

Major Goal


To *prepare* and *inspire* students to pursue STEM college majors in general, and biomedical research careers in particular *through* a *hypothesis-driven,* project-based biomedical research (BR) learning experience

PBL

Specific Aims

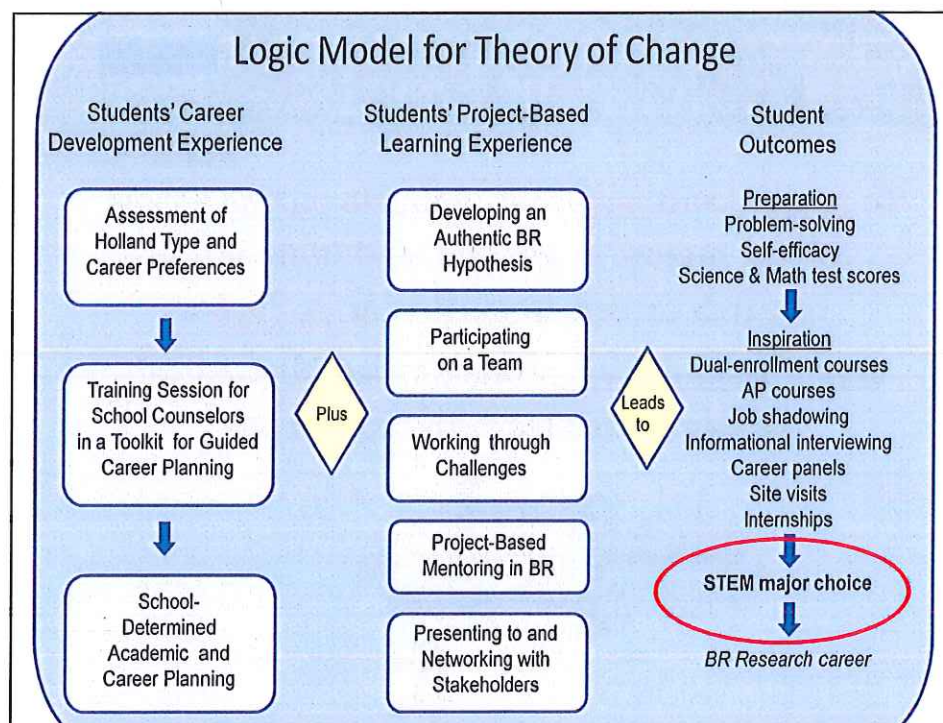
1. Determine whether interest, motivation and/or preparedness to pursue a biomedical research career are greater among students who participate in the Epi Challenge intervention compared with students who do not

