CharterLaunch

Inequality Check Dashboard
by Jack Wu

http://ic.jackwu.us/

Not a toy! Not just a demo! Not just a PPT! My solution is a real tool!

A full fledged, database driven, real time, web solution!!!

Problem

CSW is fortunate to have relatively little **INEQUALITY of OPPORTUNITY**. However, the huge factor of **INEQUALITY of OUTCOME** determines every students' career by their race.

Unfortunately, promoting more equitable academics and upholding high academic standards could be in a **negative correlation** in mathematics (also called **anticorrelation** or **inverse correlation**. My solution is to solve this issue both in mathematics and in practice.
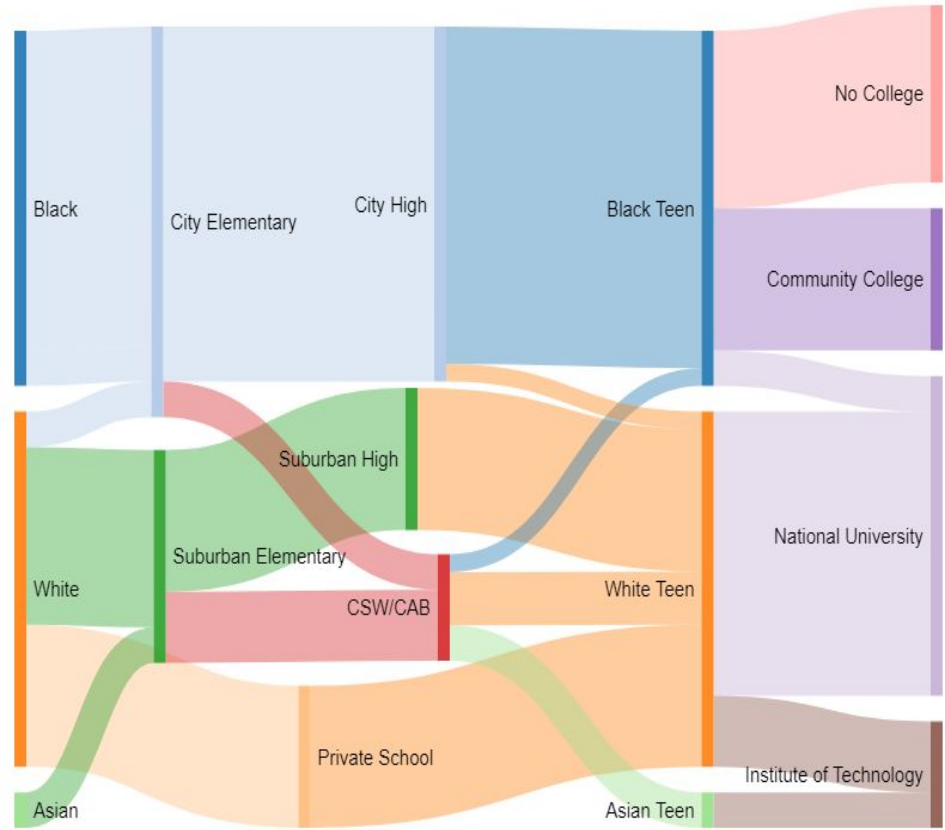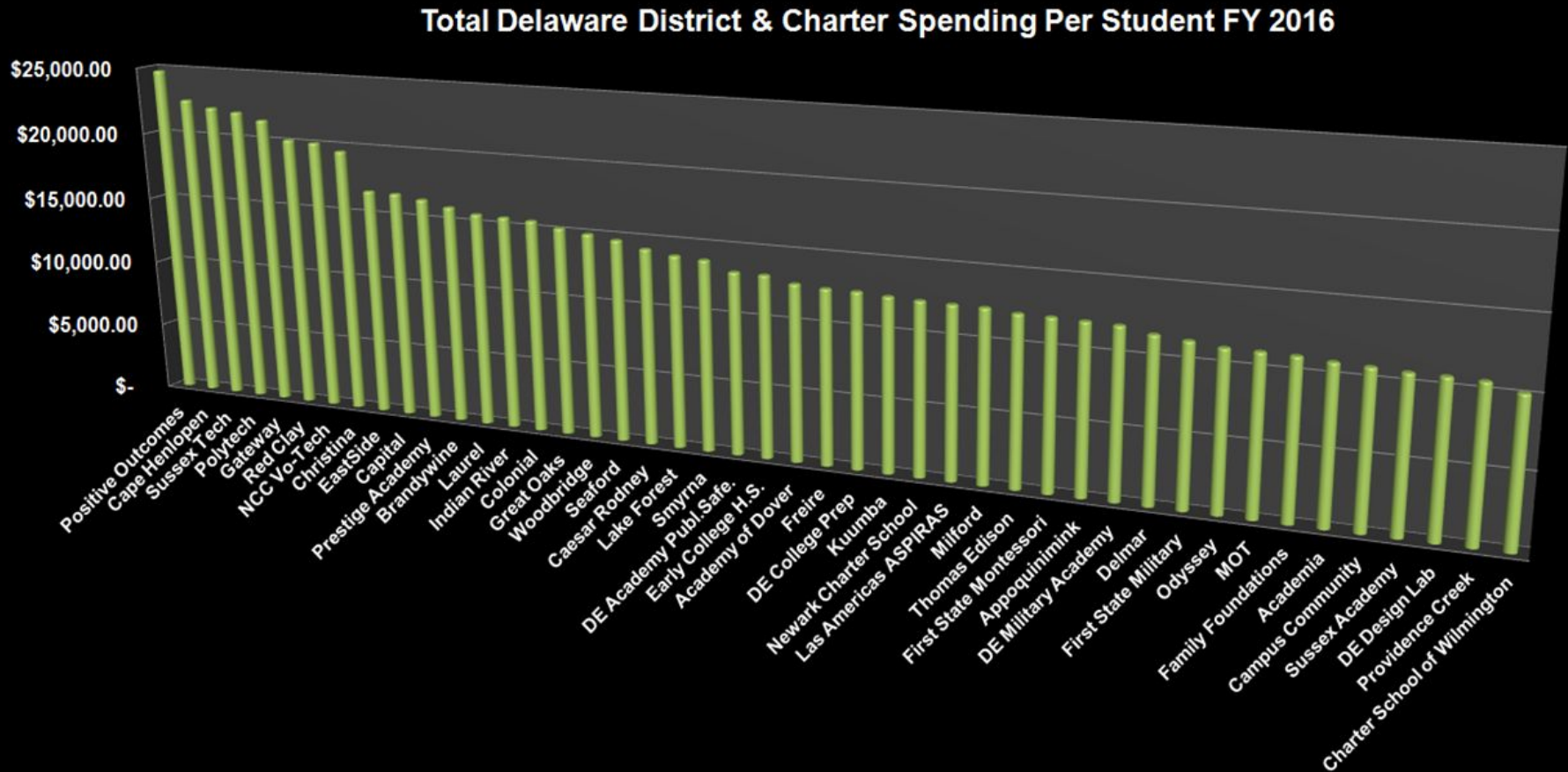
CSW comes in last among all Charter school in spending


