Cordova High School STEM Equity Pipeline Team

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Folsom Cordova
UNIFIED SCHOOL DISTRICT

NAPE
National Alliance for Partnerships in Equity Education Foundation

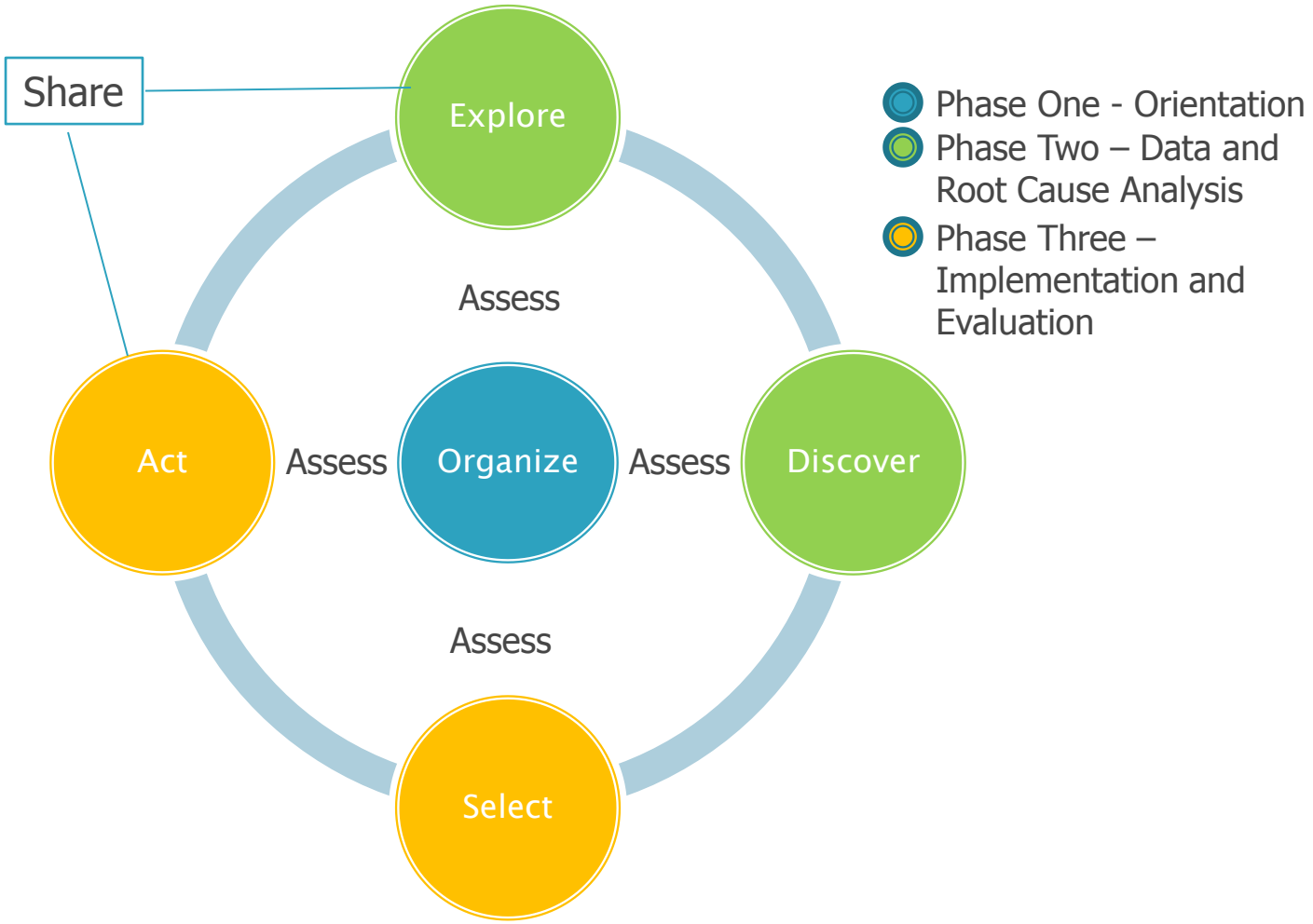
Outline

- PIPESTEM ™ & National Alliance for Partnership in Equity (NAPE) Introduction
- Cordova High School Data on Female Participation
  - IED Class Data comparison
  - POE Class Data comparison
  - Advanced Math Class Data comparison
  - Advanced Science Class Data comparison
- Cordova HS causes of low Female Participation
  - Hypothesis
  - Survey Data
- Cordova HS Actions
  - Polytech Academy Recruiting Efforts
  - Science Department Efforts
  - Math Department Efforts

