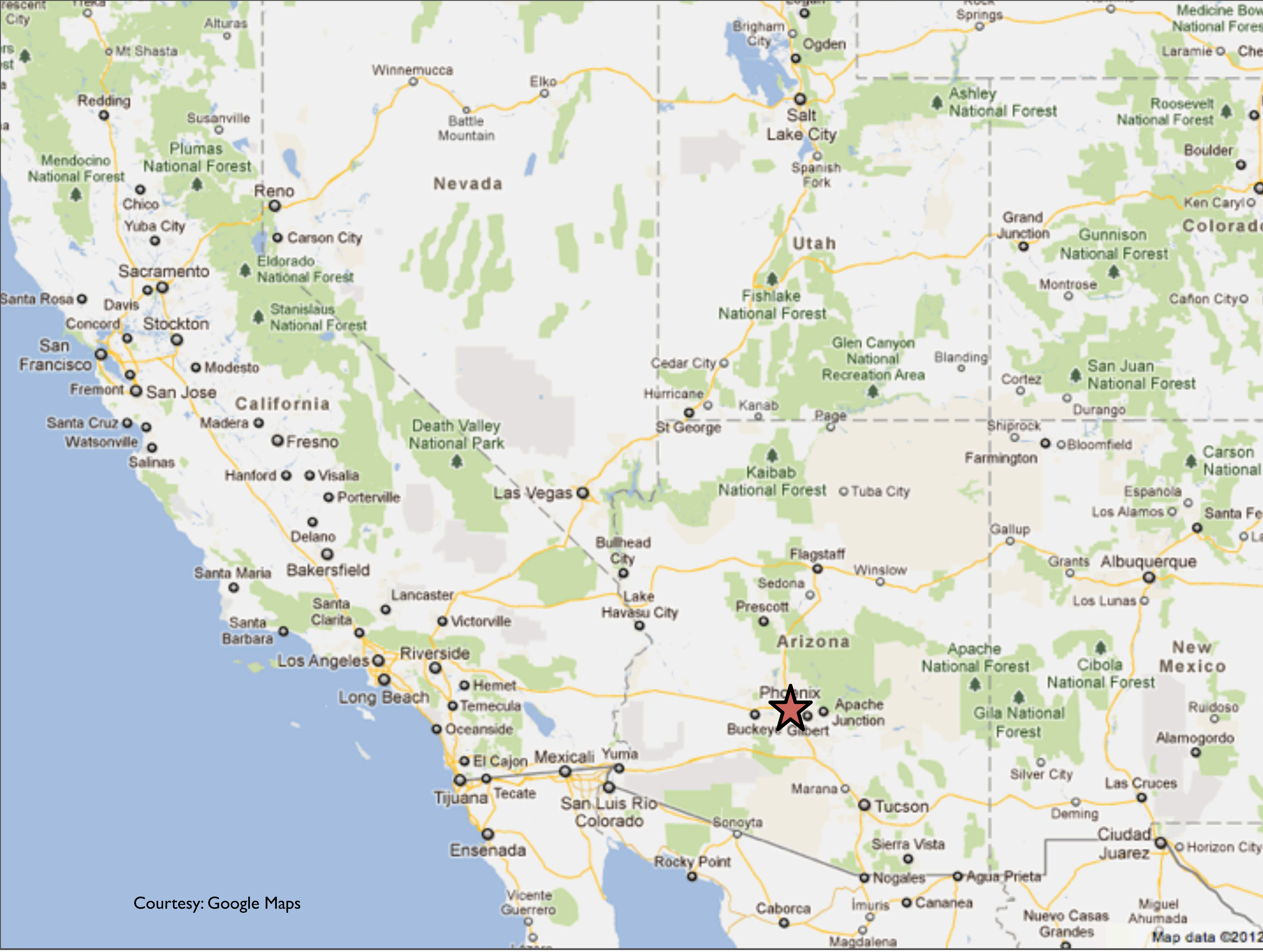
Question

- **How do you see sustainability already incorporated in the buildings that you have worked on/in?**