Delaware cost per student Charter Schools FY2016
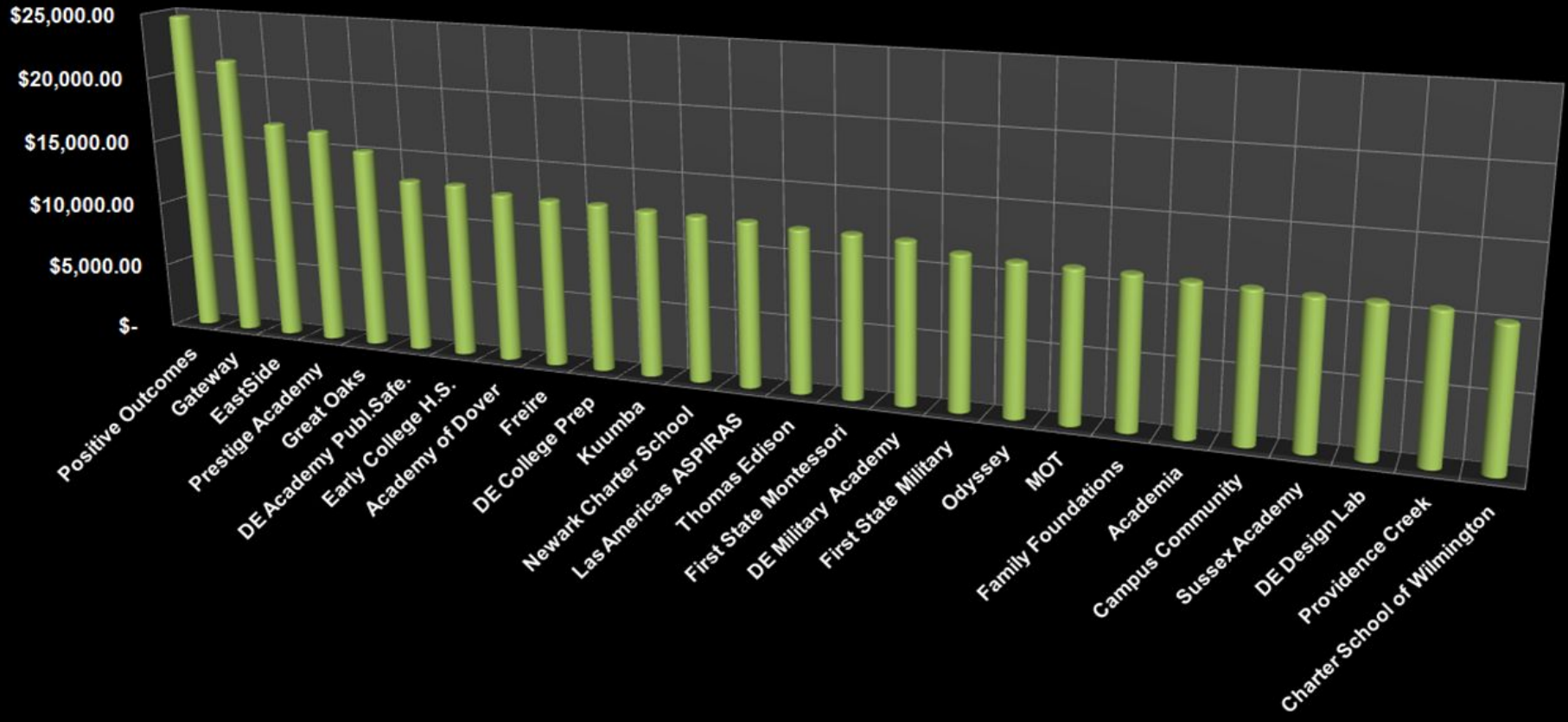
the last in all Delaware school. Solution must be at 0 cost!

Total Delaware District & Charter Spending Per Student FY 2016

Solution

We all know there are 2 things are essential in driving a car: **Vision** and **Control**. You need to see where to go, and own full control of your vehicle. It's the same for us to balance the equality and achievement at CSW. We need to have clear vision where the problem is, and have all the measures to control our process

