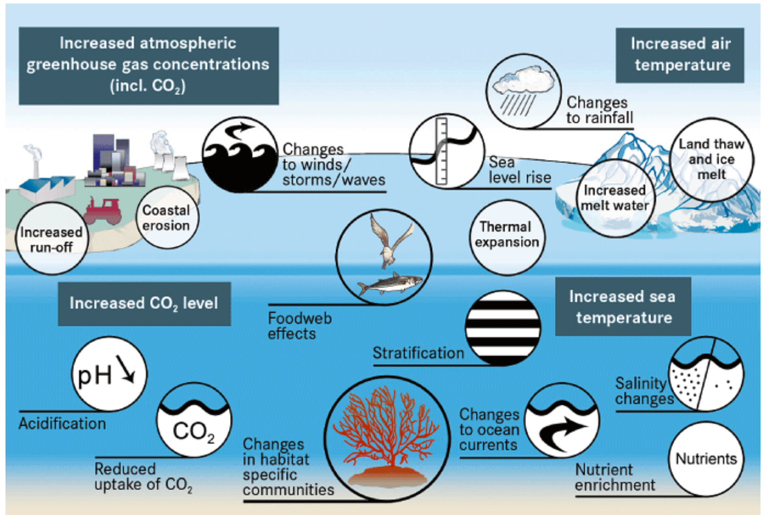

School Renewal – SHS
NWESD 5/20/16


How do you build a case for change?
What is the change?
Why do we have to change now?

How are schools like ecosystems?



Drivers for change

External

- NGSS / CCSS
- College Board
- Community Expectations
- NCLB/ESSA
- State DOE

Internal

- Achievement Gap – Data
- District Mission
- Quality of Curriculum
- Teacher Capacity
- Inquiry Cycle

What else comes to mind?

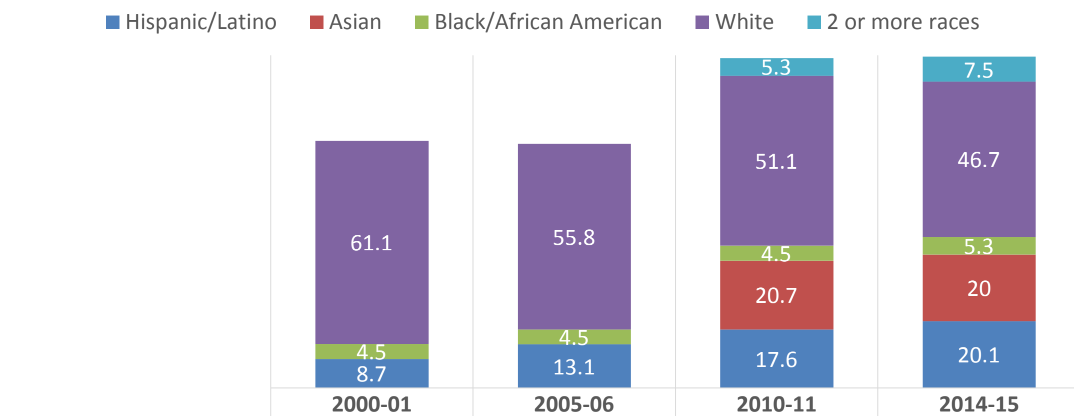
Objectives

- Describe and generalize school renewal process at SHS
- Explore Deeper Learning / PBL design and implementation at school and course level
- Look at conditions that support PBL ecosystem

Where does renewal start?

