



SANTA MONICA-MALIBU UNIFIED SCHOOL DISTRICT

# Math Instruction: Part III of Excellence through Equity Action Plan

November 17, 2016

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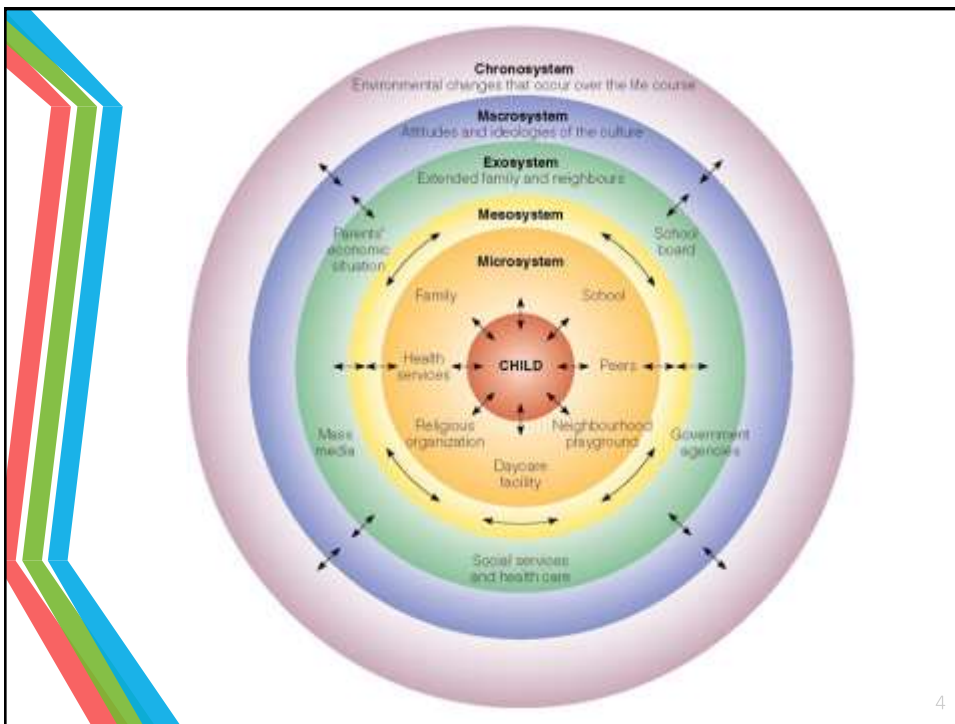
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# School Board Leading the Way

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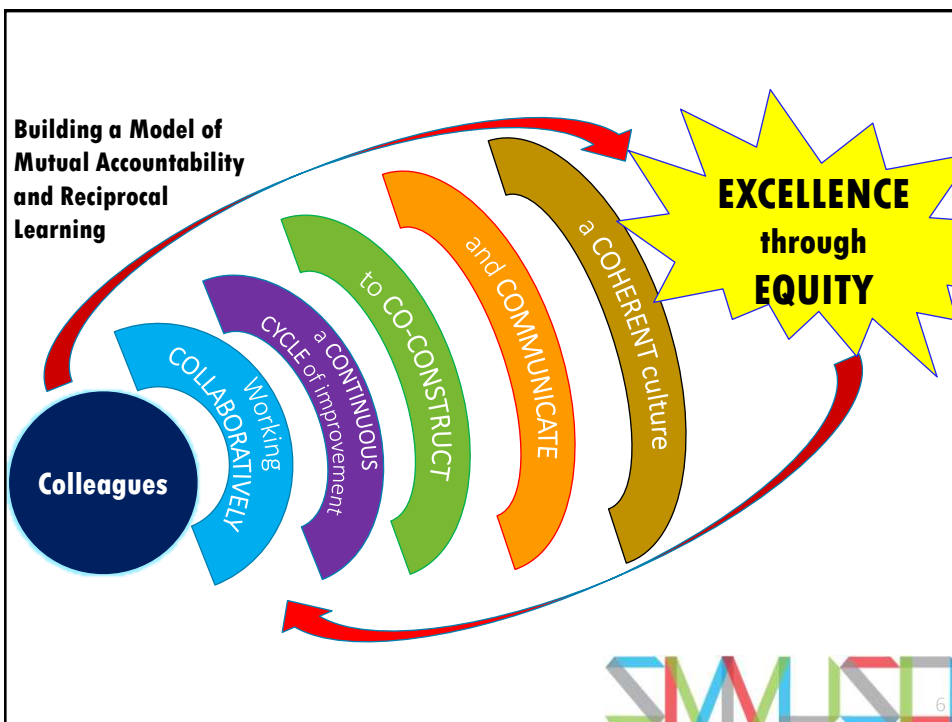