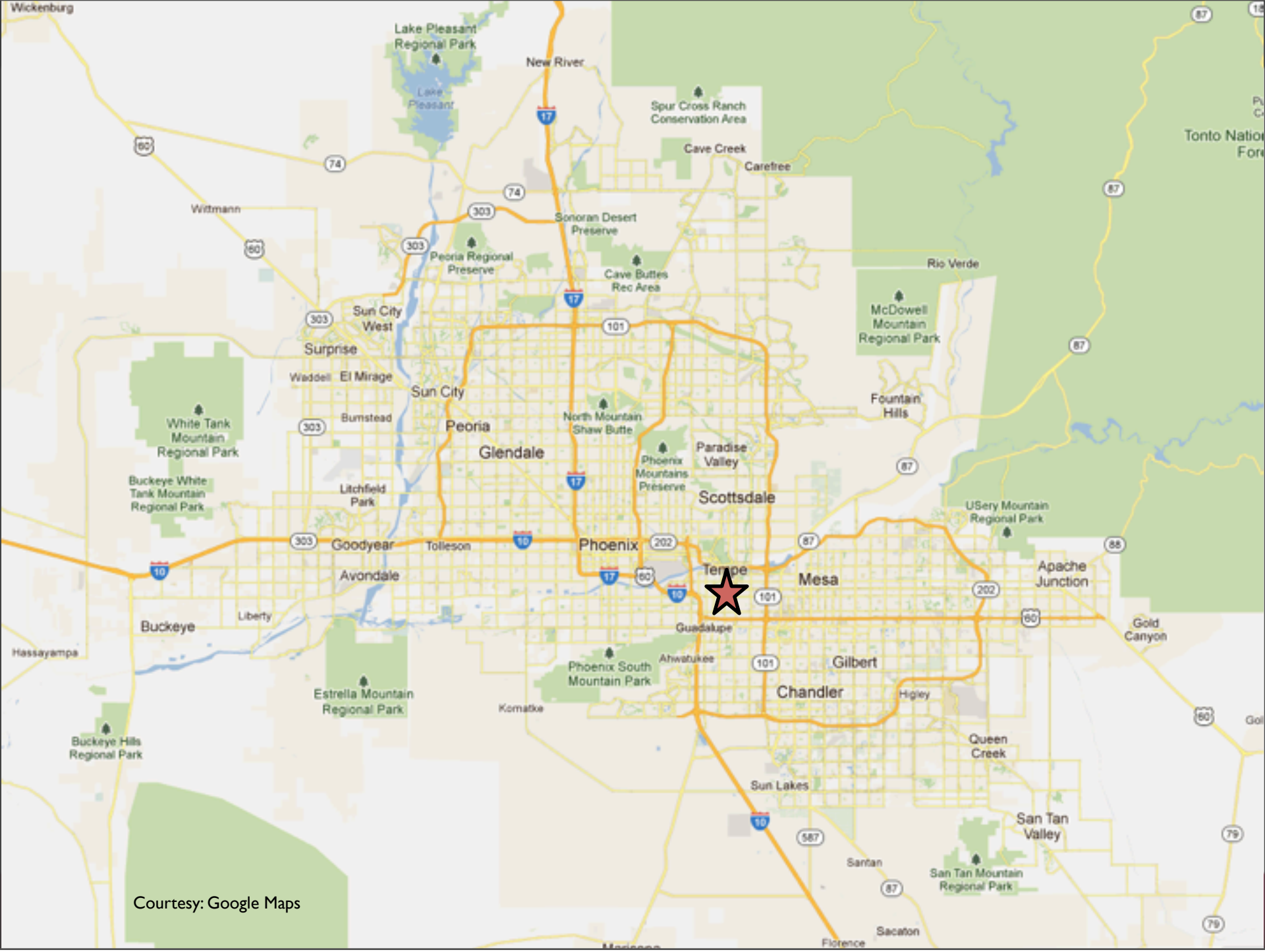
Tempe Union High School District (TUHSD)

"Innovative Energy Solutions and Sustainability Project"