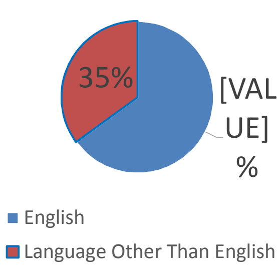
Personal, Local, Immediate

% ENROLLMENT @ SHS BY ETHNICITY OVER THE LAST 15 YEARS

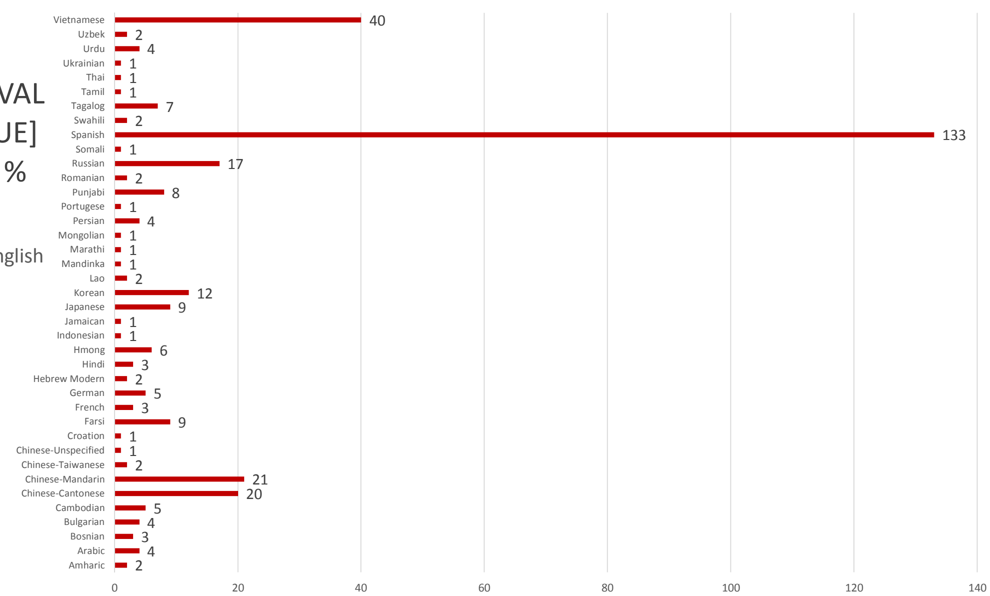


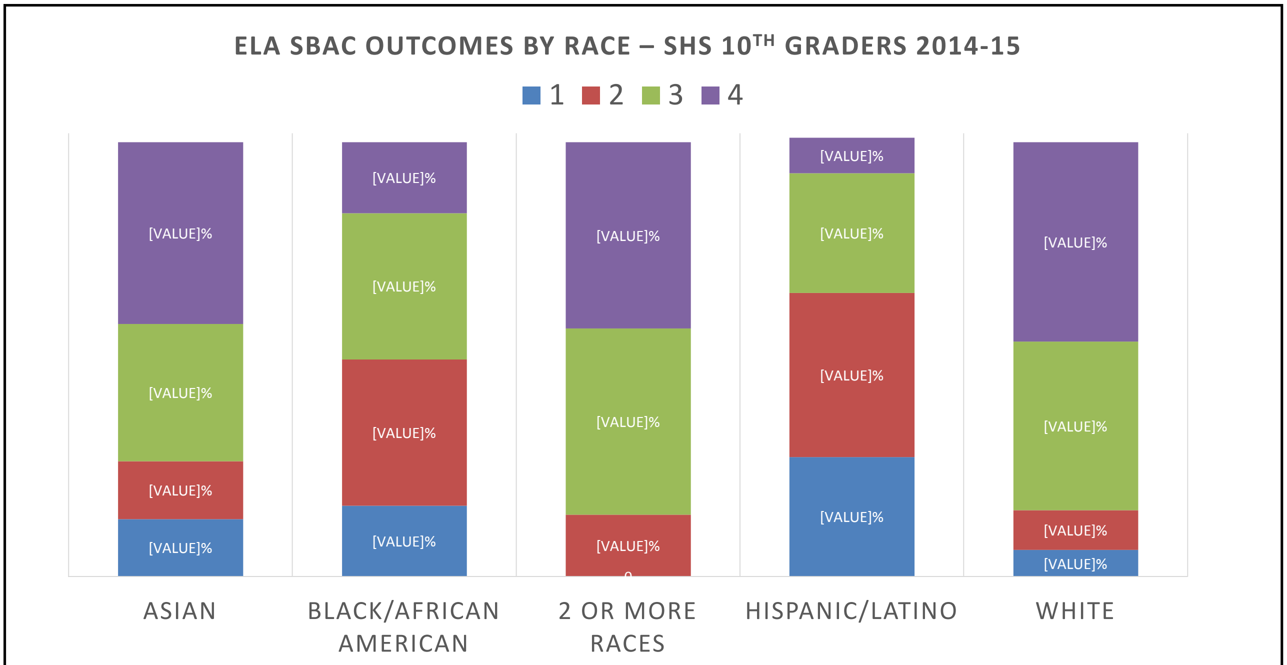
	2000-01	2005-06	2010-11	2014-15
2 or more races			5.3	7.5
White	61.1	55.8	51.1	46.7
Black/African American	4.5	4.5	4.5	5.3
Asian			20.7	20
Hispanic/Latino	8.7	13.1	17.6	20.1