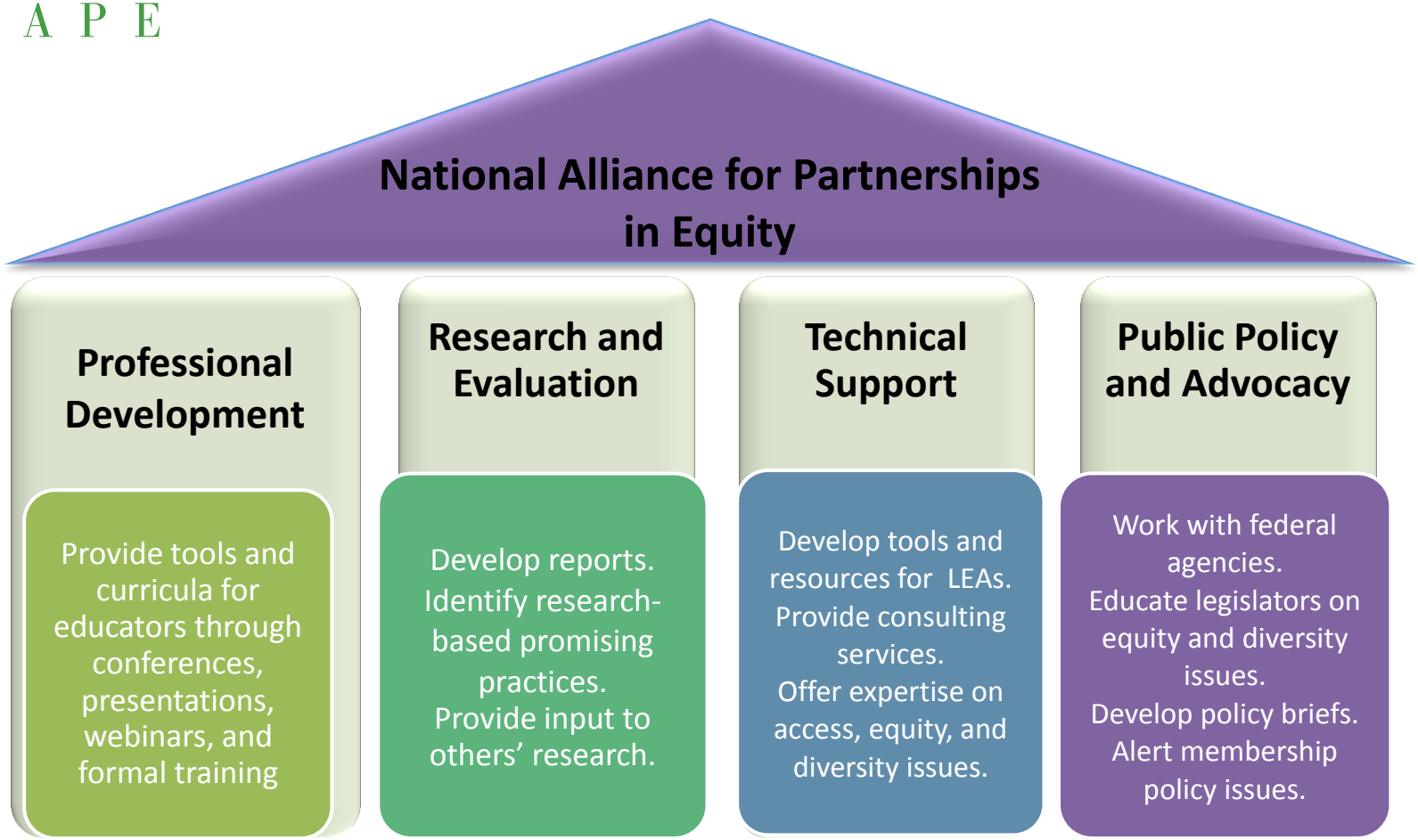
CHS
Cordova High School

Partners and Funder

STEM Equity Pipeline
Program Improvement Process For Equity



Who Is NAPE?


National Alliance for Partnerships in Equity
Professional Development
Provide tools and curricula for educators through conferences, presentations, webinars, and formal training
Research and Evaluation
Develop reports.
Identify research-based promising practices.
Provide input to others' research.
Technical Support
Develop tools and resources for LEAs.
Provide consulting services.
Offer expertise on access, equity, and diversity issues.
Public Policy and Advocacy
Work with federal agencies.
Educate legislators on equity and diversity issues.
Develop policy briefs.
Alert membership policy issues.