The whole solution is data driven. I already have and will continue to collect related data from our school and community. Based on data, I built the relationship between the data, and also find any mathematics patterns. I built an efficiency frontier model to maximize the trade off between negative correlated variables, that is equality vs academic level, and find the best solution for our school. My full fledged database driven online real time web solution provides the **vision** and **control** CSW needs
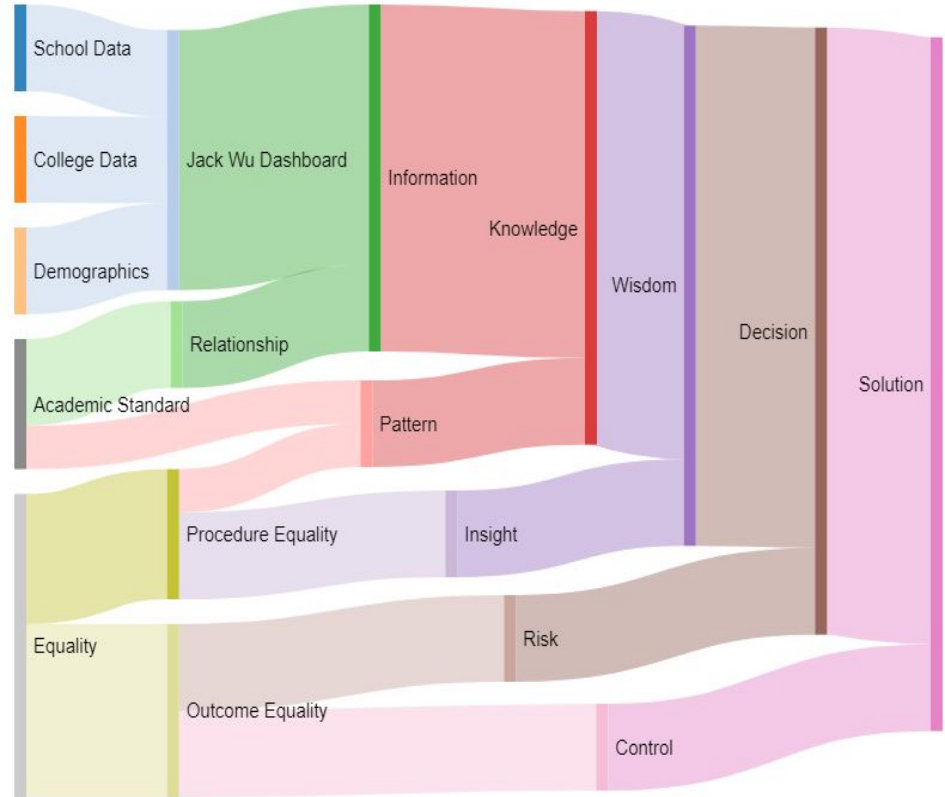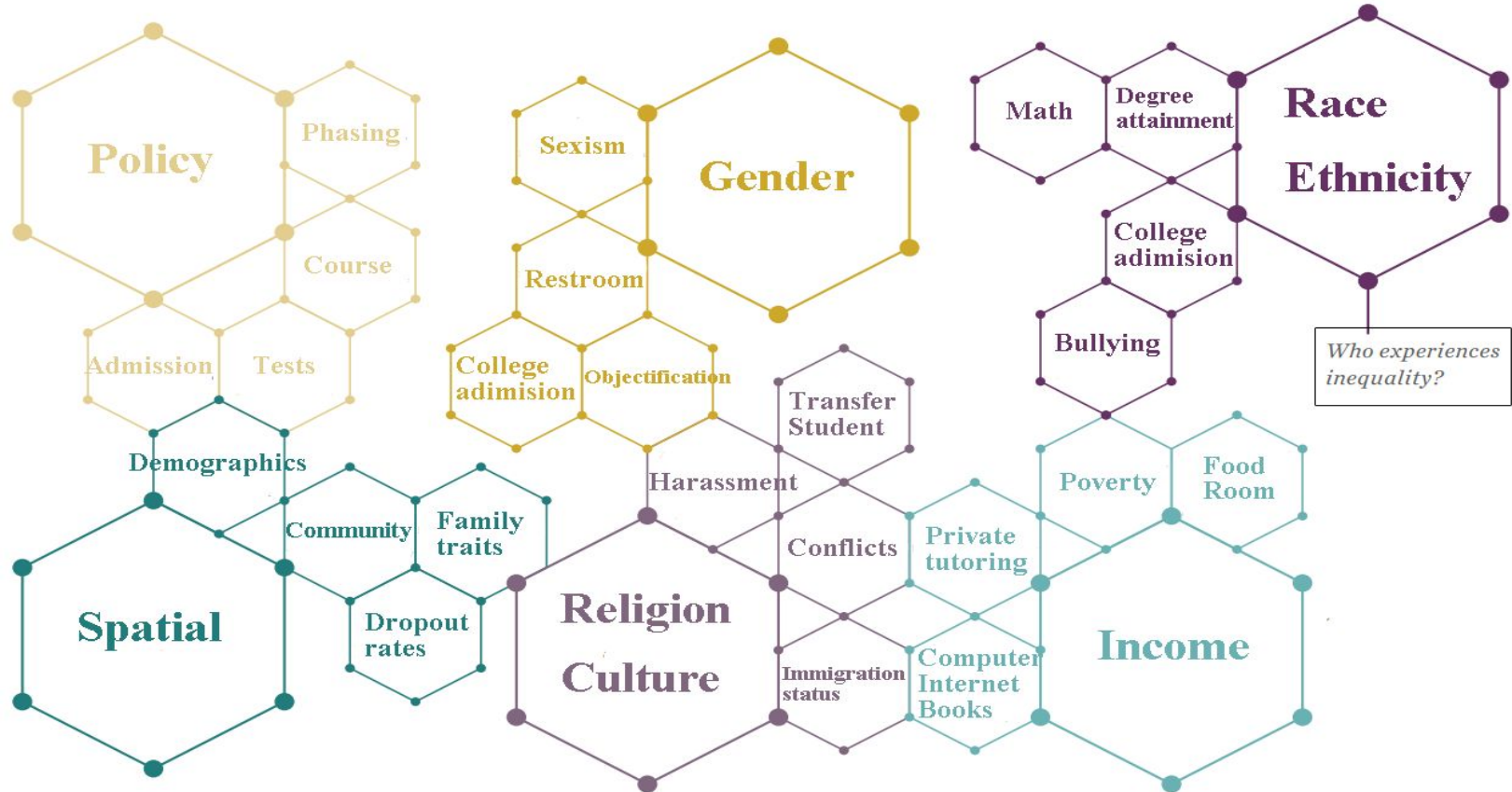
Real time monitors

When we are driving a vehicle, we need to check the speed dials, fuel dials, etc all the time. Running a school is the same as running a vehicle. Here I created dials for CSW to check its inequality and academic standards at real time. All of the data comes from current demographics and school databases. In order to detect issues and problems at the first time, we need to check these dials every day. We need to check whether too much change for outcome equality affects academic levels, and we also need to check whether too much focus on academic incentives creates more inequality among race, gender, and family background

Inequality Check

Inequality Index

Academic Achievement

Archievement Index
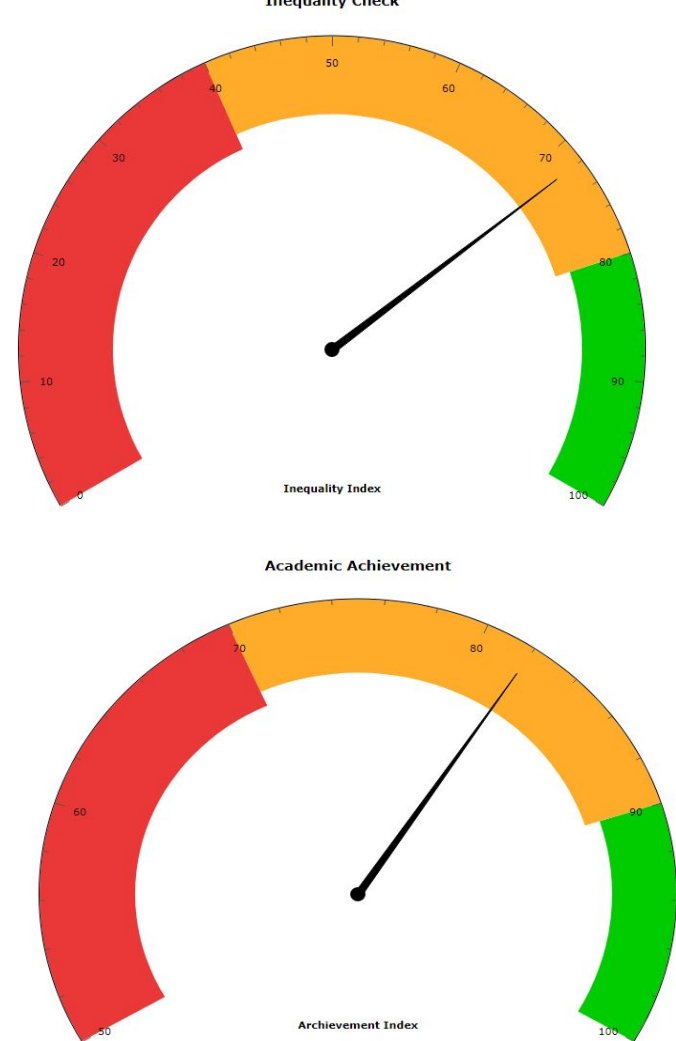
Inequality Categories