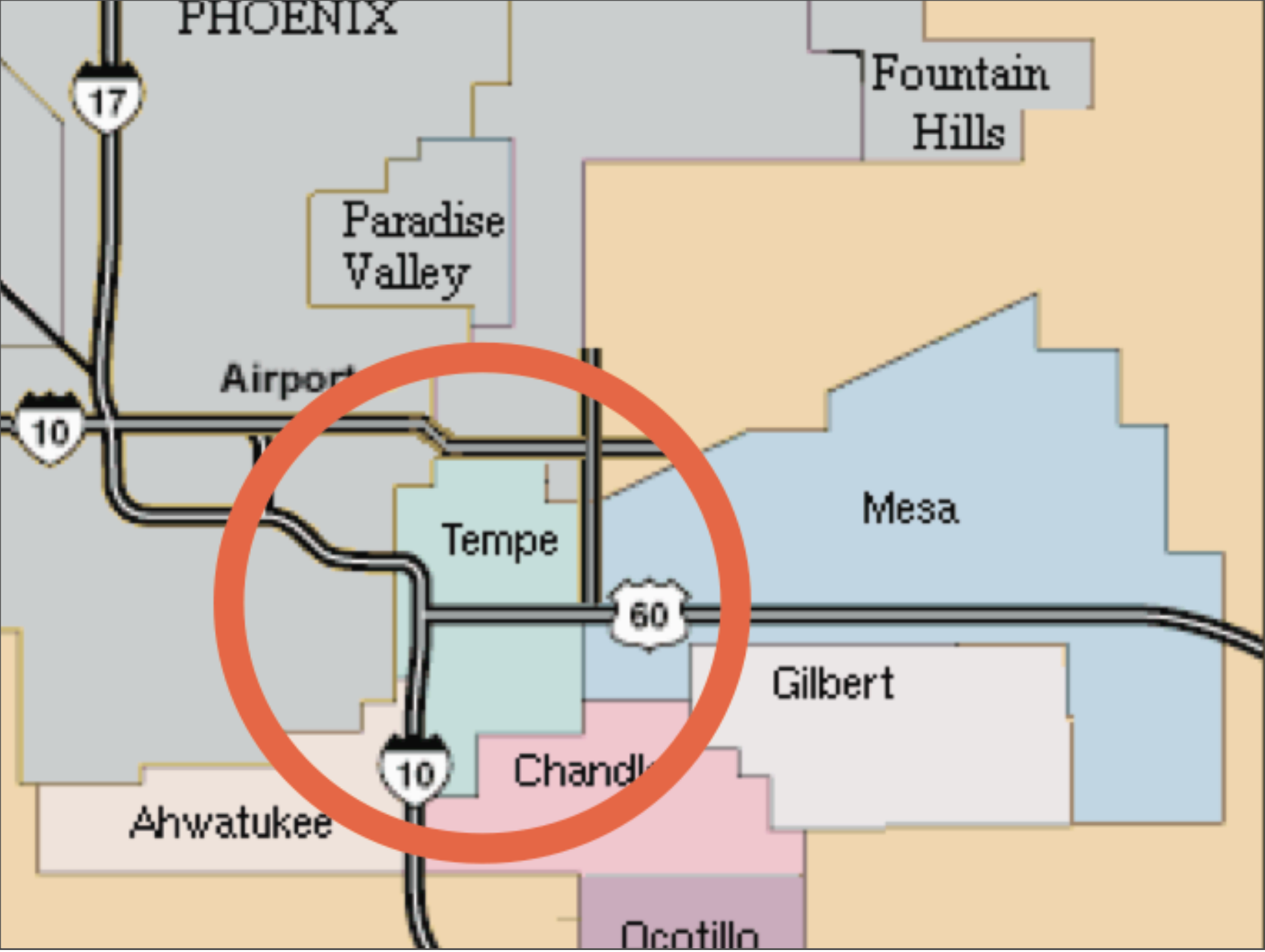
Working to make Tempe Union District schools more sustainable



Courtesy: Google Maps



Wednesday, August 22, 2012



Wednesday, August 22, 2012

TUHSD Overview

- Established April 4, 1908
  - Tempe Union High School

- 7 High Schools
- 91% four-year graduation rate
- Open Enrollment

"Through our goals and objectives, we will transform the structure of our schools to meet the needs of the ever-changing world."