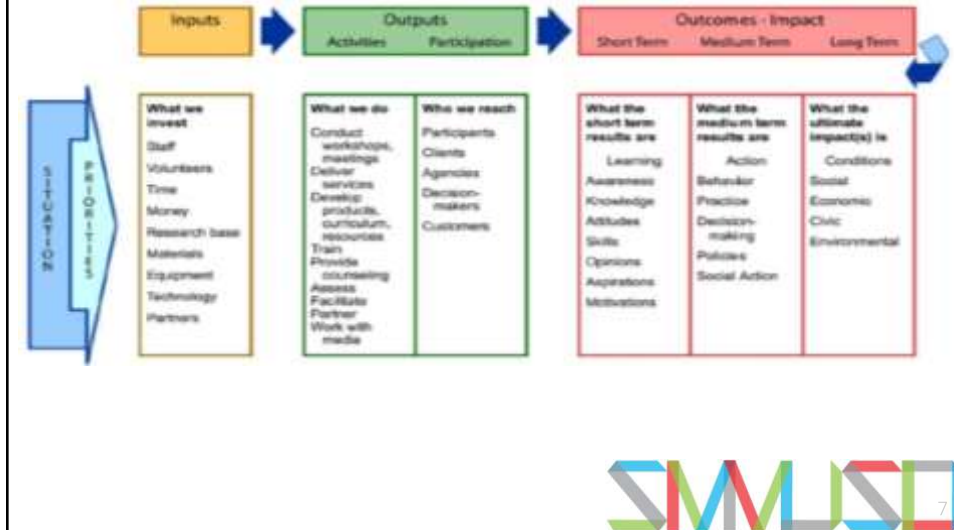
## Shared Values: Engagement

- We engage students in meaningful, rigorous and relevant educational experiences where they are inspired, supported, challenged and motivated.
  - Align our curriculum to the California Standards
  - Integrate College and Career Readiness, Technology and 21<sup>st</sup> Century Skills throughout the curriculum
  - Implement an ethnic studies/American culture curriculum such that all high school students have a common academic experience prior to graduation

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# A Logic Model Template to Use



## Integrating Priorities into a Coherent Systemic Approach for Achieving Excellence through Equity

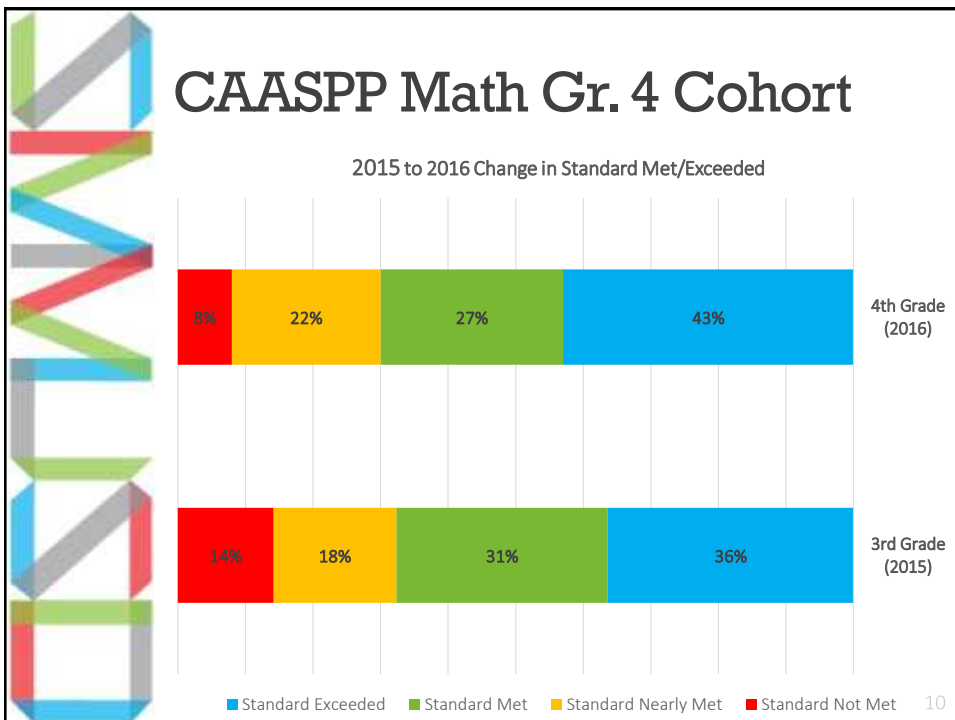
- Through the efforts of *highly effective PLCs* at the school site and district office, the SMMUSD will ensure that *all students* in every classroom are engaged in socially, emotionally, and cognitively supportive learning environments that promote a growth mindset.
- Language expressed in a variety of forms will provide a principal means for engaging students within a guaranteed, meaningful, culturally responsive and viable curriculum.