Real time monitors in each category

Equality in 6 Sub Areas

▼ **Race** 32 ▼ **Gender** 88 ▼ **Income** 82 ▼ **Culture** 92 ▼ **Policy** 65 ▼ **Spatial** 59
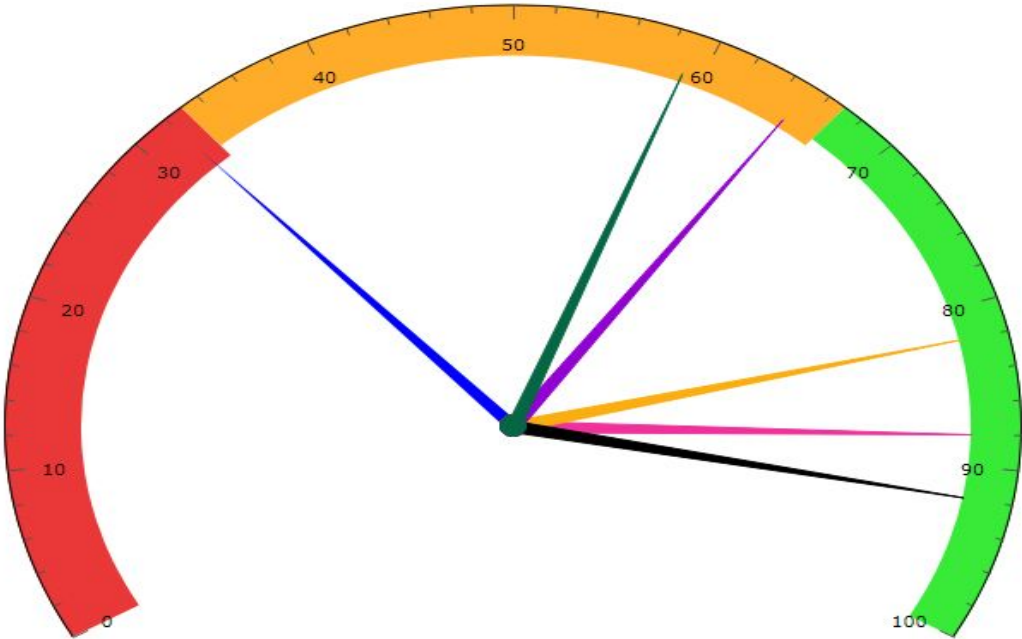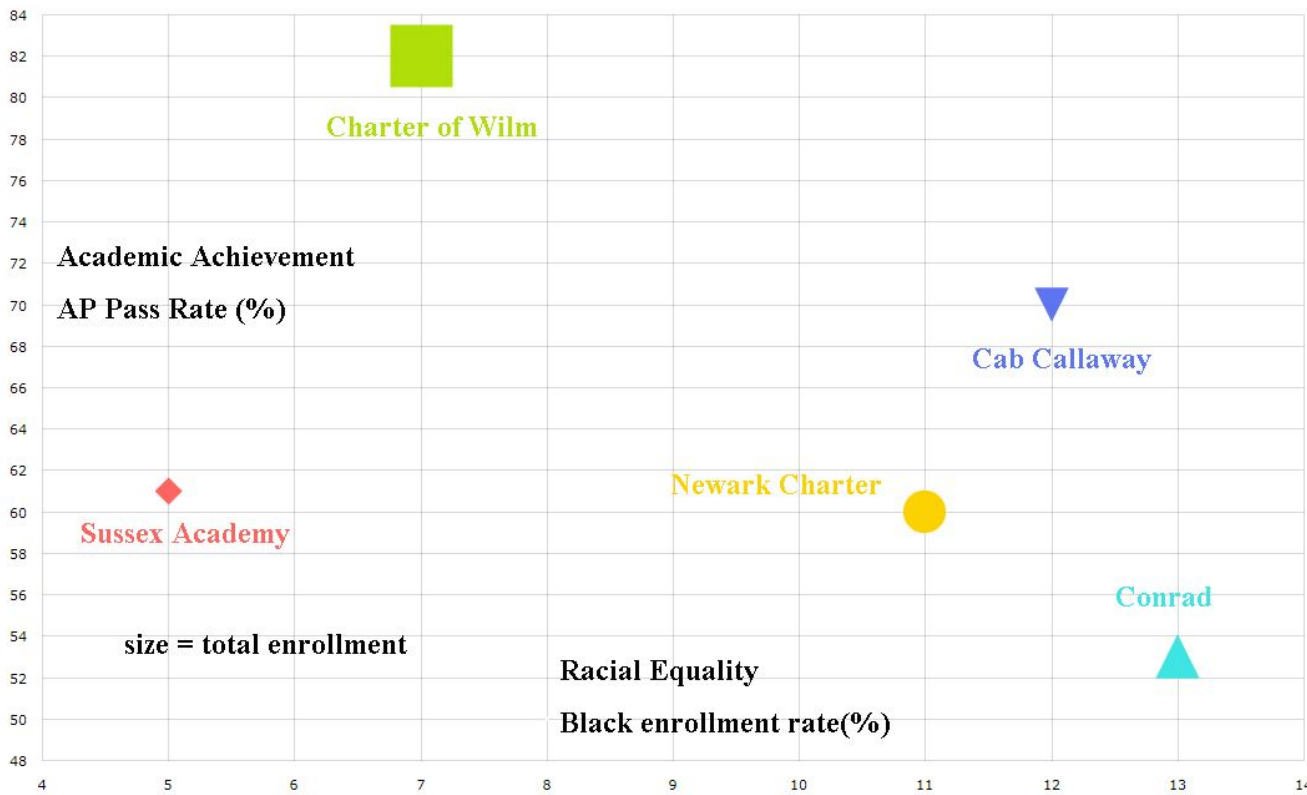
CSW leader position in Minority Enrollment
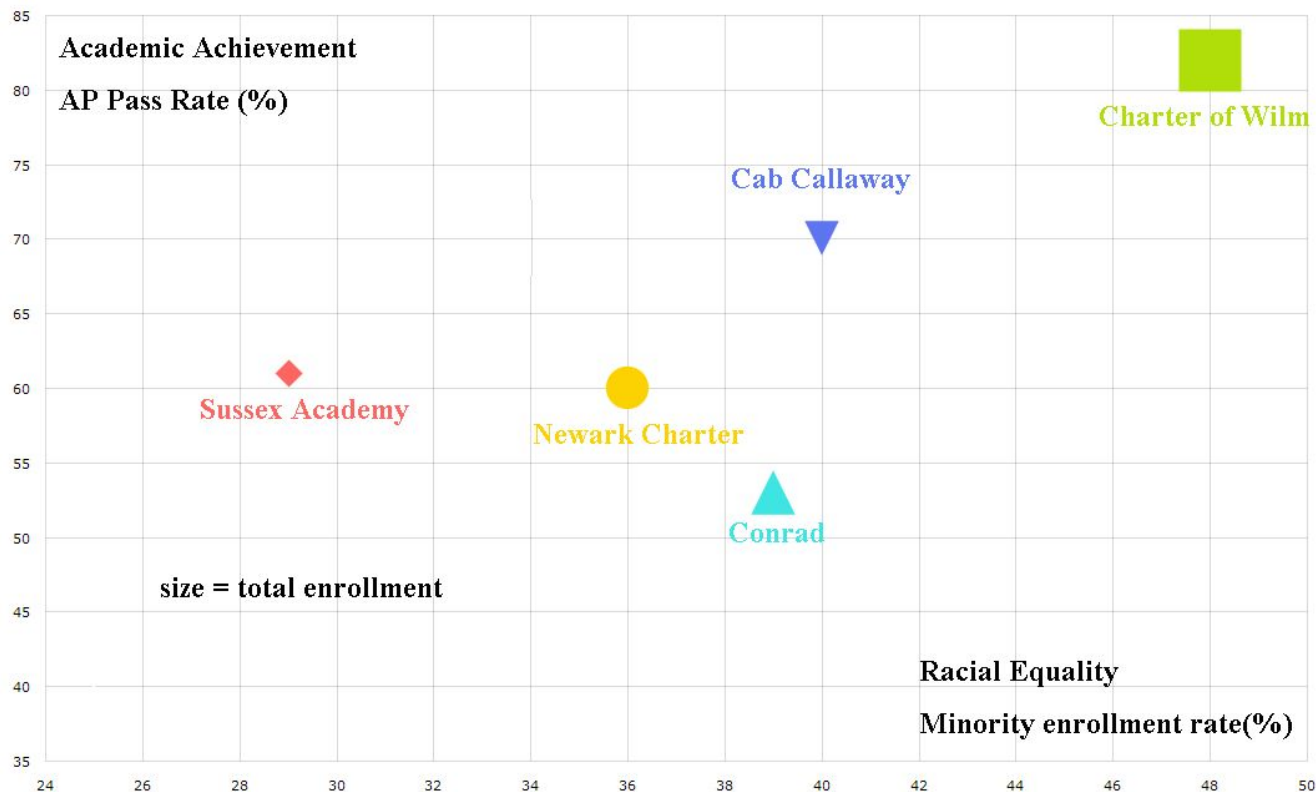
# CSW Position in UnderRepresent Minority Enrollment