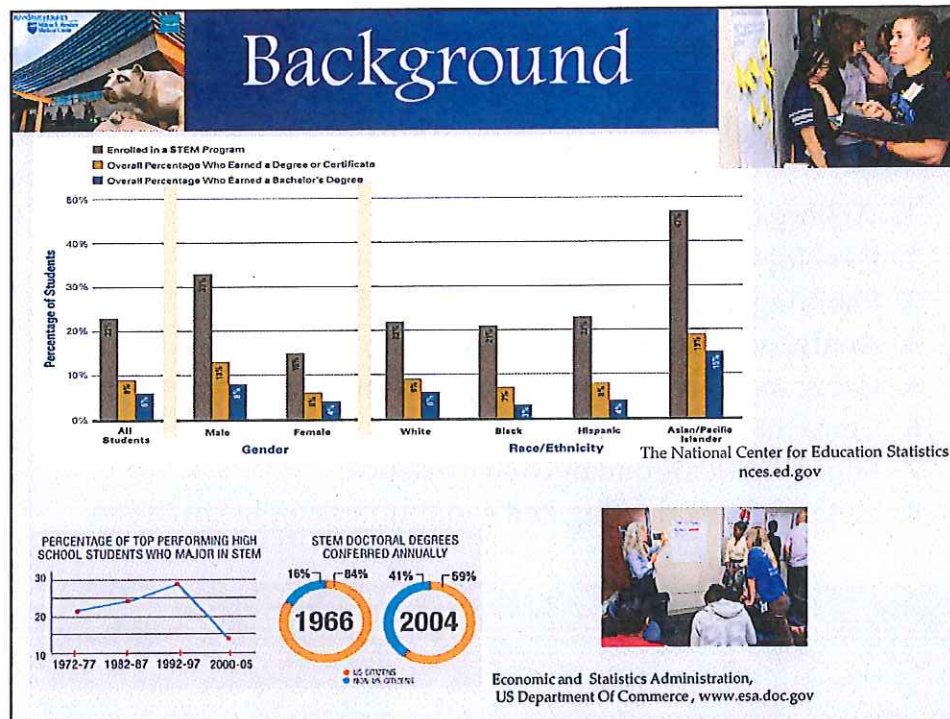
Design: Randomized Intervention



2. Determine whether adoption of career assessment and planning tools by high school career counselors influences motivation and/or preparedness to pursue a BR career

Design: Non-Random Intervention

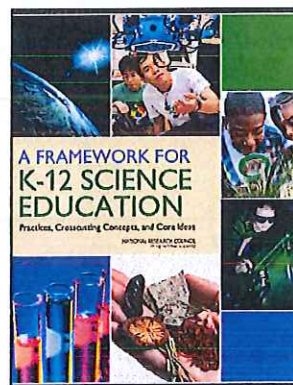




Justification for Intervention

- Many experts in science and education believe that high school students should have more opportunities to actually do science

"... our expectation is that students will themselves engage in the practices and not merely learn about them secondhand. Students cannot comprehend scientific practices, nor fully appreciate the nature of scientific knowledge, without directly experiencing those practices for themselves"



National Research Council (2012). A Framework for K-12 Science Education: Practices, Crosscutting Concepts, and Core Ideas. Board on Science Education. Washington, DC: The National Academies Press.)

The eight NRC 2012 *Practices*
that "...scientists employ as they investigate and build
models and theories about the world."

1. Asking questions
2. Developing and using models
3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations
7. Engaging in argument from evidence
8. Obtaining, evaluating and communicating information



Framework Practices for K-12	Epi Challenge Practices
1. Asking questions	<ul style="list-style-type: none"> Identify a health-related question of genuine relevance to them and formulate a hypothesis Develop questions that will allow them to test their hypothesis
2. Developing and using models	<ul style="list-style-type: none"> Write a proposal for testing their hypothesis using a cross-sectional epidemiological study design
3. Planning and carrying out investigations	<ul style="list-style-type: none"> Complete the National Institutes of Health Protecting Human Research Subjects training Ethically test their hypothesis by carrying out their proposal among students in their school district
4. Analyzing and interpreting data	<ul style="list-style-type: none"> Analyze data
5. Using mathematics and computational thinking	<ul style="list-style-type: none"> Calculate prevalence and prevalence ratios
6. Constructing explanations	<ul style="list-style-type: none"> Make justifiable inferences based on the differences or similarities between the prevalence rates
7. Engaging in argument from evidence	<ul style="list-style-type: none"> Present the results of their study to public health professionals
8. Obtaining, evaluating, and communicating information	<ul style="list-style-type: none"> Present the results of their study to school district stakeholders

Definition

Epidemiology is the study of **populations** in order to determine the **patterns** and causes of health and illness, and to be able to apply what's been learned to **control health problems**.