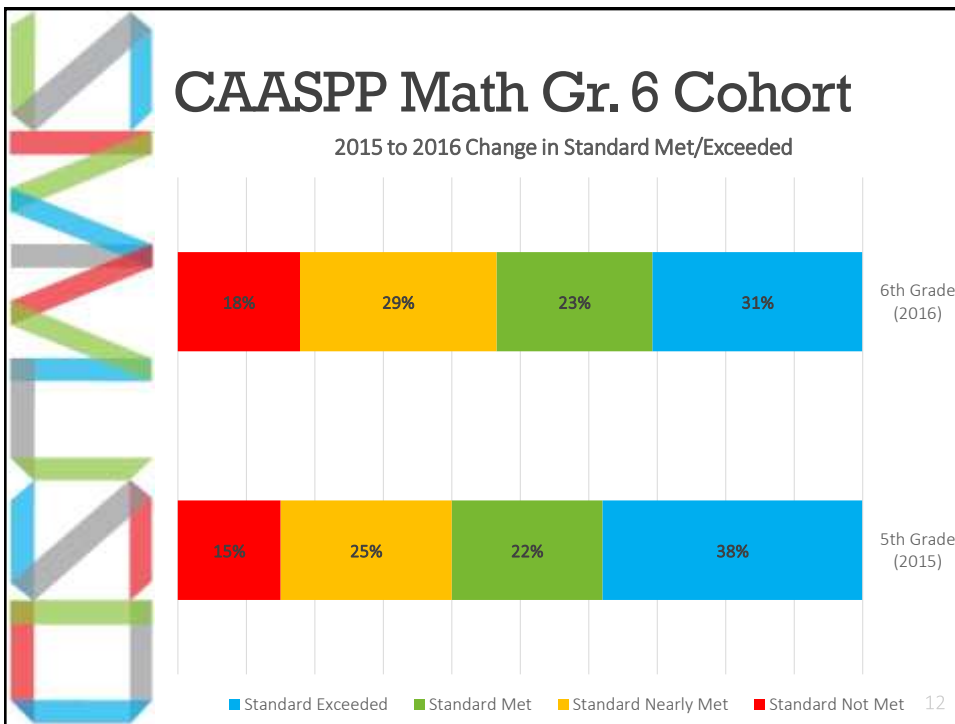
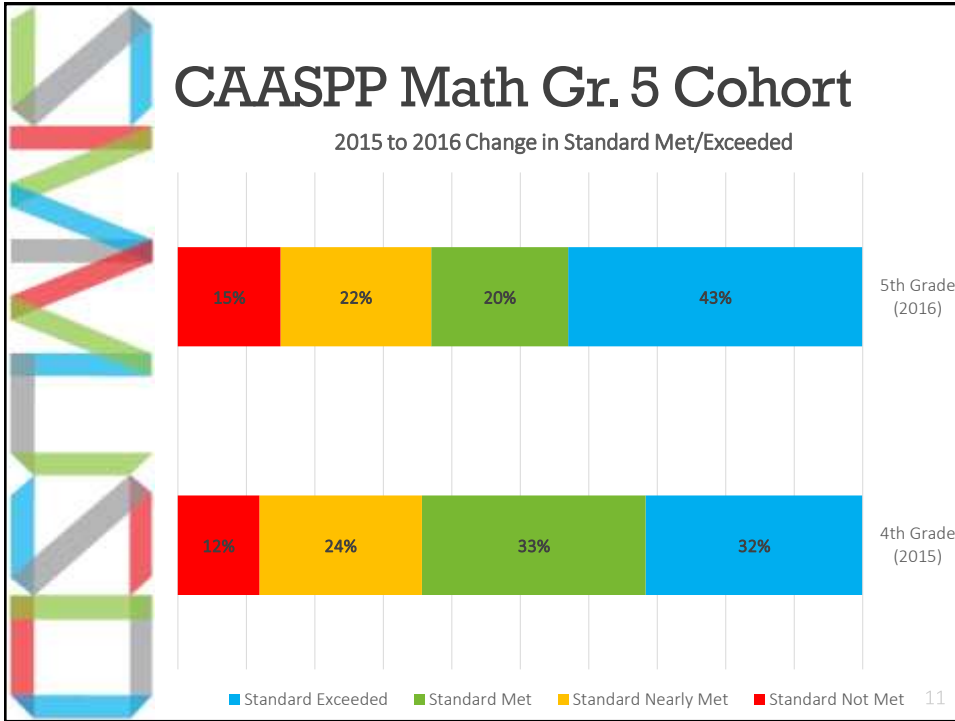


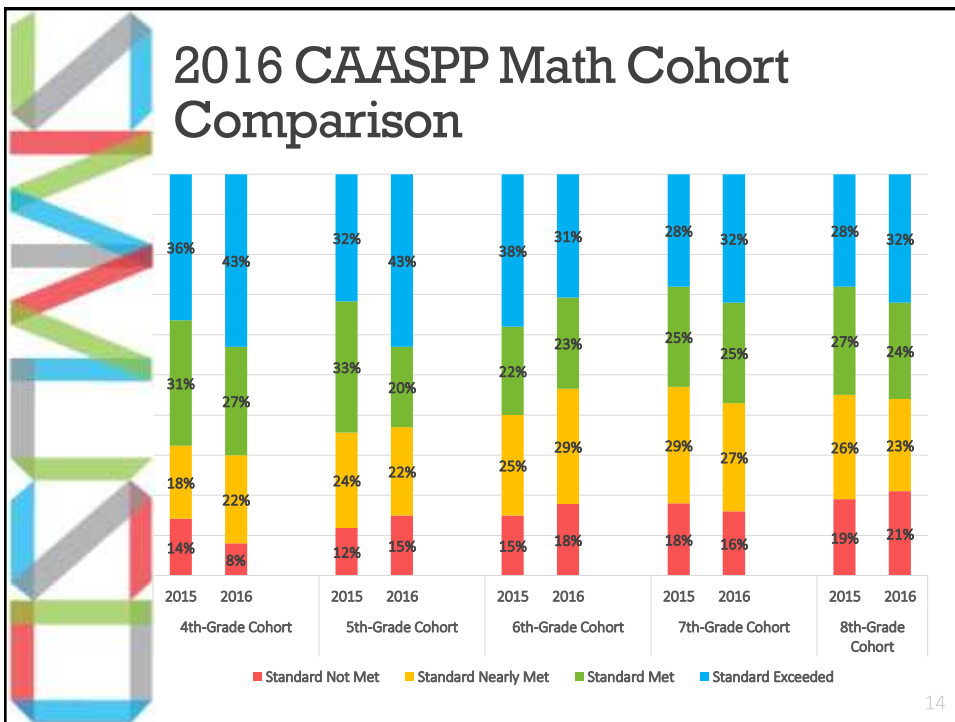
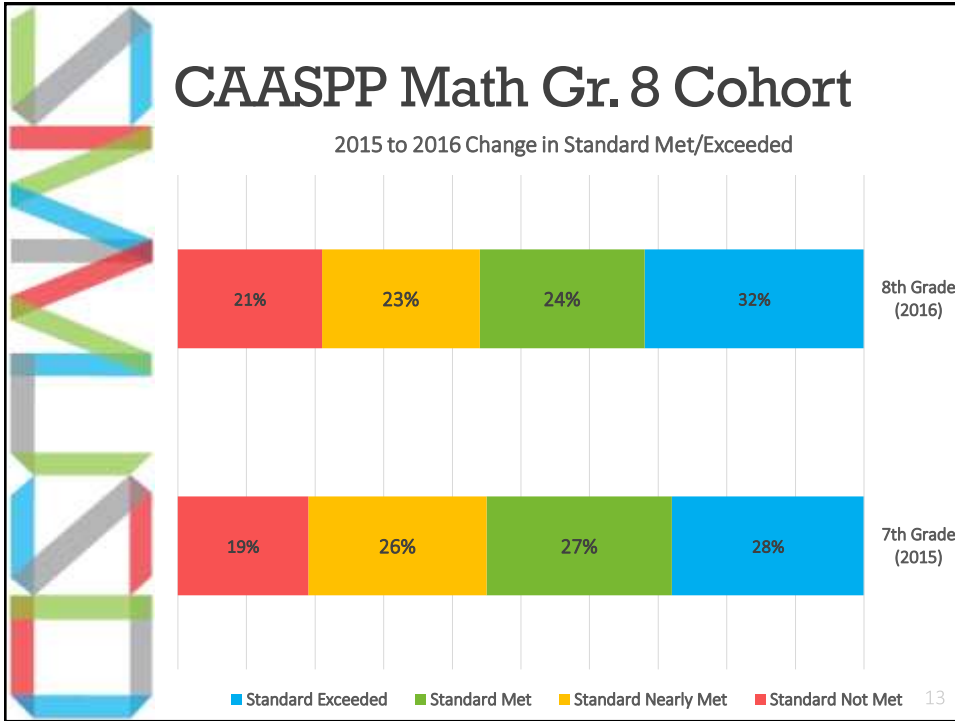
## Situation