TUHSD Schools

School Name	Enrollment	Year Established
Tempe High School	1,522	1908
McClintock High School	1,940	1965
Marcos de Niza High School	1,896	1971
Corona del Sol High School	2,482	1977
Mountain Pointe High School	2,694	1991
Desert Vista High School	3,003	1996
Compadre High School	737	1997
TOTAL	**14,274**	

Student Demographics

Caucasian	49%
Hispanic	27%
African American	12%
Asian	7%
Native American	5%

Employee Demographics

Teachers	710
Support Staff	569
Administrators	44
TOTAL	**1,323**

Sustainability and TUHSD

- Educational Partners:
  - Arizona State University (ASU)
    - Global Institute of Sustainability
    - School of Sustainability
    - GK-12 Program
  - Rio Salado Community College
- Business Partners:
  - Intel
  - Salt River Project (SRP)
  - Arizona Public Service (APS)
  - Southwest Gas
- Government Partners:
  - City of Tempe

Sustainability and TUHSD

- Go Green Initiative
  - Innovative Energy Solutions & Sustainability Project
- Purpose:
  - Integrate environmental and sustainability education across the district
  - Create cutting-edge and unique programs, making TUHSD a leader
  - Link classroom learning to co-curricular programs, campus operations and civic engagement opportunities