FCUSD PIPESTEM™ Projects 2011-2013

- Folsom/Cordova Unified School district is part of a PIPESTEM™ project to increase the number of girls and minorities in STEM classes in order to increase their access to high-wage, high-skill and high-demand careers.
- Training provided by NAPE
- Cordova Team: Dan Anklam, Faith Caplan, Pam Goldman, Mark Levy, Monica Lobbestael, Glen Reagan

Cordova High School Data

- General School Description (2011-2012 data)
  - Total Students: 1770
  - Offers AP, honors and PLTW classes.
  - Traditional Schedule

Student Enrollment by Group (School Year 2011-12)

Group	Percent of Total Enrollment	Group	Percent of Total Enrollment
Black or African American	16.4	White	44.9
American Indian or Alaska Native	0.8	Two or More Races	1
Asian	7.5	Socioeconomically Disadvantaged	68.7
Filipino	3.7	English Learners	24.4
Hispanic or Latino	24.2	Students with Disabilities	16
Native Hawaiian/Pacific Islander	1.5		

Cordova HS 2011-2012 PLTW Engineering Class Data

- IED
  - Enrollment: 24 students
    - 20 Male (83%) / 4 Female (17%)
- POE
  - Enrollment: 19 students
    - 13Male (68%) / 6 Female (32%)

Cordova HS 2012-2013 Science Class Data

- Chemistry
  - Enrollment: 97 students
    - 40 Male (37%) / 57 Female (63%)
- Honors Chemistry
  - Enrollment: 63 students
    - 25 Male (40%) / 38 Female (60%)
- Physics
  - Enrollment: 54 students
    - 38 Male (70%) / 16 Female (30%)
- Advanced Biological Sciences (AP Bio, Anatomy)
  - Enrollment: 111 students
    - 45 Male (32%) / 76 Female (68%)

Cordova HS 2012-2013 Advanced Math Class Data

- Algebra 2
  - Enrollment: 218 students
    - 105 Male (48%) / 113 Female (52%)
- Pre-Calculus
  - Enrollment: 112 students
    - 57 Male (51%) / 55 Female (49%)
- Calculus (AP)
  - Enrollment: 32 students
    - 13 Male (41%) / 19 Female (59%)

Cordova HS Observations & Goals

Data-Based Observations:

1. Girls are underrepresented in engineering.
2. Female students underrepresented in transition from Chemistry to Physics

Overall NAPE Team Goals

1. Increase number of female students in PLTW classes.
2. Increase number of female and minority students in advanced science and math classes

CHS Hypothesis Testing Method

- Creating a general survey to be given during advisory to test our various hypotheses.
- Received 293 responses from various grade levels.

Engineering Hypothesis

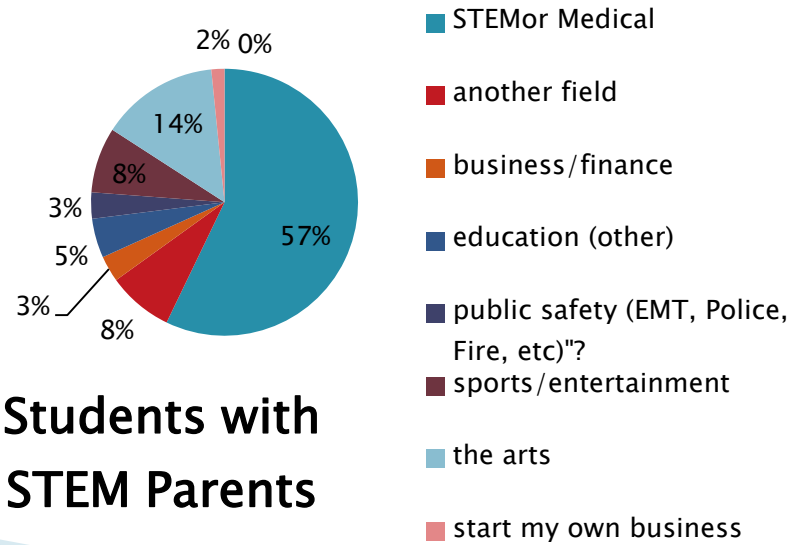
Hypothesis	Root Cause(s) (from NAPE Non-Traditional Career Preparation Root Causes & Strategies)	Method
Female students do not feel they have high level skills required for engineering studies.	I1 Self-Efficacy - Do not feel will be successful in these classes or technical careers F1 Family Characteristics - Parents don't support their female student in this type of career I3 Stereotype Threat - Gender roles S3 Peers - Friends don't support their female student in this type of career C3 Characteristics of an Occupation - Technical careers appear too hard.	Survey students about their family's support & influence for STEM. Survey PLTW students on if the academy role models work and how to encourage more female participation.