Quadrant Analysis

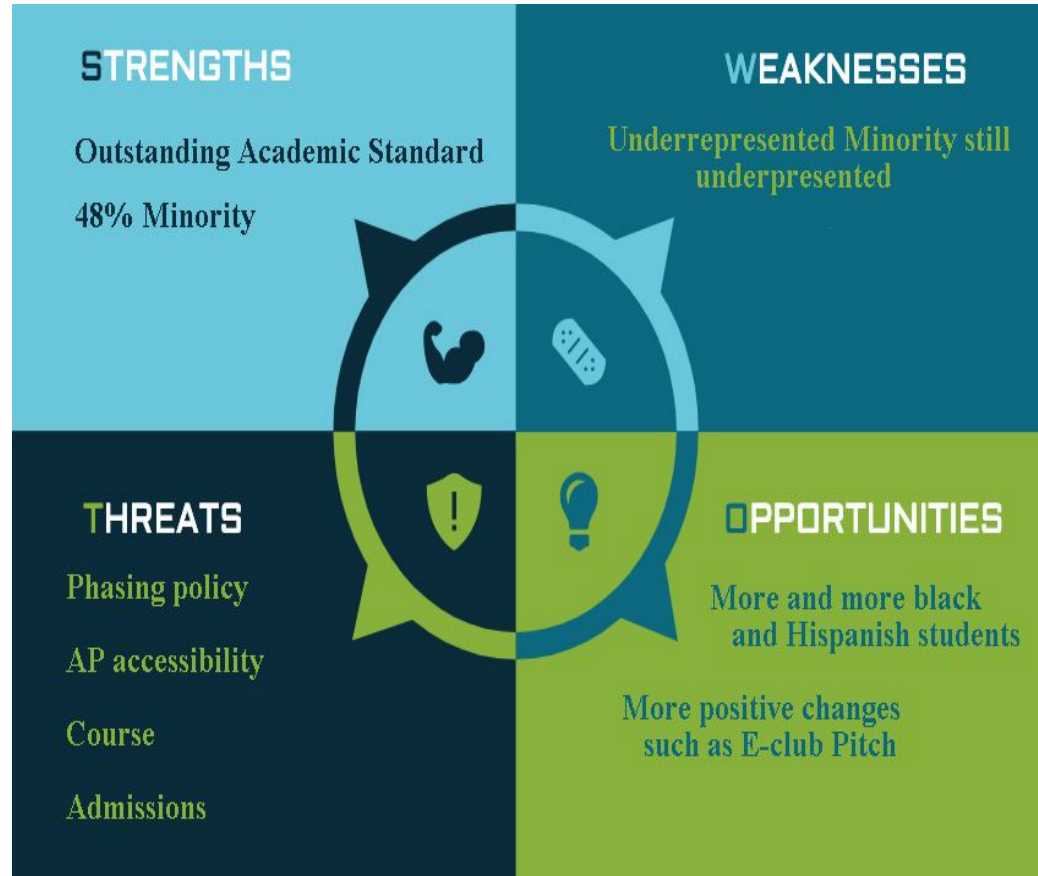all America High Schools into 4 types:

- High Inequality and Low Academic
- High Inequality and High Academic
- High Equality and Low Academic
- High Equality and High Academic

There are many schools that suffer both from high inequality and low academic standards, which is not part of our discussion. Some schools are sacrificing academic standards for high equality, while other schools are chasing high academic standards without checking equality. It's very hard to promote more equality while upholding high academic standards. That's the reason very few schools in the high equality and high academic standard quadrant. Fortunately my analysis suggested to me that CSW is fortunately at the edge, but we can still do better.

Charter School of Wilmington

High Academic

Low Academic

Inequality ⟺ Equality
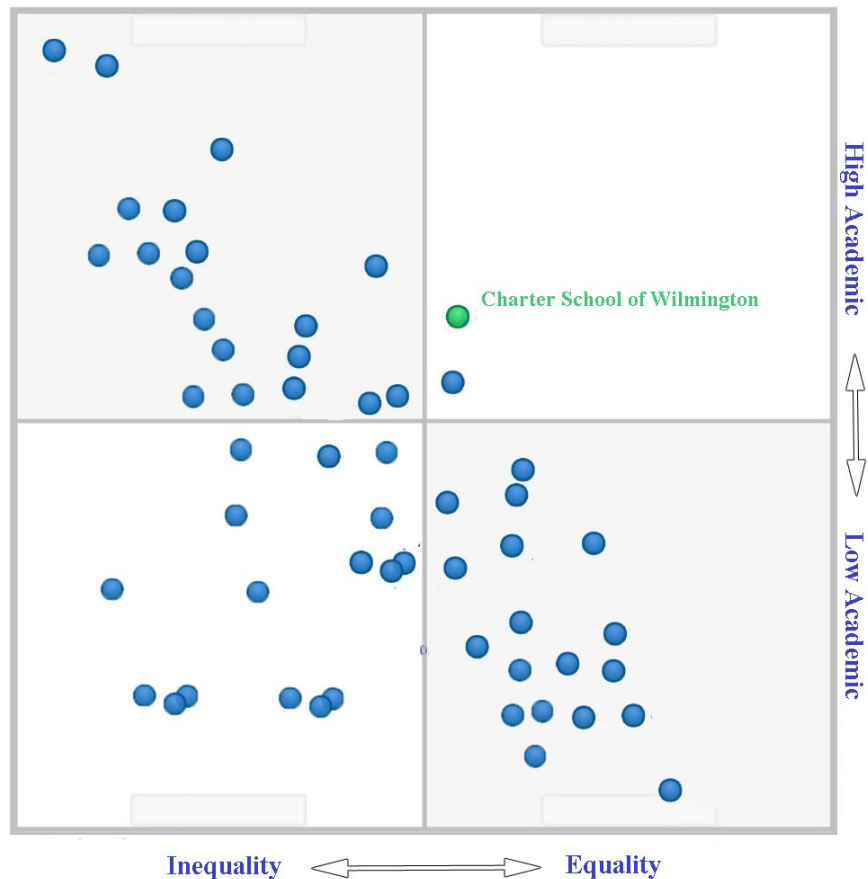
SWOT Analysis

SWOT analysis (or SWOT matrix) is a strategic technique power tool for us to tackle this issue. Internally, we has strengths and weaknesses. Externally, we have the opportunities and threats due to policies, environments, competitor schools and all stakeholders. SWOT analysis will help us develop CSW as one of the best schools in Delaware and USA.