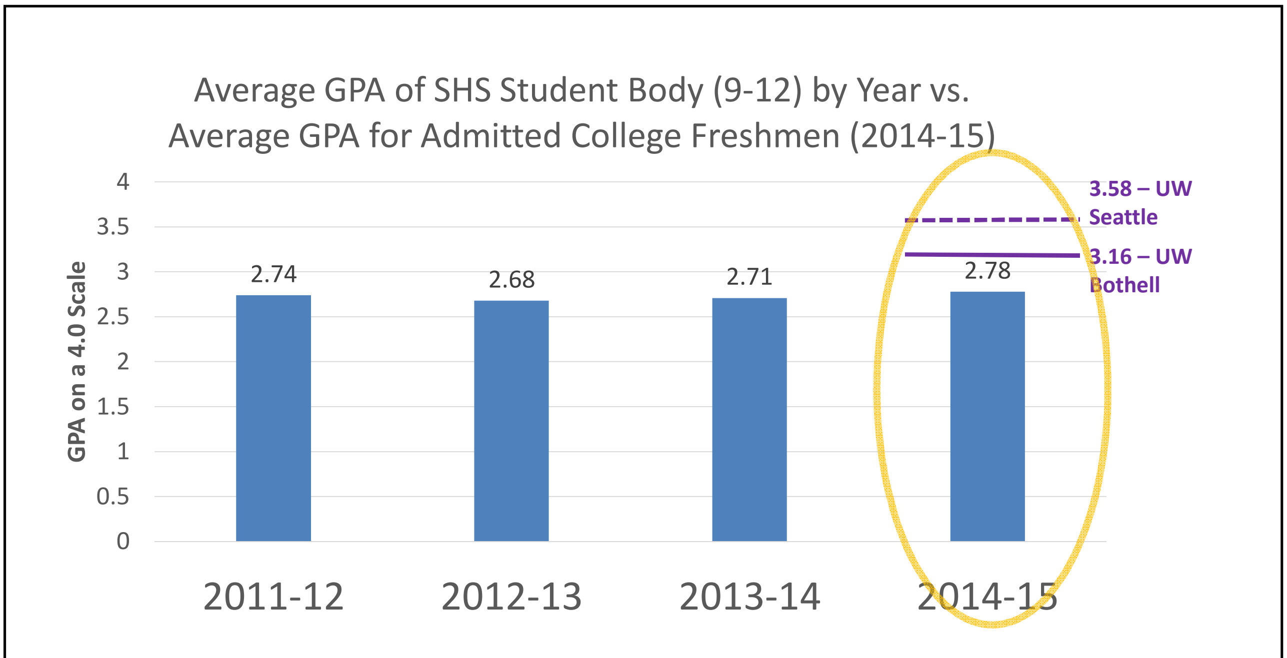
First Language Spoken at Home 2015-16

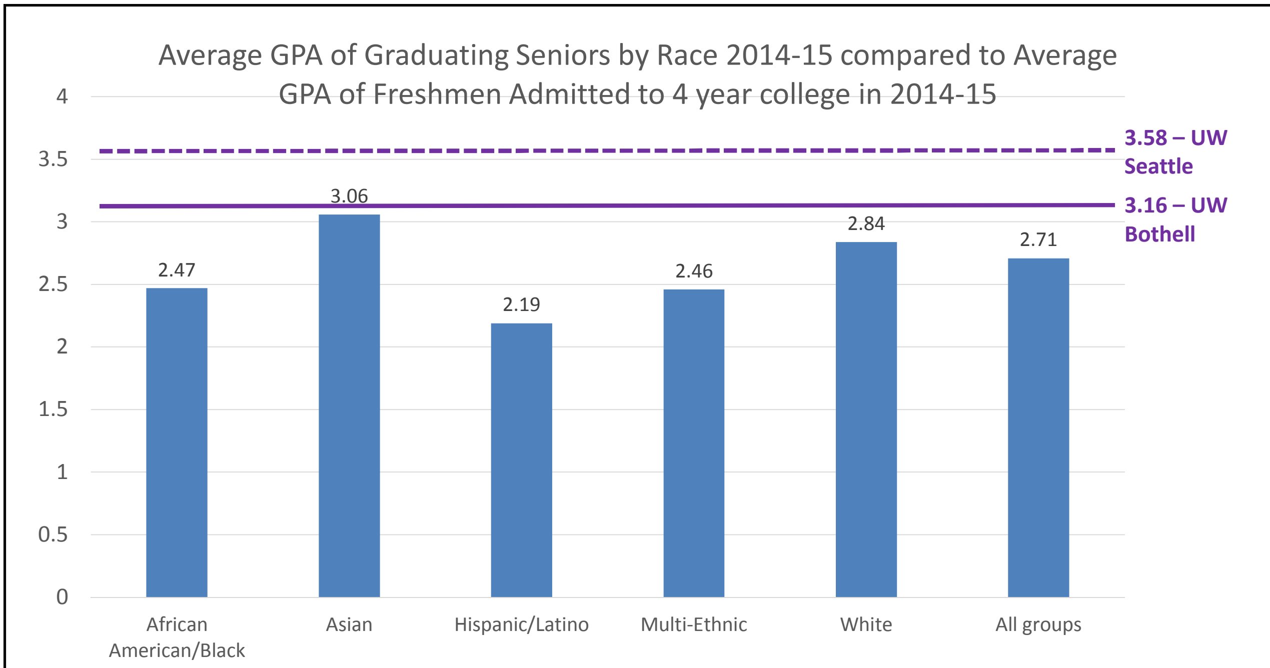


Home Language Sub-groups - # of students




ELA SBAC OUTCOMES BY RACE – SHS 10TH GRADERS 2014-15
1
2
3
4
[VALUE]%
ASIAN
BLACK/AFRICAN AMERICAN
2 OR MORE RACES
HISPANIC/LATINO
WHITE


Average GPA of SHS Student Body (9-12) by Year vs. Average GPA for Admitted College Freshmen (2014-15)
GPA on a 4.0 Scale
4
3.5
3
2.5
2
1.5
1
0.5
0
2.74
2.68
2.71
2.78
3.58 – UW Seattle
3.16 – UW Bothell
2011-12
2012-13
2013-14
2014-15



What would you say is the personal, local and immediate need in your schools?

How were we already addressing the challenges?

- Instructional Leadership Team (ILT) had been formed through a district initiative that was investigating data, conducting classroom walk throughs and leading staff meetings.
- Program Delivery Council had begun an investigation into a possible academy model to bring new students into the school.
- The district had supported SHS in being one of the sites of creation of PBL AP classes—AP US Government starting in 2008 and AP Environmental Science starting in 2009.
- LID days in the summer were used for a combination of nuts and bolts planning for the year and were also used to problem solve and engage persistent challenges for new solutions.
- School leadership favored a distributed model of leadership and actively encouraged teachers to play a leading role in the activities of the school although there was a lack of coordination and strategy between teams.
- A summer bridge program for incoming at risk 9th graders already existed and was funded through a grant from the Bellevue Schools Foundation.

What structures or teams exist in your schools to work on these challenges?

TALK TO YOUR PARTNER

In 2009, Sammamish High School, a public comprehensive high school in the Bellevue School District, was struggling. Enrollment was declining. Since 2002, Sammamish High School has served an increasingly linguistically, socio-economically, racially, and ethnically diverse student body. Student achievement data revealed that gaps between groups of students remained a chronic problem despite efforts by various school leaders to significantly narrow them. Whereas gaps in reading and writing were narrowed, gaps continued in math and, to some extent, graduation rates. White students continued to outperform their African American and Hispanic peers. Middle class and affluent students continued to outperform their more impoverished peers. Students qualifying for Special Education and English Language Learner services and accommodations struggled to keep up with their mainstream, native English peers.