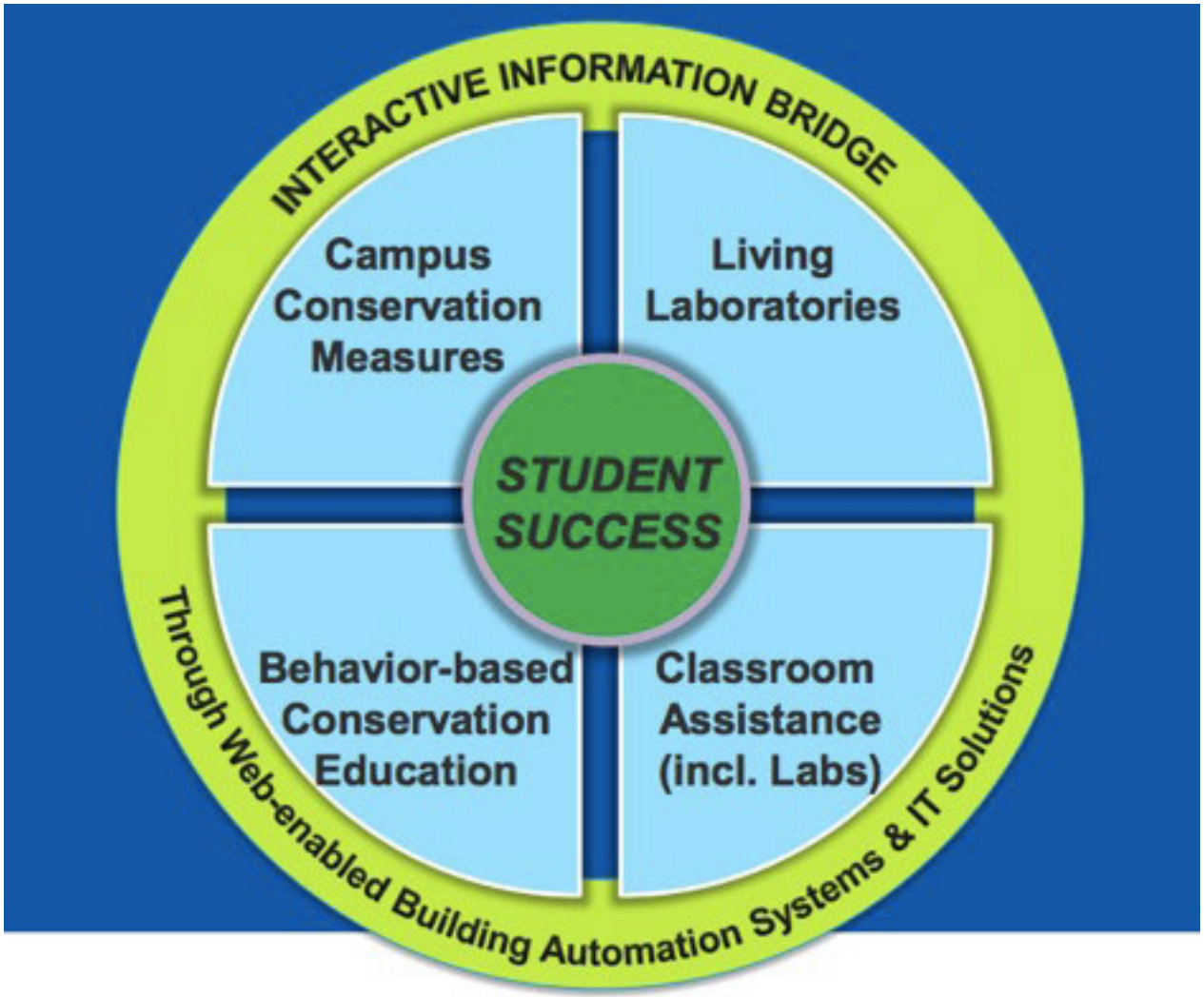
TUHSD Go Green Plan

- Phase I *(underway with Chevron)*
  - Energy Audits
  - Feasibility Studies
  - Financial and Payback Studies
  - Resources and data for sustainability education & project management
  - Campus Energy Projects
- Phase II
  - Procurement of equipment and facility modifications from Phase I
- Phase III *(concurrent with Phases I & II)*
  - Develop Internal Government Agreement (IGA) with educational partners
  - Develop Curriculum

Chevron's Phase I Sustainability Education Strategic Plan Goals

1. Champion campus conservation measures
2. Build behavior-based conservation education
3. Install Living Laboratories
4. Provide classroom assistance for the labs and their yielded data

Conceptual Model



Phase I Projects

- Energy Conservation Measures
- Classroom Assistance and Telemetry
- Living Laboratories
  - Ready by 2012-2013 Academic Year

Energy Conservation Measures

- Lighting technologies
- Converting exterior lighting to digital control
- Cooling tower water meter
- Replacement or re-commissioning of building automation system
- Ductwork modifications/repairs
- Cleaning outside air louvers
- Direct Evaporative Supplemental Cooling
- Variable Volume Chilled water pumping
- Utilityvision
- Vending Machine controls
- Window Tinting
- Power Factor Correction

Classroom Assistance and Telemetry

- Dashboards
- Heat Pump Trainer at Desert Vista
- Envision Coach
- Envision Behavioral Initiative – "Go Green"
- Sustainability Education Strategic Plan
- Sustainability Longitudinal Impact Study

Living Labs

- Tempe High – Lighting Lab
- Compadre – Solar Electric Car Charging Station
- Mountain Pointe – Battery Energy Storage
- Corona del Sol – Fuel Cell
- Marcos de Niza – Gas Heat Pump
- McClintock – Solar Thermal System