STRENGTHS

Outstanding Academic Standard

48% Minority

WEAKNESSES

Underrepresented Minority still underpresented

THREATS

Phasing policy

AP accessibility

Course

Admissions

OPPORTUNITIES

More and more black and Hispanish students

More positive changes such as E-club Pitch

Mean-variance analysis

X=Black + Hispanic Enrollment Rate

Y=SAT average score

Each Bubble represents a high school, size=Total Enrollment, color=type of school

The labeled school at the top right is the TJ High School for Science and Technology in Virginia, regarded by many to be the #1 high school in the United States. It tops at SAT scores, but has very low under represented minority enrollment.

The red bubble represents CSW(Charter School of Wilmington), it has somewhat good SAT scores and 12% URM.

What patterns can you find from this chart? What is your vision? What is your action to make the school better?
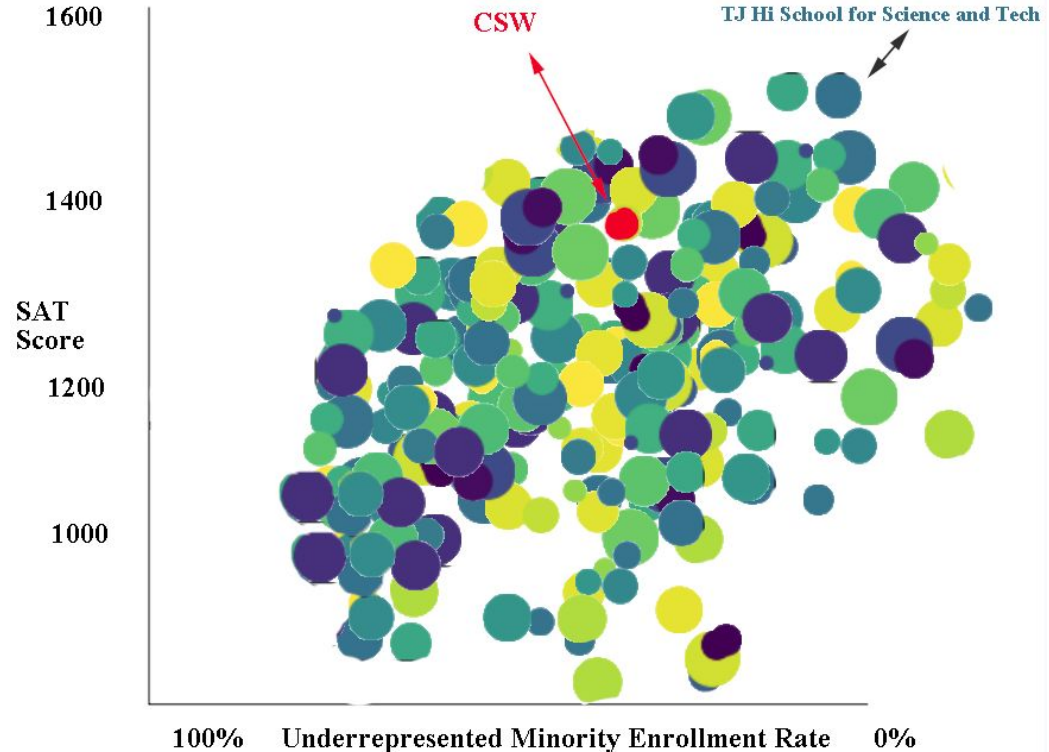
Efficient frontier

Findings:

- There is a frontier curve that all schools are beneath.
- Some schools are on the curve, or close to the curve, such as TJ, school A, and school B.
- Schools on the curve maximize SAT scores and URM enrollment. CSW is not on the curve which means CSW can improve to the direction between P and Q, which means increasing URM enrollment and also SAT scores
- Comparing school A and school C, both have the same SAT score, but A school has more URM, so A is better than C
- Comparing school B and school C, both have the same URM, but B school has better SAT score, so B is better than C
- Now the question is: which is better, A or B?
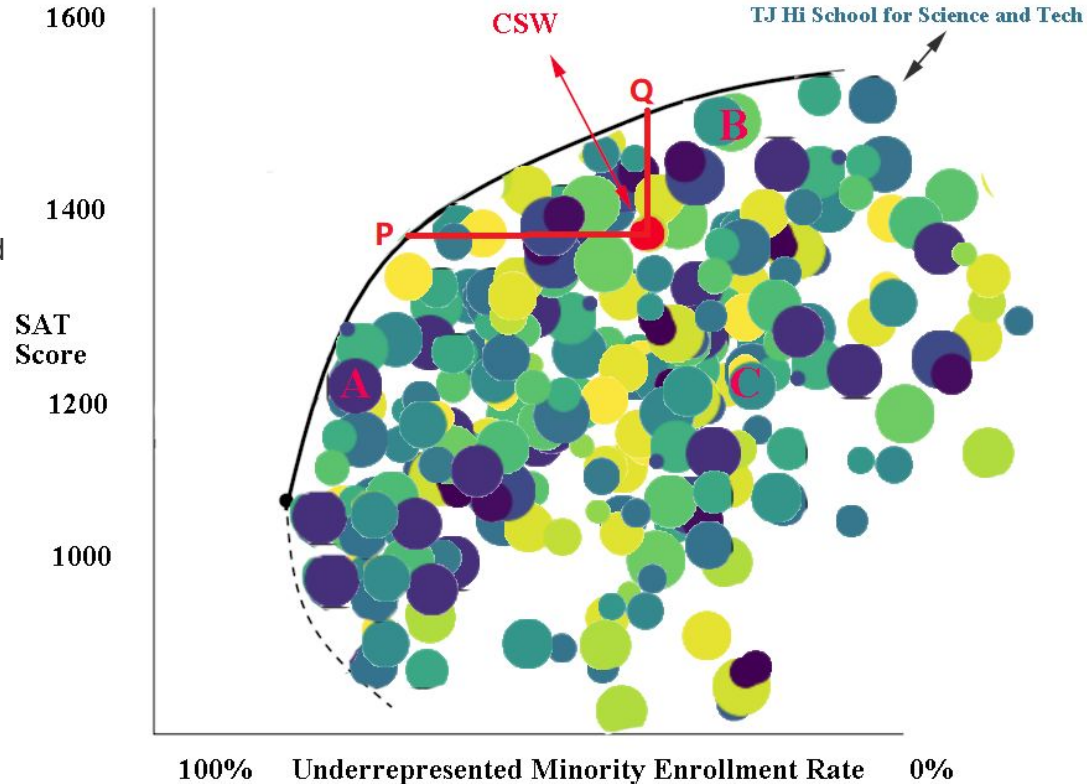
Critical Line for optimization