Instigated by a committee of teachers looking for a dramatic way to reset the school's academic culture, the school investigated various options for improving student outcomes. Problem-based learning (PBL) emerged as a promising approach. In 2010, Sammamish High School received a "Development"-level Investing in Innovation (i3) grant from the Department of Education. The school focused on science, technology, engineering, and mathematics (STEM) disciplines and identified PBL as their primary tool of school-wide improvement. In their grant proposal Sammamish articulated several goals and student learning and achievement outcomes they hoped to accomplish by 2015.

Theory of Action

INSTITUTE for Science + Math EDUCATION

- Implementation of PBL curriculum throughout the school to establish a scalable, sustainable, 21st century skills based program in Advanced Placement (AP) and non-AP coursework,
- Use PBL as a framework to support student growth in key cognitive strategies and academic behavior,
- Implement a series of specific supports for struggling students, focused on increased mathematics literacy,
- Provide customized and situated professional development (PD) that will help teachers implement new PBL curricula and evaluate their effectiveness to do so.

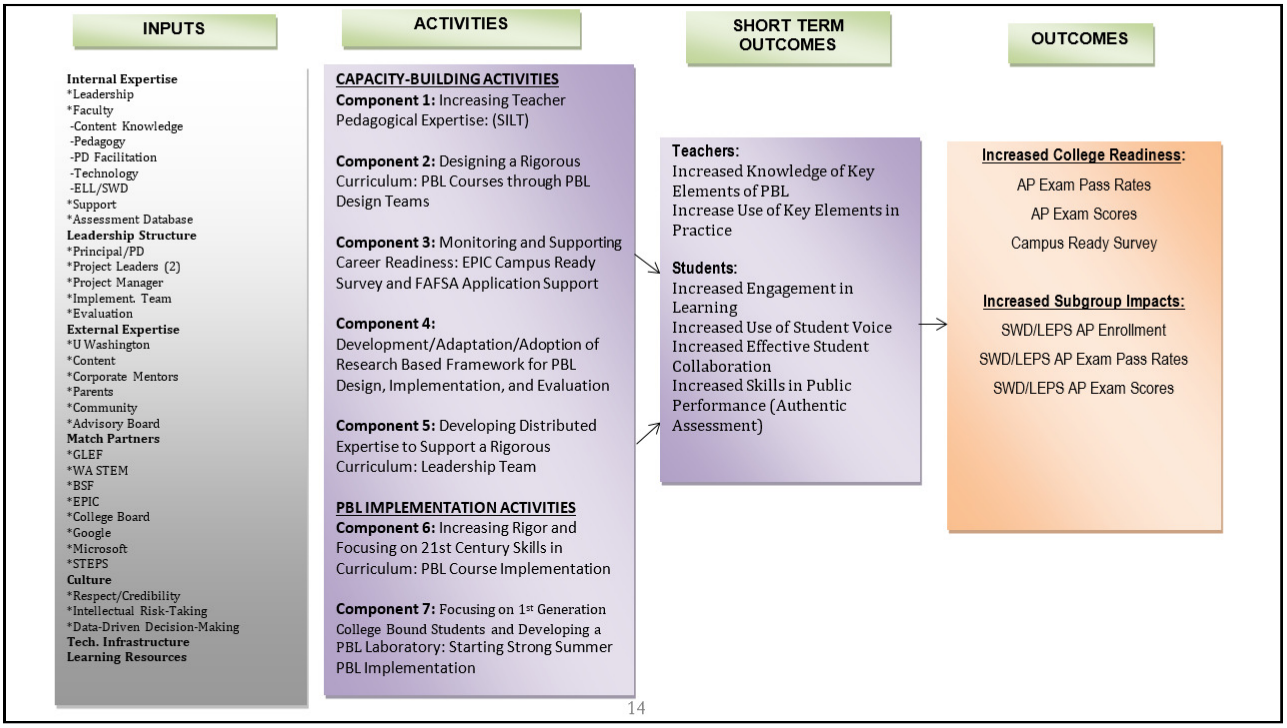
Finding promising practice (PBL)

Existing building capacity (PBL AP Gov and PBL APES)
Teacher leadership / ownership
Clear connections to content and practices/skills
Outside measures of success (AP, ThinkReady)
External expertise (UW ISME, EPIC/Conley, WA STEM)

Measuring change?

Their student learning and achievement outcomes included:

- 20% increase in AP pass rates, especially in STEM content areas (Biology, Chemistry, Statistics, Calculus AB/BC, Physics, Environmental Science),
- 20% increase in students with disabilities (SWD) and limited English proficient students (LEPS) enrolling in AP STEM classes,
- 75% of all students, 50% of SWDs, and 60% of LEPS successfully completing pre-calculus with a B or better,
- 100% of all students reaching standard on the state math test,
- 10% annual improvement on the state science test for all students,



What kind of intervention fits for your problem? Who out there is doing the work in your school? In the broader community?

What is Problem-Based Learning?

- How would you define PBL?
- How is it the same/different from deeper learning?
- What questions do you have about PBL?

"Project" or "Problem"?

Often used interchangeably

Some sources (Buck Institute for Education, *Interdisciplinary Journal of Problem-based Learning*) have specific ways they define the difference

At SHS, we formally use the term "problem-based learning"

- Aim towards students applying what they know to solve problems
- The words are less important than how we define PBL

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edutopia

http://www.edutopia.org/sammamish-problem-based-learning-video

- 3:50-6:18
- 9:40-12:48

After watching the video, re-visit your definition.

- Is there anything you would add or change?
- Questions that arose for you as you watched?