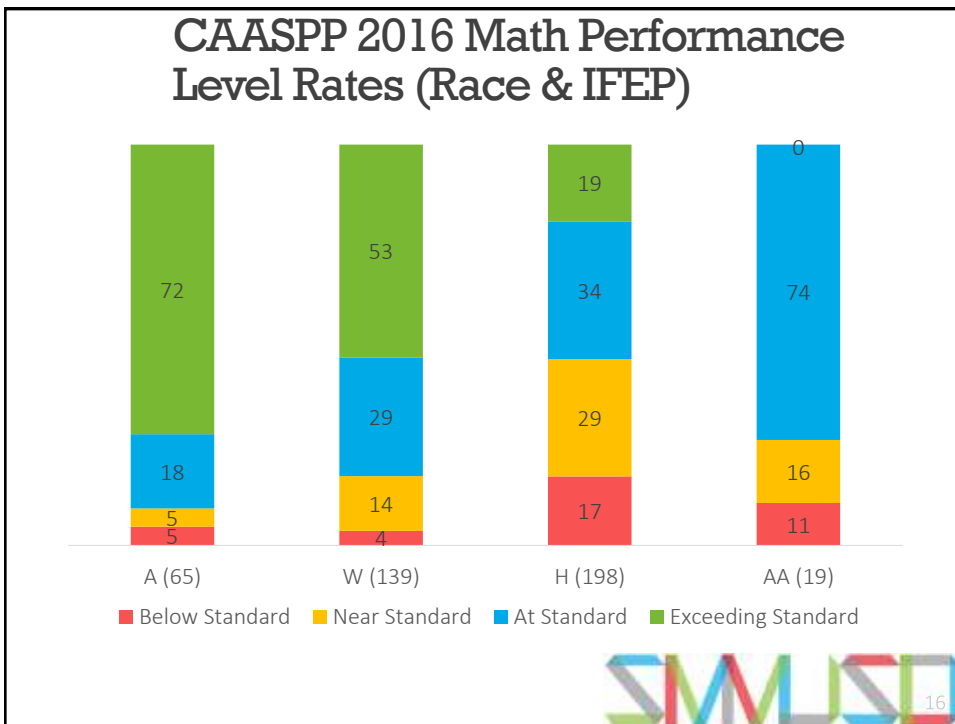
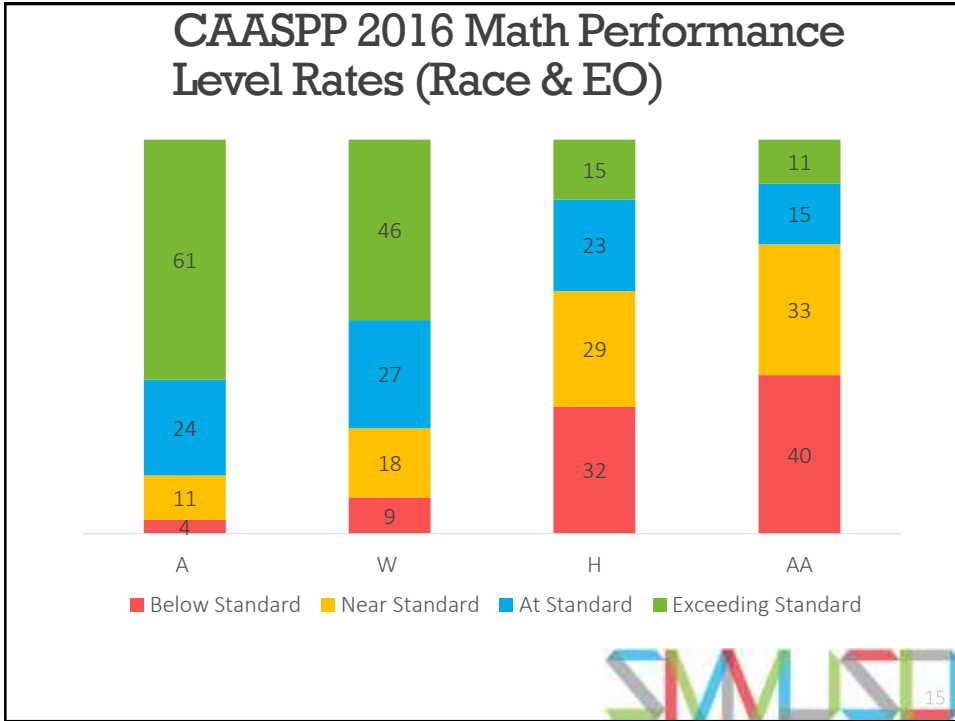
- Despite its excellent track record, SMMUSD schools are characterized by **wide and persistent disparities** in academic achievement and long-term academic outcomes.
- Specifically, while **White and Asian American students have on average performed at relatively high levels**, African American and Latino students have historically performed at much lower levels.