Using Markowitz model (Nobel prize 1990 for financial engineering), which is better A or B, convert into a mathematical problem: how to exchange the URM enrollment to get maximum increase of SAT score? We can do that by first find the 100% URM SAT score, then draw lines, the maximum value of dS/dR is the tangency point between the best possible line and the frontier curve.
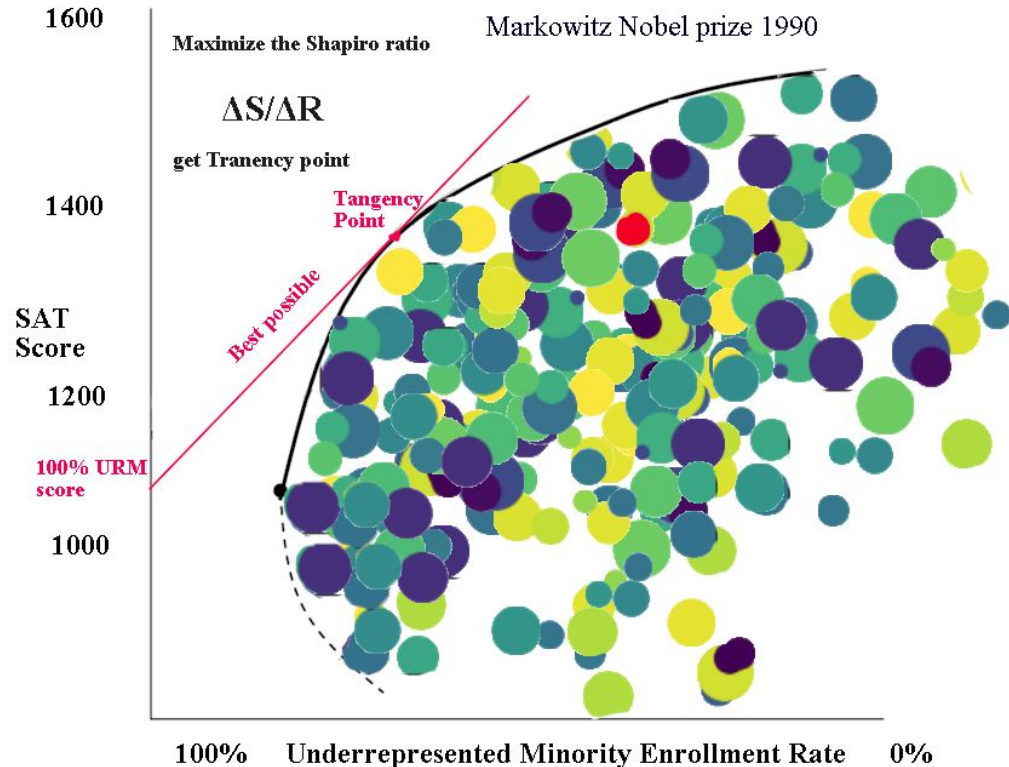
Theory behind all creative ideas

I had come up with many "creative" ideas, but the important thing is whether they can pass the Inequality Check and Upholding Academic Standard Check, especially because they are negatively correlated in mathematics. That leads to my Efficiency Frontier Solutions.

All ideas based around equality, new or old, creative or stereotypical, are all derived from **4 theories: Meritocracy, Tokenism, Affirmative Action and Legacy Preferences**. Each of these theories pursue equality of opportunity and/or equality of outcome, or even emphasize preferences. It's difficult to just fully adopt one system and disregard the others. We need to compromise to maximize our common interest
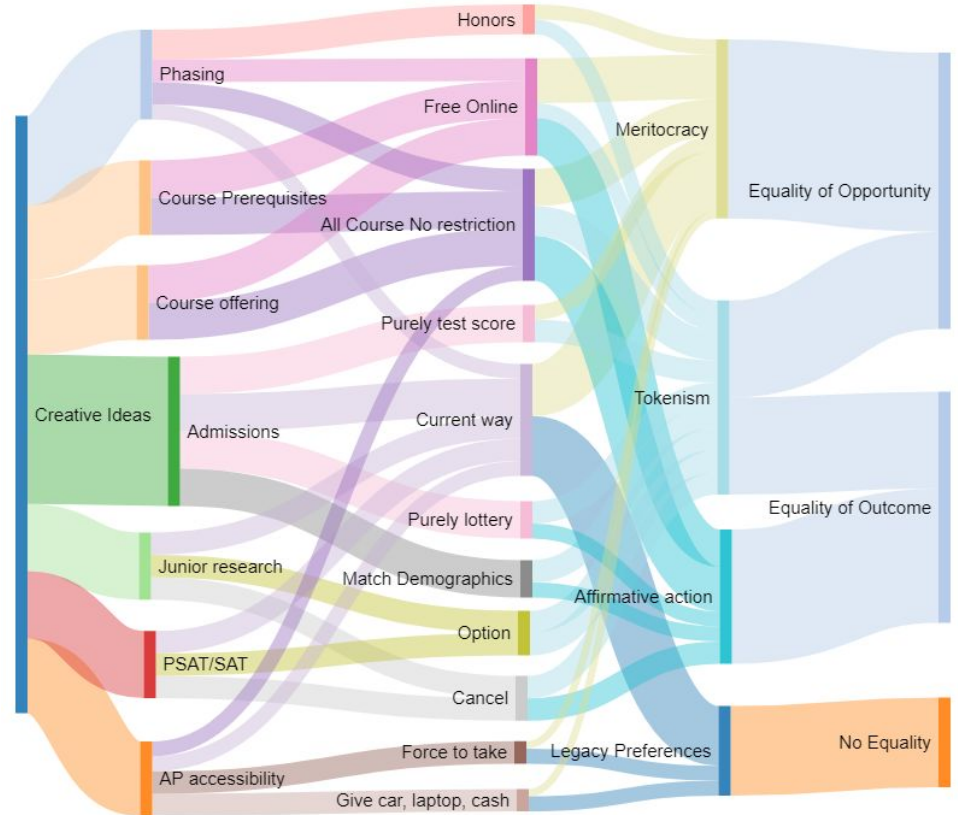
Action Plan: my 6 pack GPA

Unfair GPA Calculation:

AP Course: +1.0; Beyond AP Courses (need AP as prerequisite) are Phase 5 and 4: +0.25 or 0.5

When Heisenberg realized that a single variable was not enough to represent a physics state, he proposed a group of variables, aka matrix mechanics as the new physics, which is the most fundamental theory ruling the nature: Quantum mechanics. I don't think current GPA is the only index for students. I'm here proposing 6 new GPAs to be included in each student's transcript. I believe this is the most efficient way to promote equality and academics standard as well

Normalized GPA	Equality GPA	Lottery GPA
Universal GPA	Differential GPA	Self-Evaluate GPA

Normalized GPA

GPA distribution is a normal distribution. GPA for a specific race group is also a normal distribution. **Normalized GPA finds your percentile in your race group (say 60%), then uses the whole class percentile (60% in that case) GPA as your GPA**. For example, if you are

- the highest GPA in your race group, your GPA will be increased to the highest GPA in the whole class
- the middle (mean) in your race group, your GPA will be adjusted to the mean GPA in the whole class
- the lowest GPA in your race group, your GPA will be decreased to the lowest GPA in the whole class