Core Values vs Instructional Model

Instructional Model (KIA Phases of PBL):
Introduce the Driving Question + Introduce the Culminating Challenge + Develop Subject Matter Expertise + Doing the Culminating Challenge + Responding to the Course Master Question + Taking the Unit Exam

Instructional Model Hybrid (ie Buck Institute and others)
Key Knowledge/Understanding + Sustained Inquiry + Challenging Question + Student Voice and Choice + 21st Century Skills + Authenticity + Feedback and Revision + Public Product

Core Value (the 7 Key Elements)

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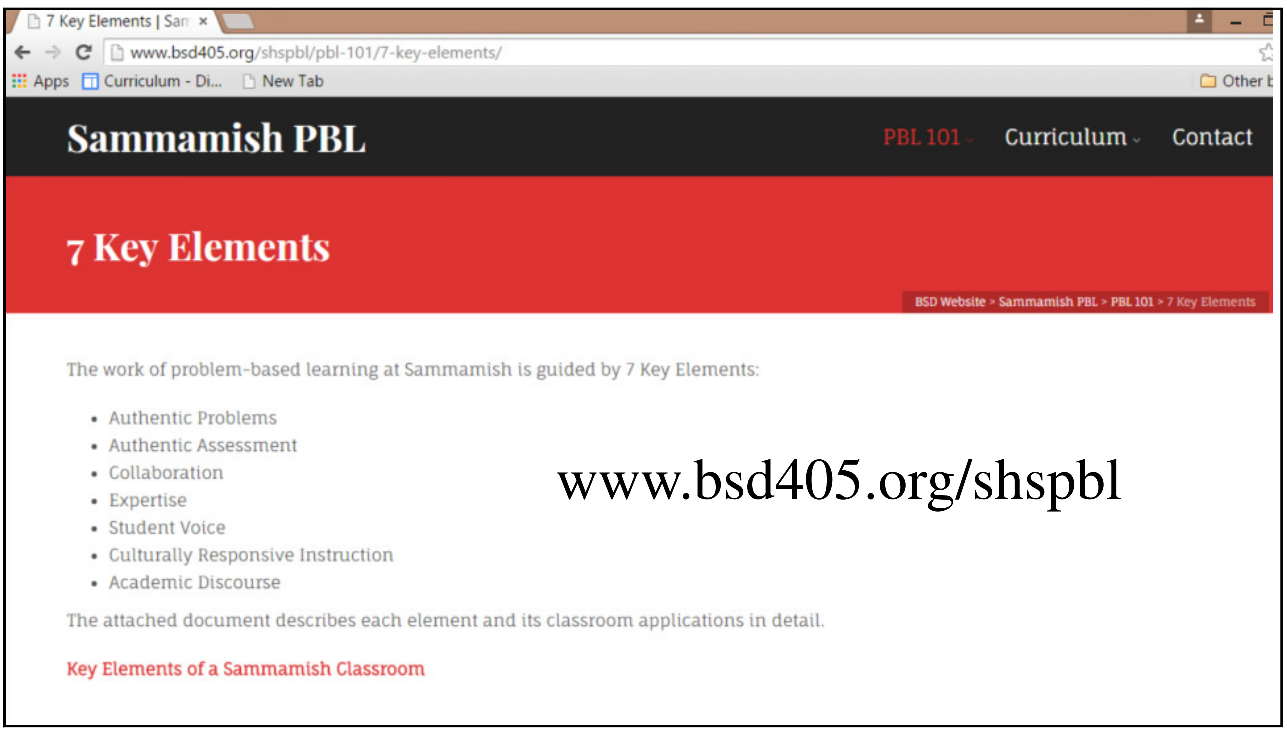
Seven Key Elements

Authentic Problems
Authentic Assessment
Culturally Responsive Instruction
Student Voice
Academic Discourse
Collaboration
Expertise



Key Elements Continuum

- Integration, Transformation, Empowerment
- Teachers and students can't be at empowerment every day, all year. *GREAT!*
  - There are very good reasons to be at other levels
- PBL isn't just for the sake of kids doing projects. It's about students learning to work together to solve authentic problems.

Teacher directed ←——————→ **Student directed**

Authentic Problems Continuum		
Integration (Teacher Led, Student Collaboration)	**Transformation (Student Led)**	**Empowerment (Student Initiated and Led)**
Teachers collaborate with colleagues and seek outside expertise to devise ill-defined problems* that reflect challenges in the field or discipline. Problems have multiple possible solutions or solution strategies. Teachers seek to work with outside experts to develop ideas and give students feedback on their work. Teachers work to develop a long-term relationship with outside experts, allowing them to interact in the course each year to benefit student learning. Experts serve as mentors and as links to careers related to course content and skills. **Students** see ways in which the problem is authentic and relevant to them. They begin developing research and collaboration skills that help them understand the complexity of the problem and how it relates to them. Students are expected to complete the task to a professional standard and are given opportunities to display their work to a wider audience.	Based on their understanding of their subject and their discipline, **students, teachers** and experts work collaboratively to identify and solve ill-defined problems*. The **teacher** serves to align the problem with the content and skill goals of the class, ensures that students receive regular feedback and guidance, but does not direct the outcome of the problem. Because the problems are naturally broad, there is no single correct response and the problems can be tackled from several perspectives and points of entry. **Students** are able to solve increasingly ill-defined* and ill-structured problems. They actively and consciously develop research and collaboration skills that help them understand the complexity of the problem and how it relates to them. Students are drawing on what they have learned either within or between disciplines to most effectively solve the problem.	Based on their understanding of their studies, their community and their resources, **students** develop an ill-defined problem* to solve that currently challenges them. They work in teams to ensure a range of voices and perspectives are represented in the task. They utilize a variety of resources to find and implement a solution. Problems frequently require students to draw on multidisciplinary skills. In addition, students inherently learn the process of failure and innovation as they encounter more sophisticated problems. The problem necessitates community action beyond the classroom with students serving as leaders of that process. **Teachers** help to illustrate the link between problem work and the content and skills required by state and national standards.