ASU GK-12 & TUHSD Involvement Timeline

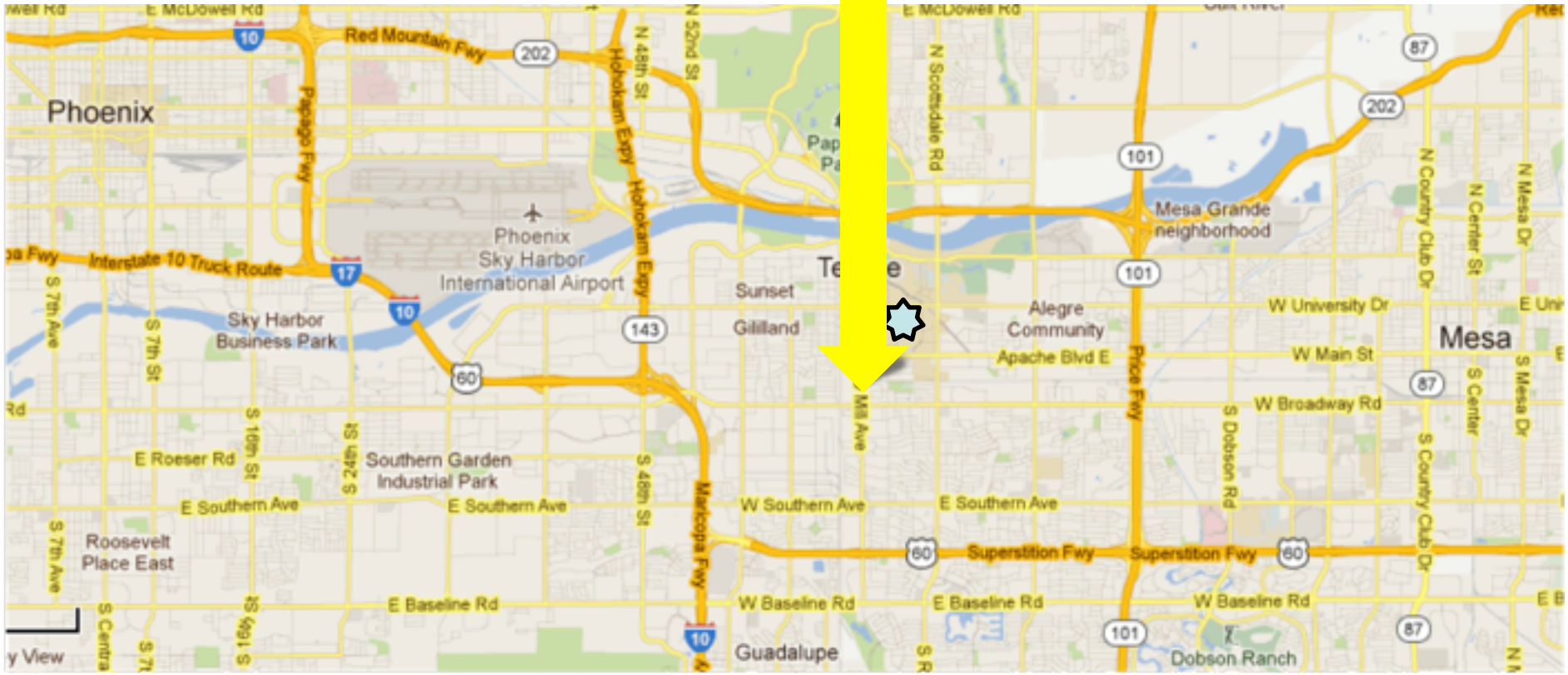
- 2010-2011 Academic Year
  - Two ASU GK-12 Fellows (Tempe High School)
- June 2011
  - TUHSD Teacher Sustainability Workshop
  - Entire GK-12 Program Participated
- 2011-2012 Academic Year
  - Phase I
  - Seven ASU GK-12 Fellows working with district at either full or part-time commitment in all schools

District Sustainability Surveys

- Developed by ASU GK-12 Fellow
- Track knowledge, behaviors, attitudes, barriers and participation in sustainability activities
- Two versions
  - Student
  - Teacher/Staff/Admin
- Rollout during Earth Week in April

Tempe High School (THS)

Tempe High School



Sustainability PLC

- Founded 2010-2011 academic year
  - 12 teachers in 7 departments
- Collaborative effort with ASU GK-12 Fellows
- Grassroots approach to sustainability education
- Aim to involve the wider community
- Teaching style:
  - Head (cognitive learning)
  - Hands (kinesthetic)
  - Heart (emotional attachment)

Curriculum

2010-2011
13 teachers
450 students

Lessons Taught

Teacher	Subject	Fellow	Lesson	No. of Days	No. of Classes	Approx No. of Students
Scott Madine	Government	-	I	?	4	100
Lorna Barker	Culinary Arts	Forrest	AI&E	4	3	75
Jessica Hauer	SpEd Living World	Forrest	E	5	2	24
Hauer + Nowicki	SpEd + Biology		I	4	2	50
Mary Bridget Nowicki	Biology					20
Steph Milam	Earth Science	Forrest	I	2	2	40
Tanya Moulton	Health		I		1	20
Lu Ann Kenner	SpEd		I			
Mike Warner	Math		I		4	80
Rosanne Stapka	English	Forrest	I	3	5	125
Aaron Jarvis	Physics	Forrest	AI&E	2	4	80
Priscilla Ketay	SpEd	Koster	I	5	2	10
Dale Cooper	Art		I		1	30
Gwen Reynolds	Biology	Forrest	I	2	1	20