CHS Eng.Hypothesis Testing Data

Root Cause: Parents don't support their female student in an engineering career

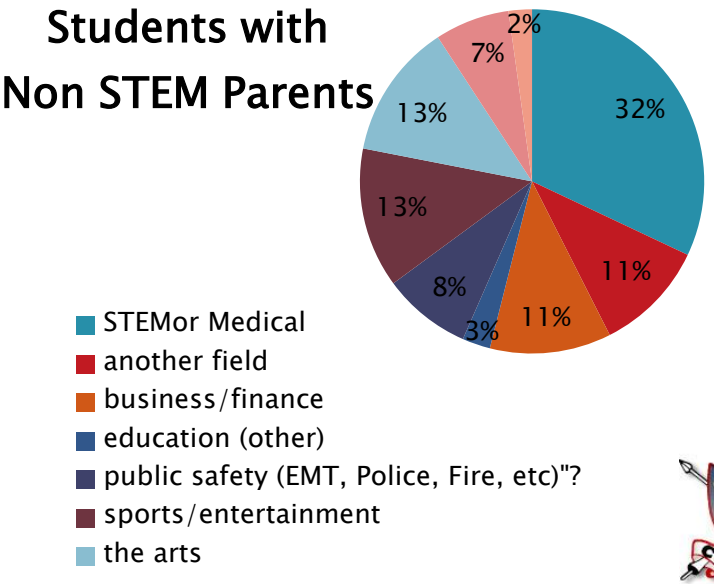
Conclusion: STEM Parents support STEM Careers much more. Only 21% have STEM parents at Cordova HS.

Student Career Choice based on Parent Career



Students with STEM Parents

Students with Non STEM Parents

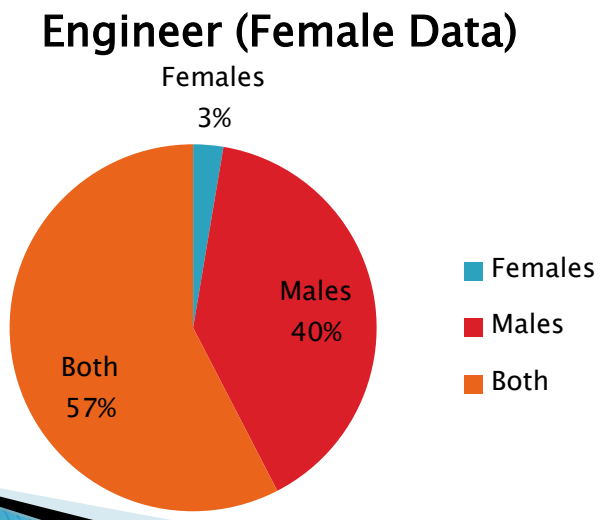


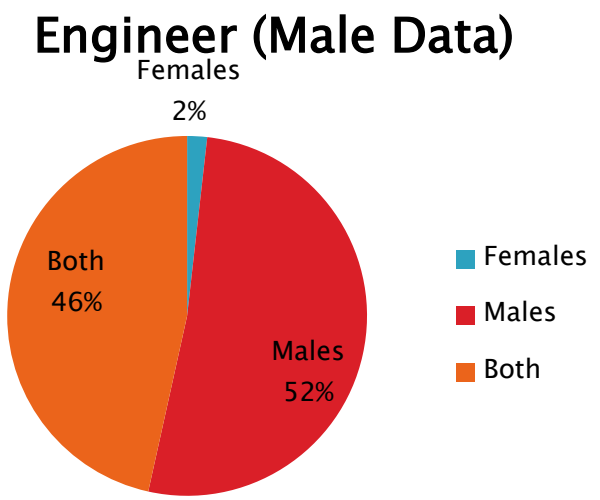
CHS Eng.Hypothesis Testing Data

Root Cause: Stereotype Threat – Students believe there are specific gender roles and engineering is a male field.

Conclusion: Males believe engineering is a male field more than females. In general, both have strong beliefs that is a male field. Results fairly consistent across grade levels and ethnicity.