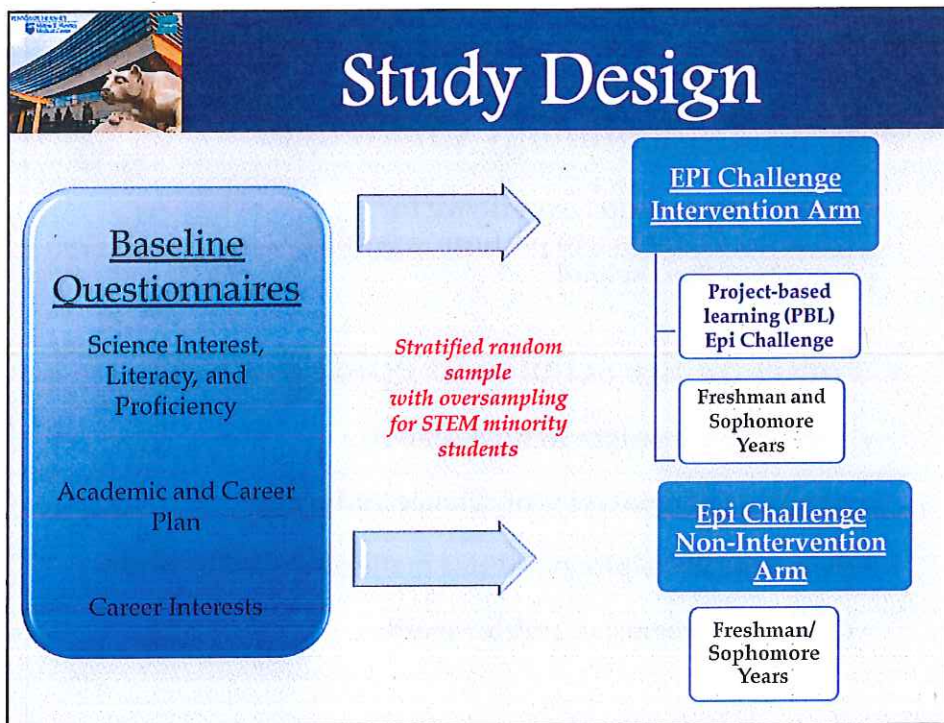
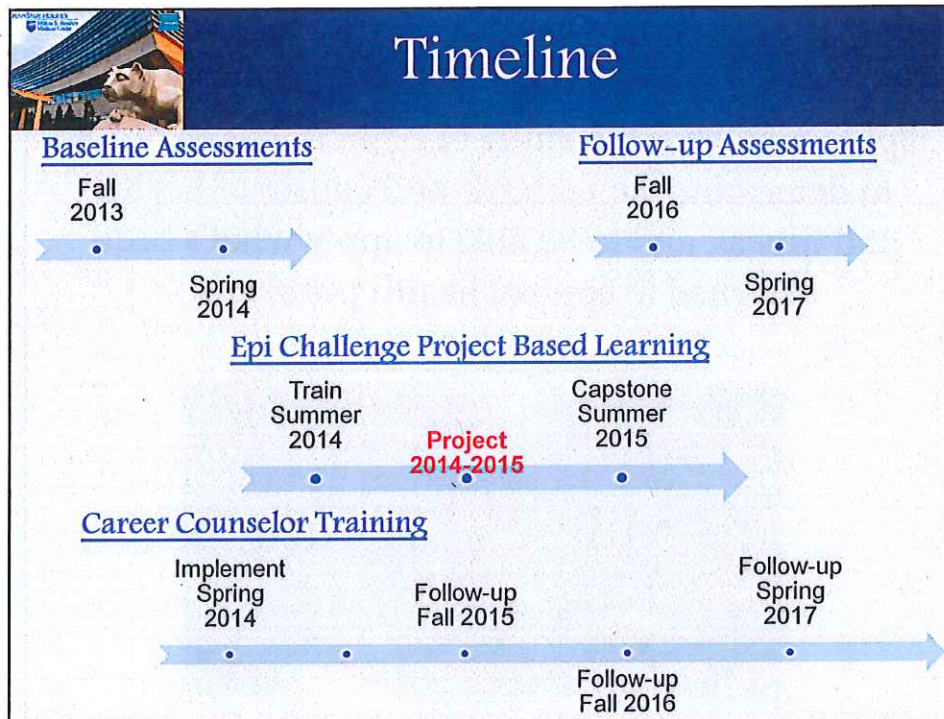
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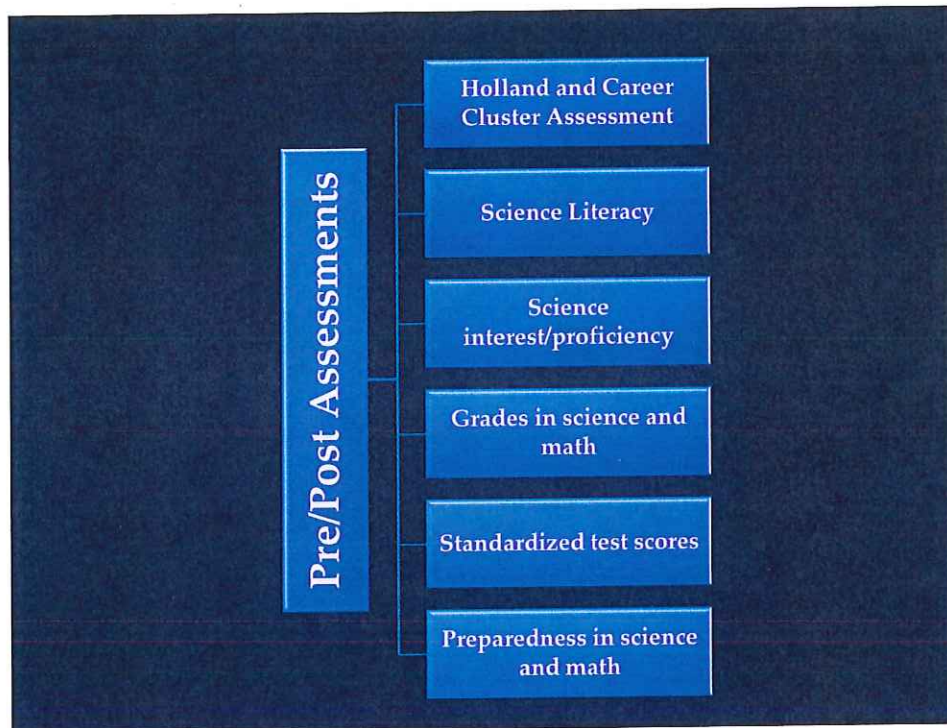
• Why an Epidemiology Challenge?