*In cognitive theory, every problem consists of three parts: (1) an initial state, such as a question, need, or problem statement; (2) the process of solving the problem; and (3) the end state, such as a solution or product. In an **ill-defined** or **ill-structured problem**, one or more of the three parts is not specified – that is, one or more end states/products/solutions could be possible, multiple processes could be used to solve the problem, etc.

Additional references:

Reitman, W. (1965). *Cognition and thought.* New York: Wiley.

Simon, H.A. (1978). Information-processing theory of human problem solving. In Colodny, R.G. (Ed.). *Mind and cosmos: Essays in contemporary science and philosophy.* Pittsburgh, PA: University of Pittsburgh Press. pp. 71–119.

Thinking about the instructional element of your intervention, how can you empower teachers to define their work? What might that look like for you?

Whole-staff professional learning

- Sammamish Institute for Learning and Teaching (SILT)
- Teacher-led, with support from university partners
    - No outside consultants/trainers
    - Taking advantage of skills in our building
    - Adjustments based on frequent feedback
- Focus on developing common language around Key Elements

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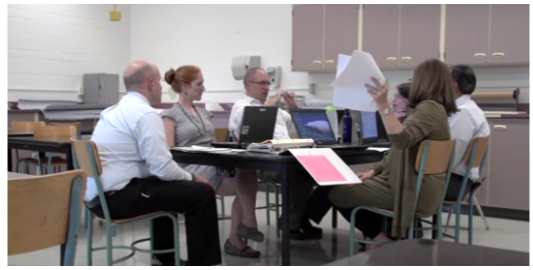
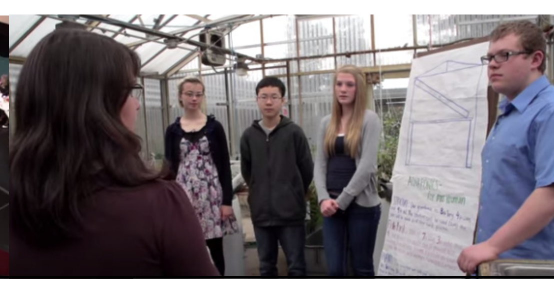
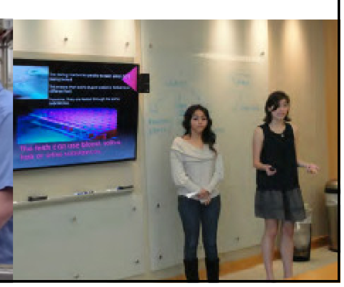
Teacher-designed courses



- People Proposed Teams for Design
  - Release Time/PLC Time
  - Summer Work
  - Continual Revision
- Effective design teams:
  - Set up explicit norms for talk & design work
  - Discussed student artifacts & problems of practice
  - Design/pilot, design/pilot

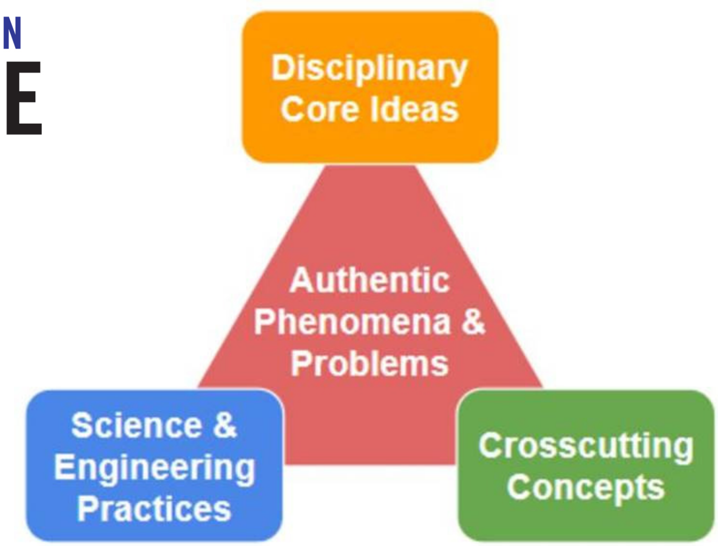
Generating problems…

- What careers require skill in this discipline? What kinds of things do those professionals do?
- What standards must be taught?
- What are some "authentic problems" in this discipline that (a) relate to those standards and (b) are accessible to students?

What might the component parts of the work look like for you? Where and when can they happen?

NEXT GENERATION SCIENCE STANDARDS



Qualities of a Good Anchor Phenomenon for a Coherent Sequence of Science Lessons

Instructional sequences are more coherent when students investigate compelling natural phenomena (in science) or work on meaningful design problems (in engineering) by engaging in the science and engineering practices. We refer to these phenomena and design problems here as 'anchors.'

- ☐ A good anchor builds upon everyday or family experiences: who students are, what they do, where they came from. It is important that it is compelling to students from non-dominant communities (e.g., English language learners, students from cultural groups underrepresented in STEM, etc.).
- ☐ A good anchor will require students to develop understanding of and apply multiple NGSS performance expectations while also engaging in related acts of mathematics, reading, writing, and communication.
- ☐ A good anchor is too complex for students to explain or design a solution for after a single lesson.
  - ☐ The explanation is just beyond the reach of what students can figure out without instruction.
  - ☐ Searching online will not yield a quick answer for students to copy.

West Coast Scientists Urge Rapid Action Against Ocean Acidification

By JOHN RYAN • APR 5, 2016

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Institute for Systems Biology
Revolutionizing Science. Enhancing Life.