Student View of Gender Appropriateness of Engineering





CHS Engineering Action Plans

- Try to recruit more 8th grade girls
  - Feel included and generate family support
    - Personal invite letter sent home
    - 8th Grade elective fair
      - Raffle prizes
      - Student representation
  - Generate Peer support
    - Get GTT teachers (8th grade PLTW class) involved in recruiting
    - Visit classes during course sign-up
      - 87 Students signed up, 14 girls enrolled (16%)
  - Summer Middle School "Girls Week" to show what classes and an engineering career is all about. (4th year)

CHS Engineering Action Plans (cont.)

- Retention of current students
  - Feel included and generate family support
    - Personal renewal invite letter sent home
      - Lists CPA course plans
      - Confirms commitment or asks reasons for dropping
  - STEM teacher Support
    - Posters for Science & Math teacher rooms
    - Ask teachers for recommendations
    - Her World presentation to show female STEM role models.
  - Generate Peer support
    - PLTW course recruitment lunch
      - Free food
      - Invite registered student and give guest pass

CHS Engineering Action Plans (cont.)

- Retention of current students (cont.)
  - Community Support
    - Provide Cyber Buddies – Engineer or Engineering student to email with student
      - Gives student a contact in the "real world" to understand the career and day to day job
      - Personal support / mentor
    - Activities to encourage girls to continue in Engineering
      - Invites to Society of Women Engineer's Sponsored Events
      - CAL ISO tour for girls to visualize themselves in an engineering career.
      - ACE team

College Requirements Hypothesis

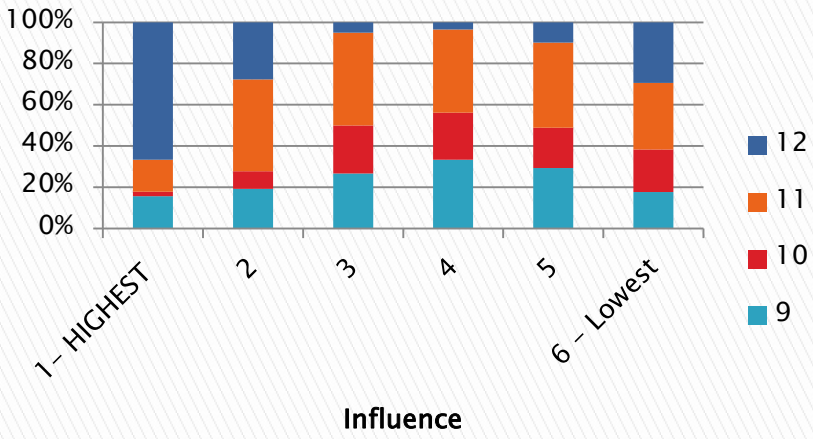
Hypothesis	Root Cause(s) (from NAPE Non-Traditional Career Preparation Root Causes & Strategies)	Method
Girls are misinformed (from peers and teachers) about the requirements for college, including Physics and advanced math (above Alg. 2)	C1 Materials & Practices - College information given to students about preparation for medical careers is incomplete or unclear. S3 Peers - Students give incorrect guidance to their peers. S4 Role Models/ Mentoring - Teachers give incorrect guidance to their students.	Survey students about college requirement knowledge. Survey students about sources of college data Review A-G graduation information provided to teachers/students from counselors

CHS College Hypothesis Testing Data

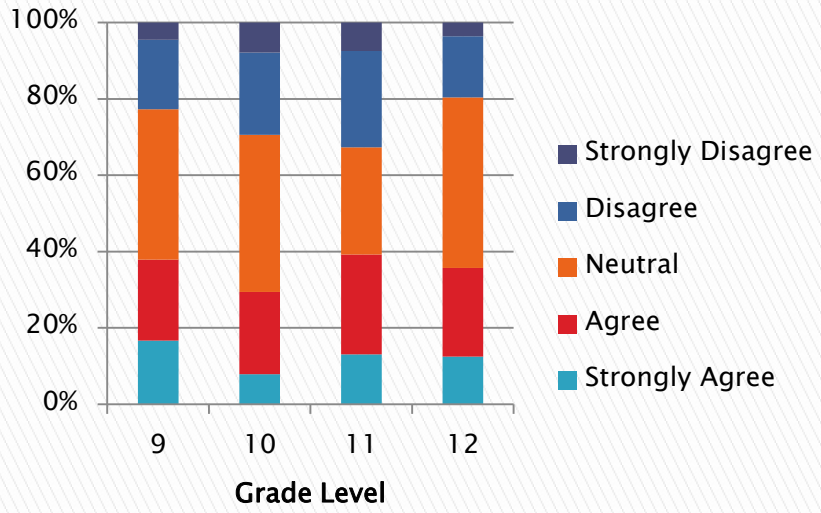
Root Cause: Friends influence class choice

Conclusion: Peers have a strong influence on course selection.