- Offers a "real world" experience for high school students to perform scientific research in their school
- Focus on the science of epidemiology
 - Typically not taught in high school
 - Applies key principles of science and math
 - Scientifically explores subject matter relevant to youth
 - Called the science of public health


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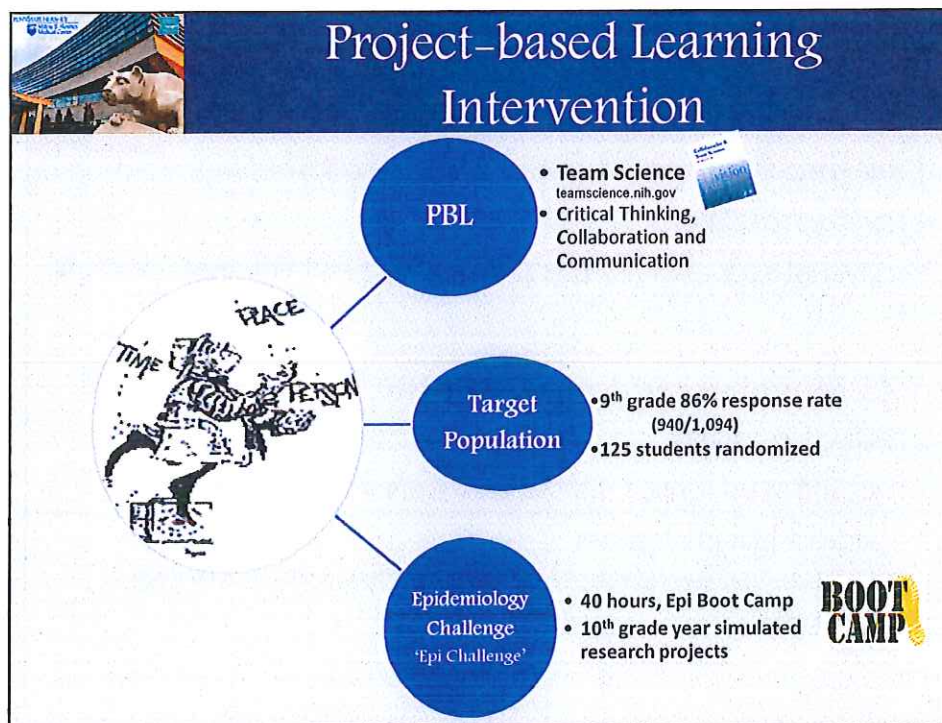
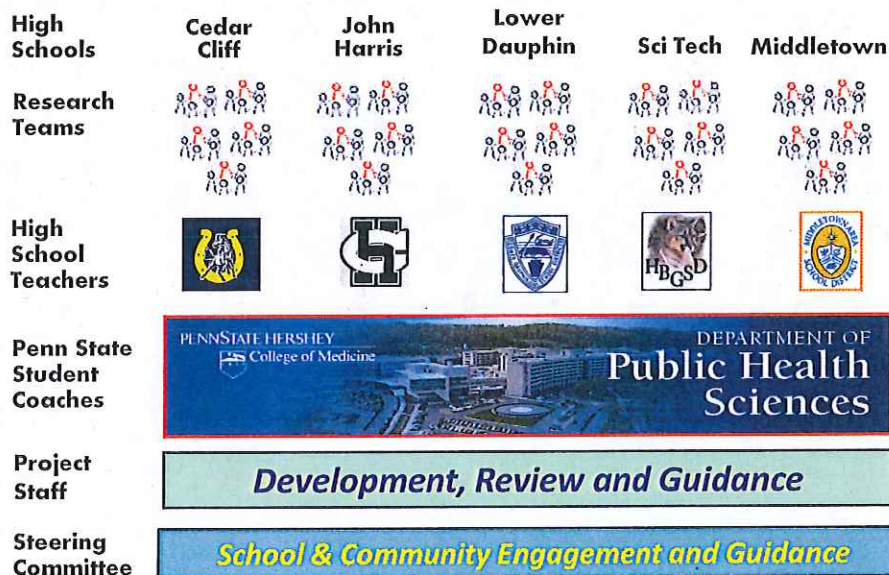