Ocean Acidification CO_2

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Where does this fit in your current curriculum? What is the most high leverage change you could make?

Talk to Your Partner

Life of a unit: Ocean Acidification

- Content taught: acid-base chemistry, ecosystems
- Required biology/chemistry course; 9th or 10th grade
- Iteration 1: Spring 2011
  - Great hopes; but train wreck
- Iteration 2: Spring 2012 – much better!
- Iteration 3: Spring 2013
  - Implemented in new version of course; pacing trouble causes product shift!
- Winter 2014 & 2015 – CO_2 challenge
- Iteration 4: Winter 2016 – original curriculum now finished

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Cross Cutting Concepts	Science and Engineering Practices
Patterns	Asking questions (for sci) and defining problems (for engineering)
Cause and Effect	Developing and using models
Scale, Proportion and Quantity	Planning and carrying out investigations
Systems and System Models	Analyzing and interpreting data
Energy and Matter	Using mathematics and computational thinking
Structure and Function	Constructing explanations (for sci) and designing solutions (for eng)
Stability and Change	Engaging in argument from evidence
	Obtaining, evaluating and communicating information

Authentic Problems
Authentic Assessment
Culturally Responsive Instruction
Student Voice
Academic Discourse
Collaboration
Expertise

Conditions for success

- Freedom to fail
- Research-based instructional framework
- Dedicated collaboration time to:
  - Create common vision & language
  - Design curriculum