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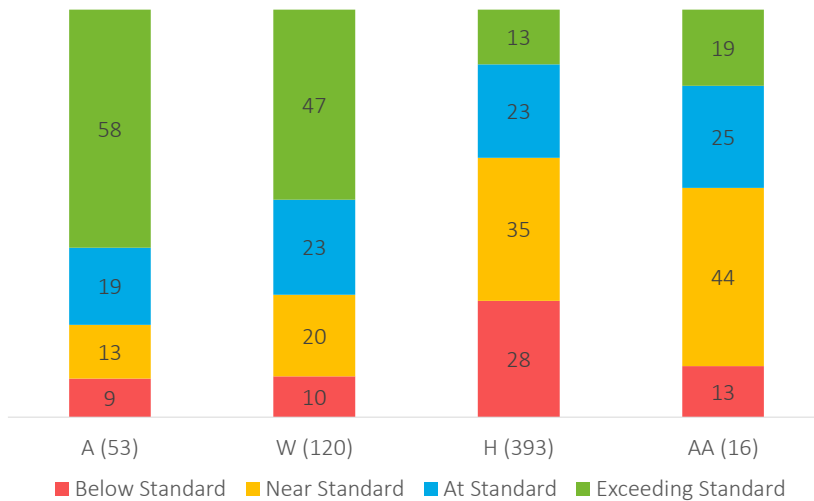