Baseline Assessment and Randomization



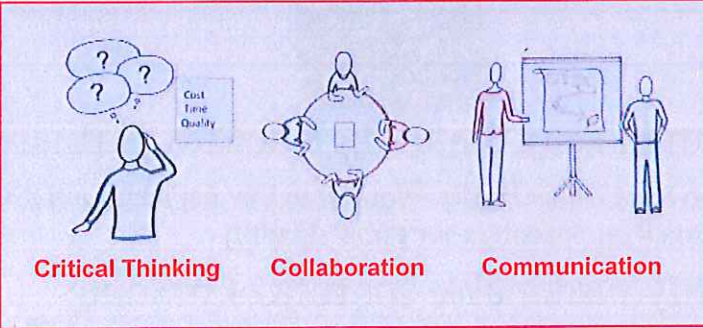
- Baseline Science Literacy and Interest Questionnaire:
 - Overall 86% response rate (940/1,094) of all 9th grade students
- 125 Students randomized to the intervention and control groups
 - Stratified by student interest and proficiency in STEM
 - At least half of all strata
 - under-represented science minority or economically disadvantaged
 - female

Method: University-School Partnership






Project-Based Learning



Critical Thinking Collaboration Communication

-Team science
-Professional Development
 -

www.youtube.com/watch?v=LMCZvGesRz8
 Buck Institute for Education



Successes/Challenges

➤ **Successes**

- work as a team, constructive criticism, PD, participant rate is steady

➤ **Retention of students with a diverse set of skills, learning styles, and educational backgrounds**

- Coaching model includes both school educator and graduate student coach teams
- Life Challenges
- Epi Challenge Schedule
 - -in school versus out-of-school
- Student Professional Development
- Dynamics of "Real" Research

Differential adoption of career model among schools

- In-person training of all counselors at one time
- Interactive format to promote peer-to-peer learning






Long Term Goals



- Maintain Penn State–High School partnerships
 - Penn State Public Health Workforce Development Initiative (Council on Education for Public Health)
- Identify sustainable sources of funding
 - Community Science Education Partners
- Develop partners at other institutions
- Develop teaching capacity at other schools




Acknowledgements

Research Team	High School Partners	Sponsors
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