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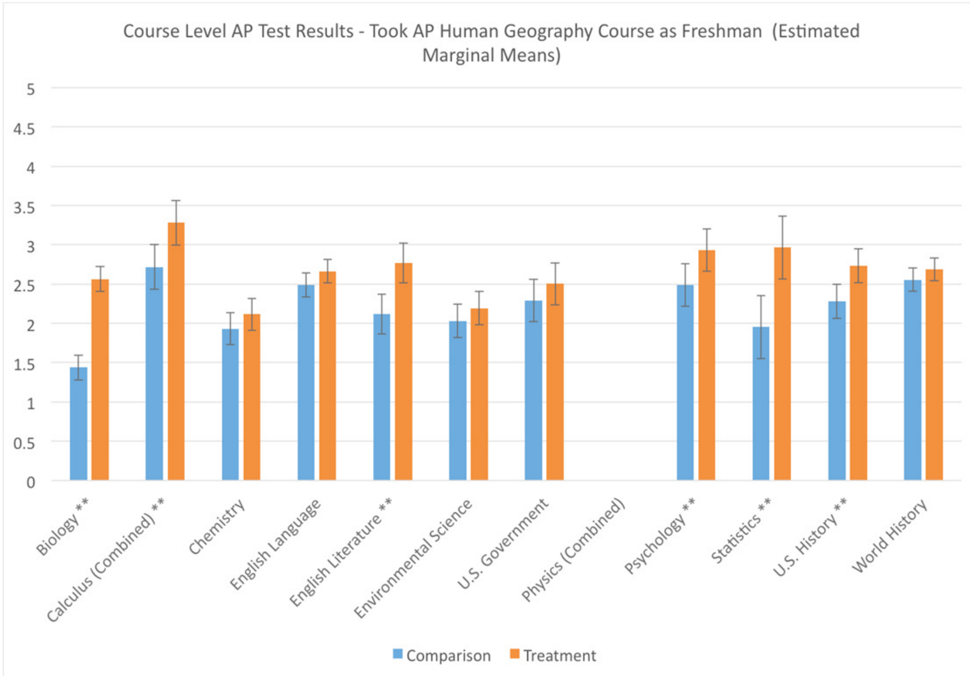
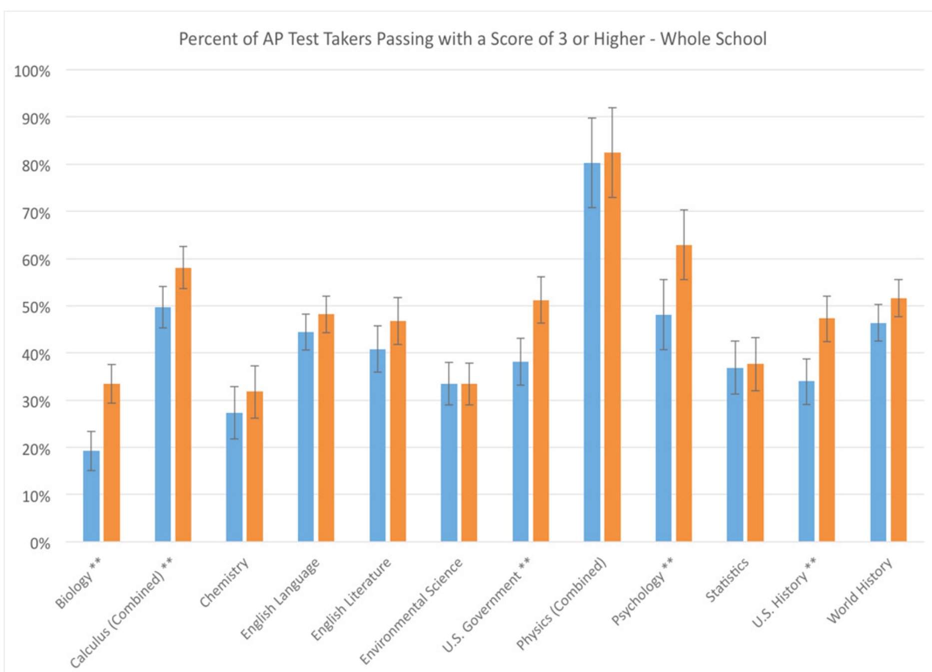
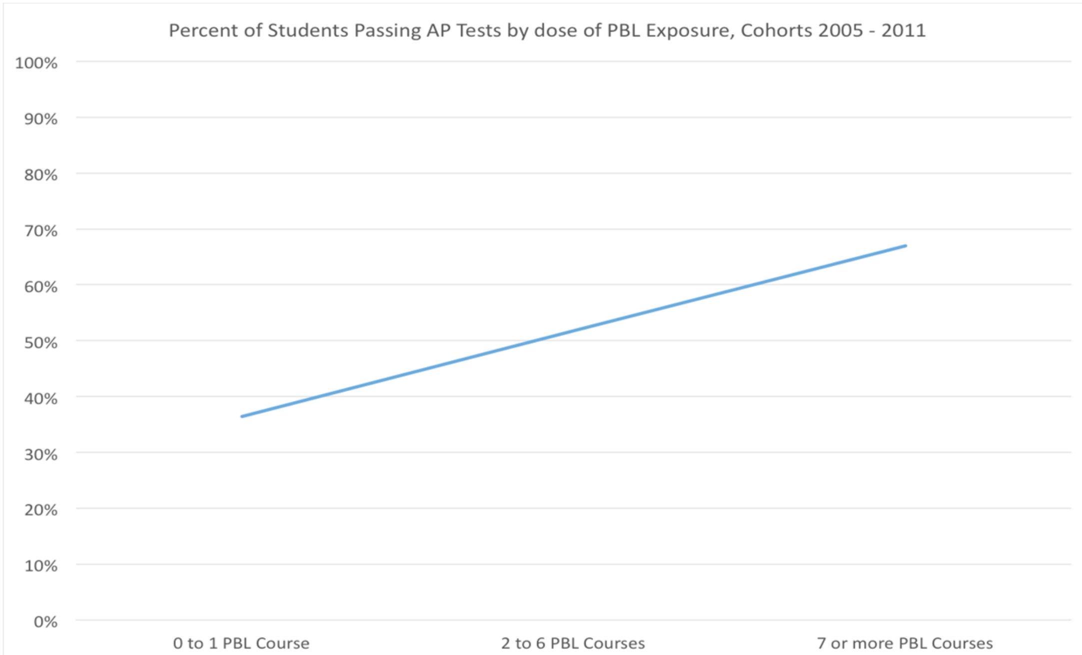
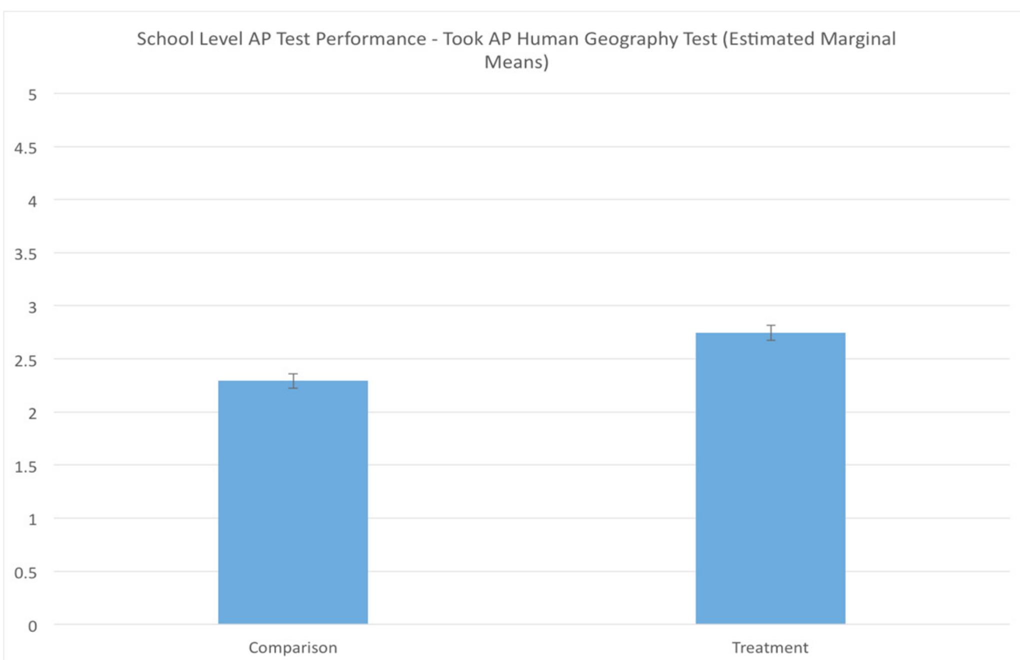


Course Level AP Test Results - Took AP Human Geography Course as Freshman (Estimated Marginal Means)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Biology **
Calculus (Combined) **
Chemistry
English Language
English Literature **
Environmental Science
U.S. Government
Physics (Combined)
Psychology **
Statistics **
U.S. History **
World History
Comparison
Treatment



Percent of AP Test Takers Passing with a Score of 3 or Higher - Whole School
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
Biology **
Calculus (Combined) **
Chemistry
English Language
English Literature
Environmental Science
U.S. Government **
Physics (Combined)
Psychology **
Statistics
U.S. History **
World History


Percent of Students Passing AP Tests by dose of PBL Exposure, Cohorts 2005 - 2011
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0 to 1 PBL Course
2 to 6 PBL Courses
7 or more PBL Courses


School Level AP Test Performance - Took AP Human Geography Test (Estimated Marginal Means)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
Comparison
Treatment

What is one thing you can do before the end of the school year to set up your work?