I=Introduction, AI=Abbreviated Introduction, E=Sustainable Energy

Energy Conservation Poster Project

2010-
2011

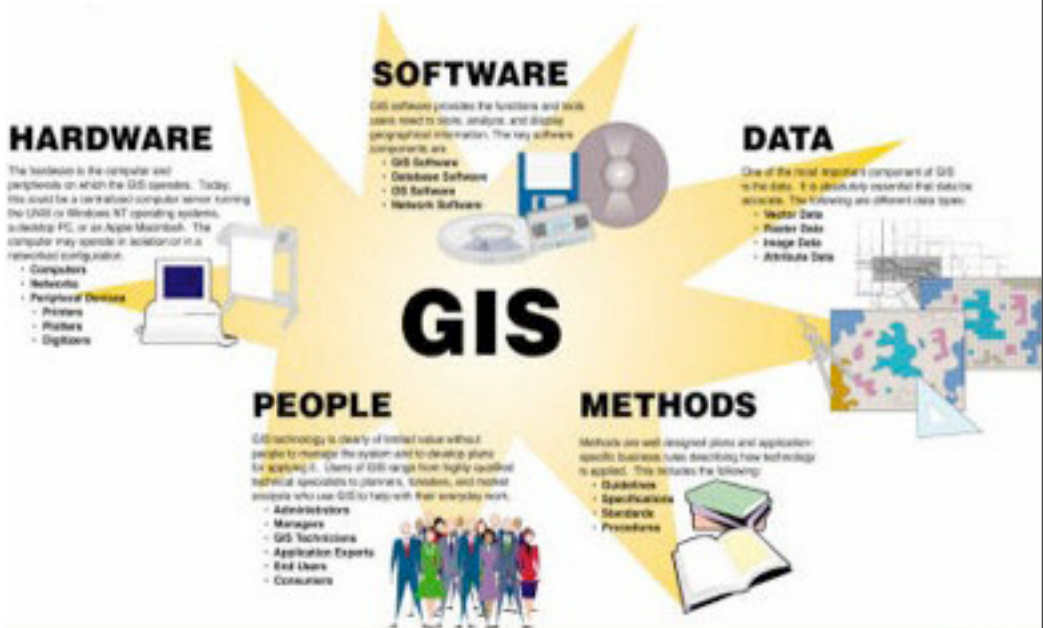
Jessica Hauer,
Stephanie Milam,
Nigel Forrest,
Auriane Koster

Intro to Sustainability 1-2 Course

- Career & Technical Education (CTE)
- Topics
  - Introduction to Sustainability
  - Land & Ecosystems
  - Food
  - Consumption & Waste
  - Supply Chain
  - Energy
  - Climate & Weather
  - Water
  - Health & Well-Being
  - Humankind & Civilization
  - Sustainable Management
  - GIS
  - Change Agent for Sustainable Solutions (CASS)

GIS, Career Exploration and STEM

- "Examining Your Environment through the Power of Data" (EYE-POD)
  - NAU sponsored project
- $10,000 worth of resources
  - ArcView GIS



- Sustainability students learn the technical aspects of GIS software while investigating real phenomena
- Sustainability students participate in laboratory demonstrations and field data collection using Labquest handheld field measurement systems

Class activities

- BioBlitz: National Geographic sponsored Environmental Assessment of Saguaro National Park
- Williams Institute Essay Contest
  - Ethics in Sustainability
- Next year: AZ Game and Fish Heritage Grant (outdoor classroom and schoolyard habitat)

THS Sustainability Class

Living Laboratories: Green Leaf Project

Classes:
Special Education
Biology
Culinary Arts
Art
Child Development

Earth Week – Passport to Sustainability

Who: THS student body, staff, community
What: Earth day celebration to highlight student achievements, strengthen sustainability awareness on our campus, promote career awareness in STEM
When: Thursday, April 19th Earth Week
Where: THS track/ football field

No Impact Week

- First high school
- Themes
  - Consumption
  - Waste
  - Food
  - Energy
  - Water
  - Giving back
- Movie viewing on lawn
  - Wall-E
  - Documentaries