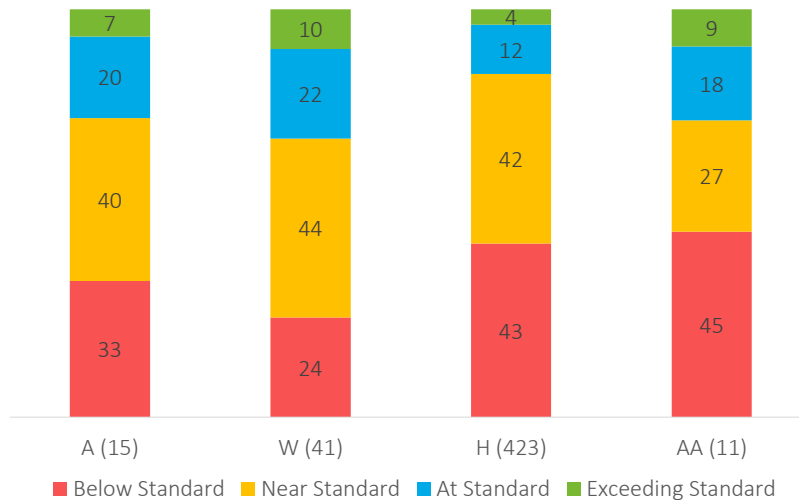


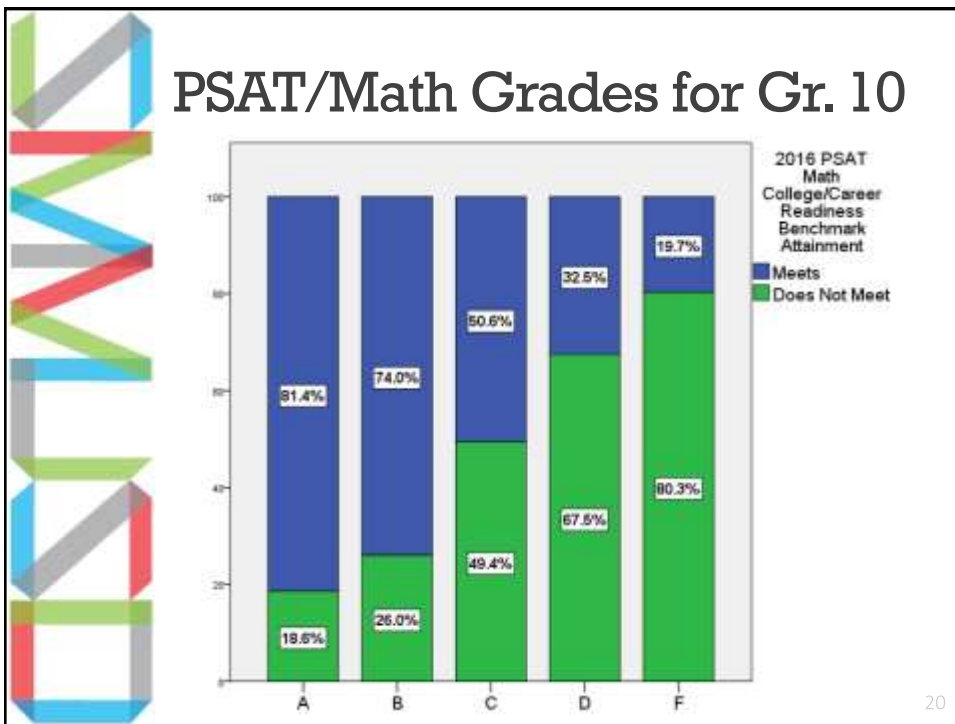
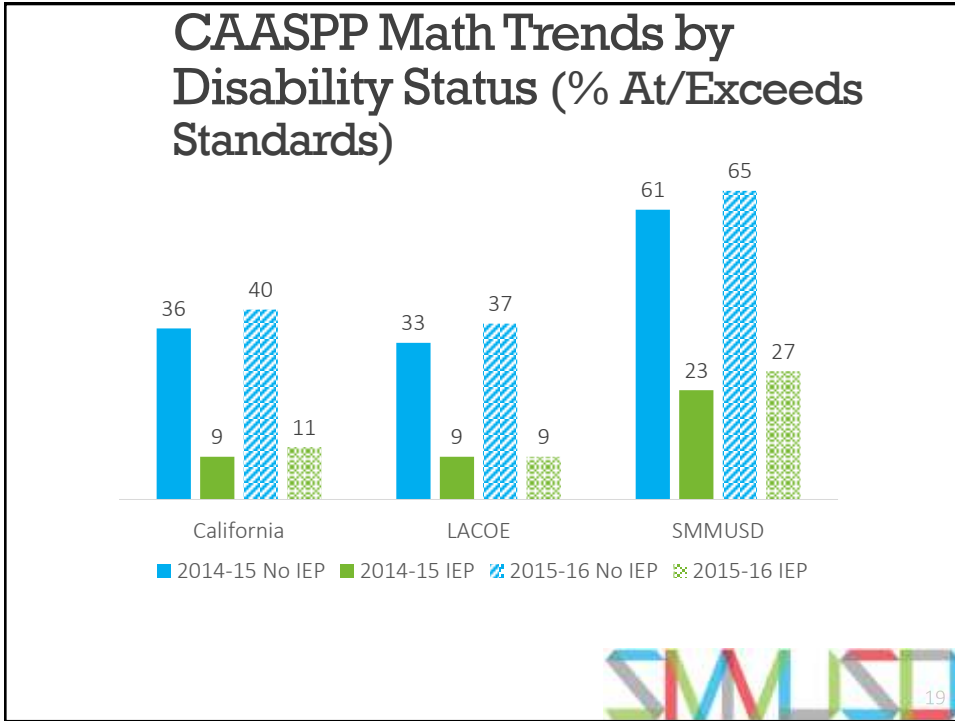


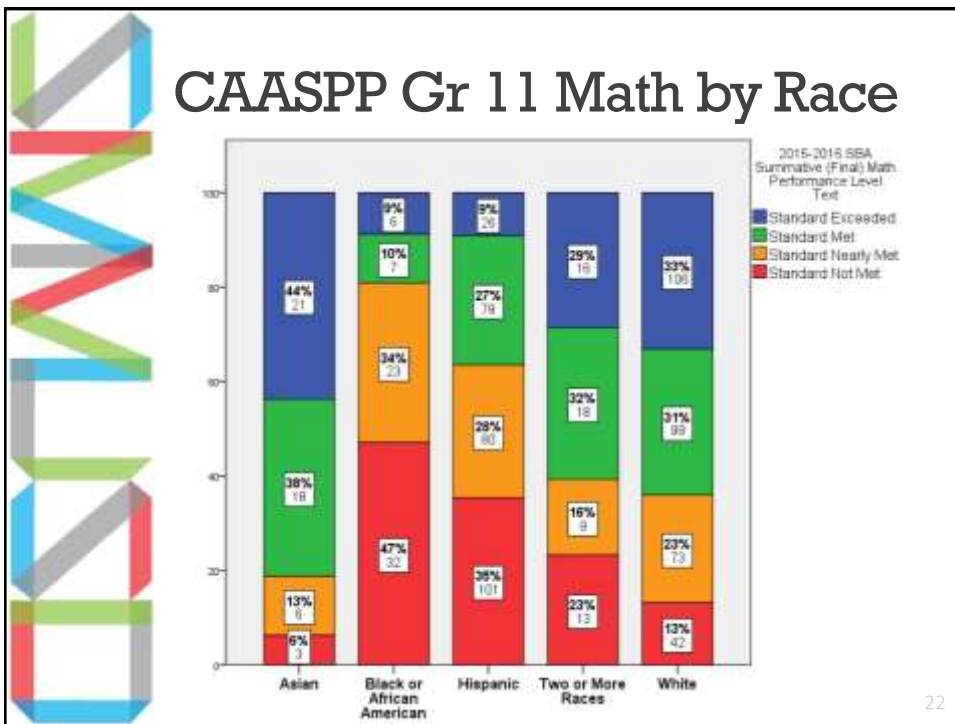
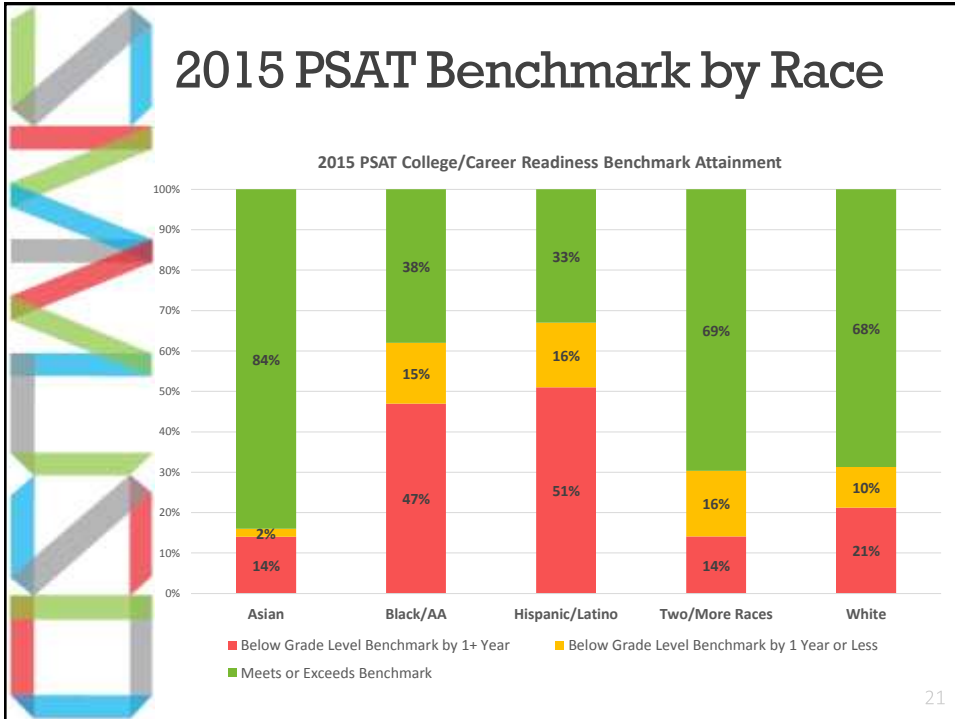
### CAASPP 2016 Math Performance Level Rates (Race & RFEP)