Pros

- Totally remove the inequality between race on GPA scores
- As long as you are the highest GPA in your race group, you will be the highest in the whole class

Cons

- Cannot remove the gender inequality at the same time
- Almost half of the students adjusted to a lower GPA, which might be difficult to implement
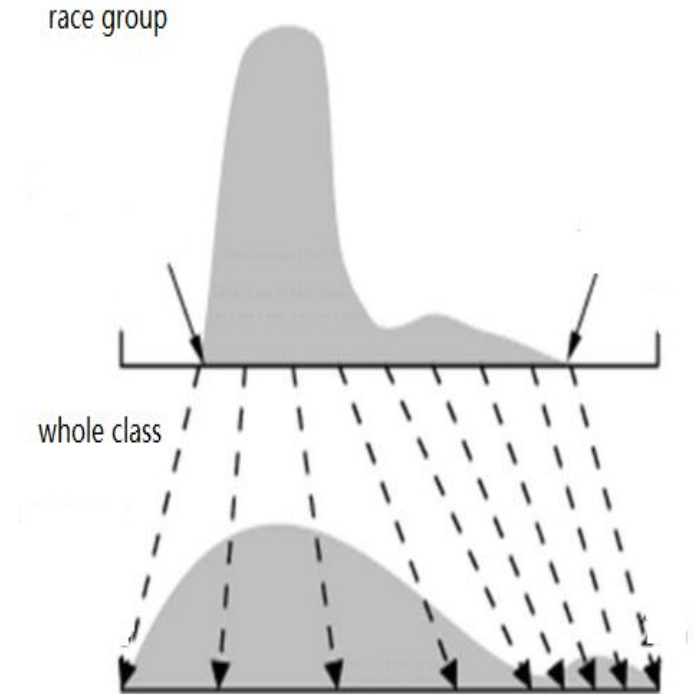
Equality GPA

Equality GPA is to adjust your GPA according to the following
- For all asian male students, your **Equality GPA=weighted GPA**
- For all white students, your **Equality GPA=weighted GPA+0.2**
- For all hispansih students, your **Equality GPA=weighted GPA+0.4**
- For all black students, your **Equality GPA=weighted GPA+0.6**
- For all female students, your **Equality GPA=weighted GPA+additional 0.4**
- Race is determined by each student's self proclaimed race
- Gender is determined by each student's self proclaimed gender

Pros
- No students adjusted to a lower GPA
- Balance both the race inequality and gender inequality

Cons
- Adjusted scores do not have enough mathematical evidence. They are empirical and different for different cases
- Cannot guarantee different race groups having the same mean GPA and standard deviations

Gaussian or Normal Distribution with shifting mean
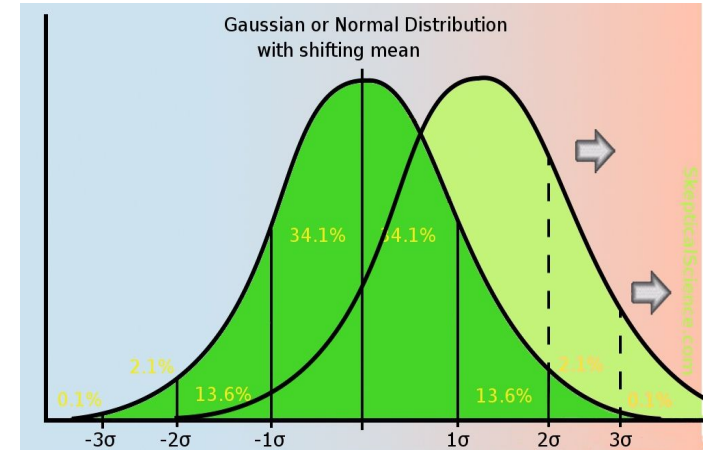
Lottery GPA

People hate meritocracy the most is that personal success is purely determined by their talents and hardwork. The real story should be told that success is stochastic and unpredictable, like lottery. Therefore using lottery to decide each student's GPA is the most realistic method. We may grant the students with higher test score some little higher lottery odds

Pros
- It's the real world situation
- GPA will be not affected by race, gender, but only the luck you have

Cons
- You could get a lower GPA even you are excellent in tests
- Students may depend on luck in their whole life

Universal GPA

To promote teamwork and team honor, why not give each student the same GPA of the class. You can get higher GPA if and only if the whole class get higher average GPA. You will win and lose as the class win and lose, like a team

Pros
- Promote teamwork, in order to get high GPA, you have to help your classmates
- Most real projects are team work, ask what you can do for your class before ask what GPA your class can give you

Cons
- Nobody can distinguish an individual student from others
- Some students may depend on others forever

Differential GPA

Say student A's GPAs were 3.0 in 9th, 3.3 in 10th grade, 3.6 in 11th and 3.9 in 12th, while student B's GPAs were 3.9 in 9th, 3.6 and 10th, 3.3 in 11th and 3.0 in 12th. Unfortunately, they both got 3.5 GPA. Clearly, A progressed a lot while B regressed. A should be better in college than B. Therefore, using differential GPA is a better way. A's differential GPAs are 0.3, 0.3, 0.3 whilte B's are -0.3, -0,3, -0.3

Pros
- It gives the trend instead of history
- It encourages students becoming better instead of lying on historical results

Cons
- Students may not want to get high GPAs too early for future growth
- Some students may not feel good if get a negative GPA
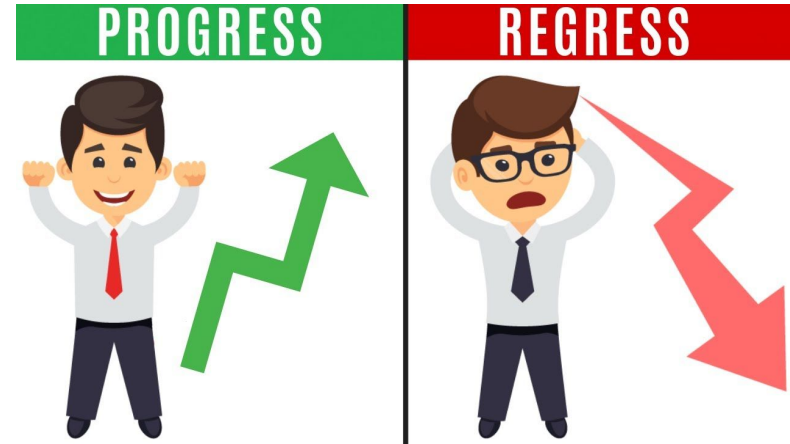
Self-Evaluate GPA

The person that knows you the best is yourself. Why give the evaluating job of you to other people? Let each student evaluate themselves, give themselves the GPA they think they deserve

Pros
- This is definitely the most accurate GPA
- This definitely makes student happy, also build up the trust relationship between teachers and students

Cons
- It may be unfair to compare different students' GPAs
- Some students might concentrate on evaluating their GPA instead of learning

Key Stakeholders Benefits

Students, Parents, Teachers, Administration

From college admission, equality, efficiency, fun to funding and good pay

My whole set of solutions can satisfy them all