Other Campus activities

- Green Products (soap) and Reusable Bags
  - Art Club
- Community wide E-waste recycling drive
- Aeropostale's Teen Jean Drive
  - STUCO
  - Key Club
  - Sustainability PLC

The ASU Engineering College Challenge for High School students:
Sustainable Doghouse Robotics Competition

Field Trips

- Looking for community-based sustainability projects
- The Hayden Mill
- Community gardens
  - Valley of the sunflowers
- Tour de Tempe
  - Sustainable energy in the city

Collaborations and Project Based Learning

- Hayden Flour Mill Project
- Sustainability Problem Solving Framework
- "Transformational" research
- Student led projects
  - Community Voices
  - Chalk Walk
  - Community Art Space
  - Storyboards
  - Community Garden

Lessons Learned

Challenges Faced

- Potential lack of clarity among team members
- Need for resources
- Developing skills of fellows
- Keeping up with the activities of fellows
- Change is hard!

Overcoming the Challenges

- Potential lack of clarity among team members

Individual School Charters

- Need for a variety of resources

Development of a toolkit (5 day & 1 day lessons)

- Developing skills of fellows

Summer & weekly leadership training

- Keeping up with the activities of fellows

Weekly project tracker sheet

- Change is hard!

Be patient and build in redundant reminders

Question

- **Do you have an idea of a new way to integrate sustainability into your school/facility?**

Find out more about the program.
Visit: sustainableschools.asu.edu

ASU Global Institute of Sustainability
Arizona State University

Camp Energy

1. The Basics
- Introduce lesson and Camp Colley

2. Nonrenewable Energy Sources
- Where do fossil fuels come from?

3. Renewable Energy Sources
- What are renewable energy sources?

4. Let's Work Together
- Energy portfolio creation

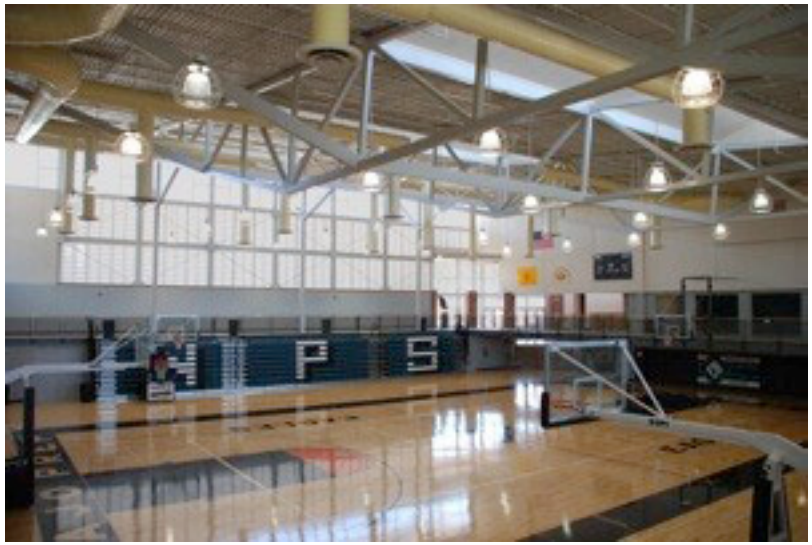
5. Presentations
- Presentations and wrap-up

The Second C: Campus Turning the campus into learning environment

- Sustainability PLC's
- Staff–Faculty–Student committees
- District policies and practices
- Sustainability projects

Energy Conservation

Solar production



Resource Efficiency – facility design to show the "bones"

Daylighting Design

Renewable Energy

BioScience – Hybrid Car

Navajo Prep – Passive solar and natural ventilation

Wrigley Hall – Wind Turbines

Water Conservation

Metro Tech - Building Rain-Water Harvesting System

Low Water Use Plumbing Fixtures

Waste Management & Recycling

ASU's Engrained – waste management program: reduce, reuse, recycle

Vermi composting practices

Outdoor/Ecosystem

Metro Tech – edible orchard

Tempe – learning gardens

Schoolyard Biodiveristy

Food

MetroTech's Culinary Program

Supply Chain

Local Food Sourcing – Metro Tech from Singh Farms

Sustainable purchasing policies

The Third C: Community

- Sustainability projects for the community
- Partnerships with business and industry