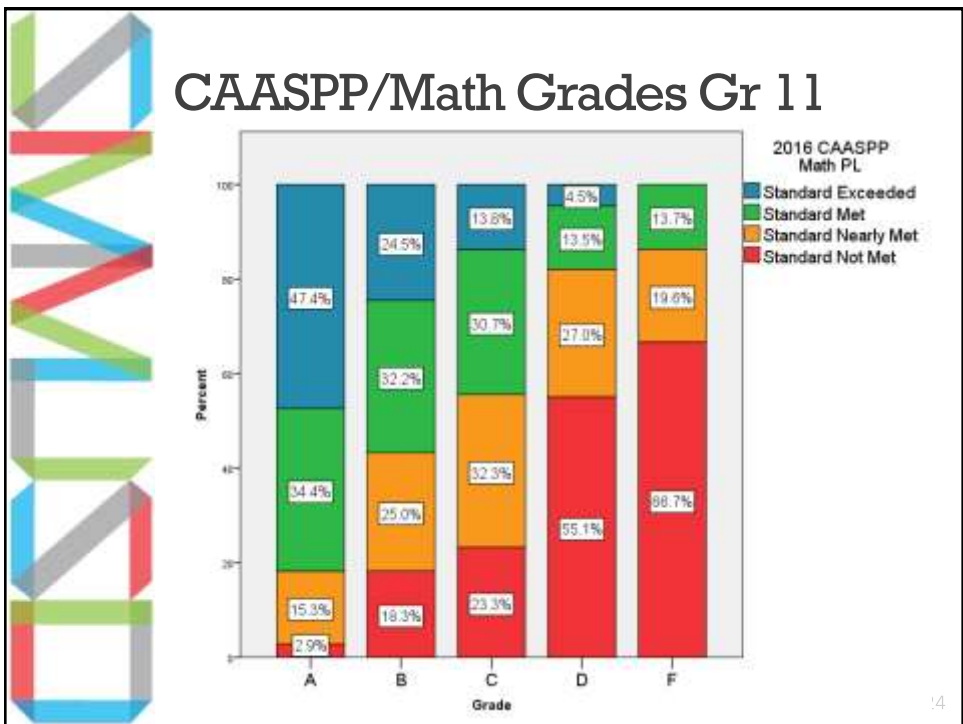
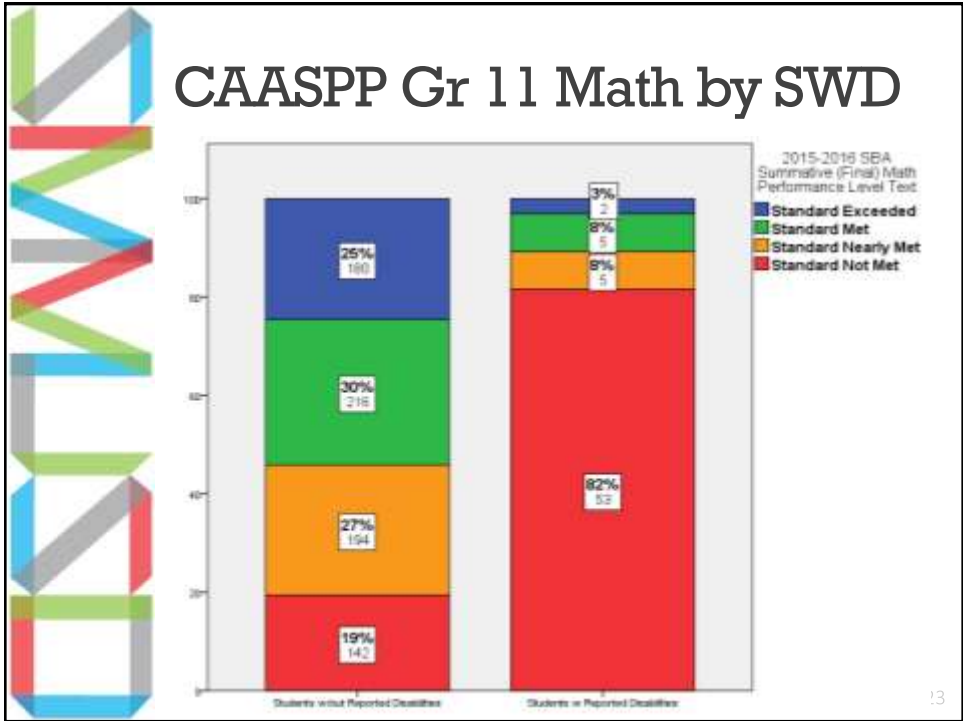