Peer Impact on Course Selection



Friend Enrollment Influence



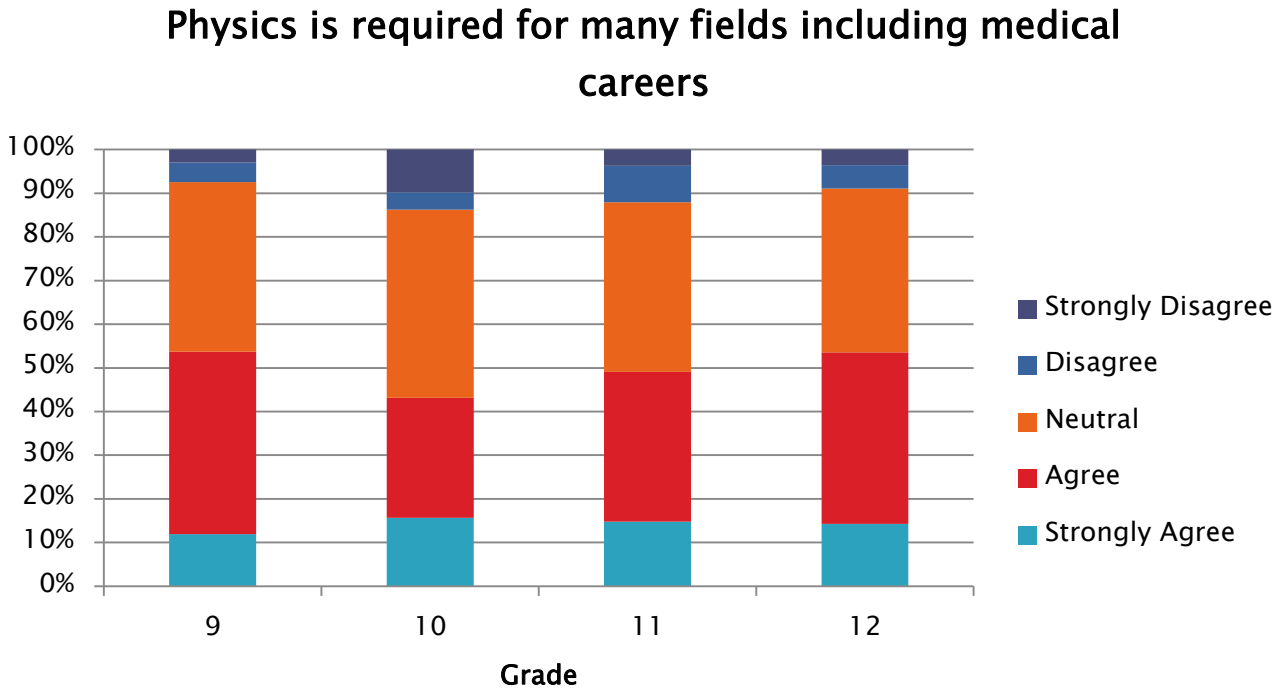
Student Career Choice Influence Course Selection

Compared to parents, teachers, counselors etc

If my friend is enrolled in a class it is more appealing to me

CHS College Hypothesis Testing Data

Root Cause: Physics requirements in college not clear.
Conclusion: Only half of the students believe that physics is necessary.



High Level Science Class Action Plans

- **Highlight the contributions** made to Math, Science, and Engineering by female and minority-background professionals.
  - By reading articles, researching, and using the contributions made by these individuals.
  - Dinner with a Scientist Event
- **Encourage counselors** to inform students of the importance of higher level science & math classes and their connection with careers in STEM and the medical field.
- **Actively recruit** under-represented students for the higher level science & math classes in their current classes.

Summary / Recommendations

- Confident that we know the main problems and some of their causes
  1. Female students do not feel they have high level skills (or interest) required for engineering studies.

  2. Girls are misinformed about the requirements for college, including physics. Most girls take advanced biological sciences instead of physics.

- A workable action plan is in progress.
  - Continue using some current strategies
  - Professional development for staff
  - Work with NAPE to implement additional strategies based on our known causes and NAPE's proven approaches for improvement.

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