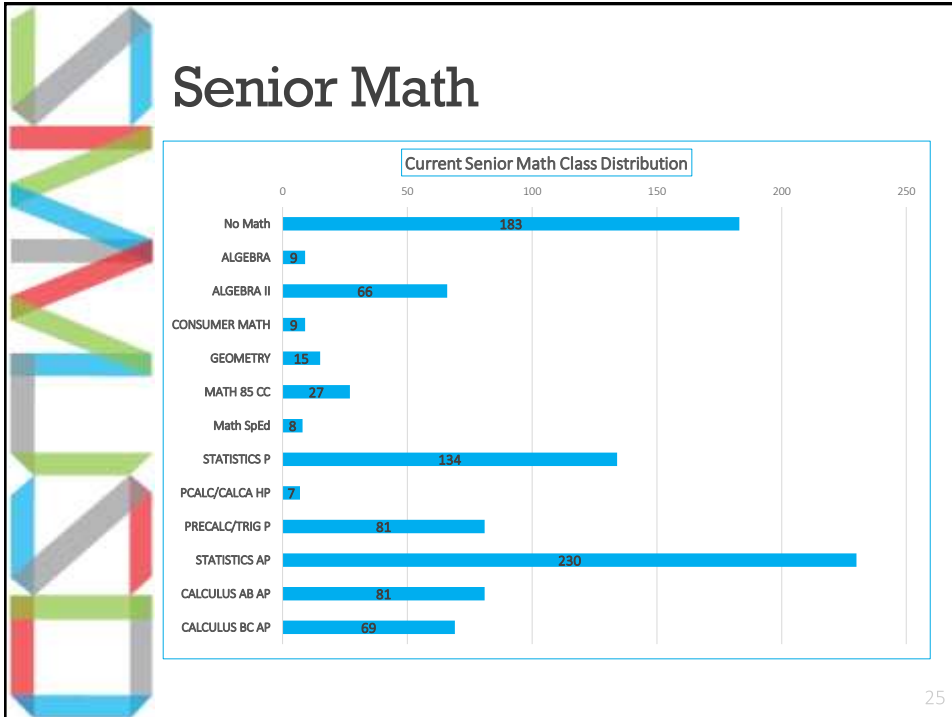
### CAASPP 2016 Math Performance Level Rates (Race & EL)












## Aspirational Math Goals

- All students will experience the joy of learning math.
- All students and teachers will adopt a growth mindset in math community-wide.
- District will eliminate barriers to students' access to rigorous math teaching and *learning*.
- Students' diverse math experiences and cognitive flexibility will be valued assets to advance learning.
- All students understand the relevance/purpose math serves in their lives


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## Operational Math Goals

- Increase the number of students by     % entering high school ready to engage in rigorous math learning – based on grades, CAASPP, and UCLA math test.
- Increase the number of students who successfully complete four years of high school rigorous math classes.
- All students will experience mathematical growth based on their previous years' performance data (CAASPP)


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## Integrating Priorities into a Coherent Systemic Approach for Achieving Excellence through Equity

- Through the efforts of *highly effective PLCs* at the school site and district office, the SMMUSD will ensure that *all students* in every classroom are engaged in socially, emotionally, and cognitively supportive learning environments that promote a growth mindset.
- Language expressed in a variety of forms will provide a principal means for engaging students within a guaranteed, meaningful, culturally responsive and viable curriculum.

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## What is Student Engagement Related to Mathematics?

- Student engagement is purposeful and conscious participation in learning.
- *Student engagement is active learning.*
- Language is the mediator for social, emotional, and intellectual engagement signifying the importance of academic discourse.

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## How is the way we teach and learn mathematics different with our new CA math standards?

Memorizing procedures to get an answer





Do math in a way that makes sense to the learner


Teacher – centered discourse



Student – centered discourse

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### Beliefs About Teaching and Learning Mathematics

Unproductive Beliefs	Productive Beliefs
Mathematics learning should focus on practicing procedures and memorizing basic number combinations.	Mathematics learning should focus on developing understanding of concepts and procedures through problem solving, reasoning, and discourse.
Students need only to learn and use the same standard computational algorithms and the same prescribed methods to solve algebraic problems.	All students need to have a range of strategies and approaches from which to choose in solving problems, including, but not limited to, general methods, standard algorithms, and procedures.
Students can learn to apply mathematics only after they have mastered the basic skills.	Students can learn mathematics through exploring and solving contextual and mathematical problems.
The role of the teacher is to tell students exactly what definitions, formulas, and rules they should know and demonstrate how to use this information to solve mathematics problems.	The role of the teacher is to engage students in tasks that promote reasoning and problem solving and facilitate discourse that moves students toward shared understanding of mathematics.
The role of the student is to memorize information that is presented and then use it to solve routine problems on homework, quizzes, and tests.	The role of the student is to be actively involved in making sense of mathematics tasks by using varied strategies and representations, justifying solutions, making connections to prior knowledge or familiar contexts and experiences, and considering the reasoning of others.
An effective teacher makes the mathematics easy for students by guiding them step by step through problem solving to ensure that they are not frustrated or confused.	An effective teacher provides students with appropriate challenge, encourages perseverance in solving problems, and supports productive struggle in learning mathematics.

Taken from NCTM's (National Council of Teachers of Mathematics) publication *Principles to Actions: Ensuring Mathematical Success for All*, 2014

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## Standards for Mathematical Practices k-12—SMP 3, 6

### 3. Construct viable arguments and critique the reasoning of others.

Students are expected to be able to make and defend a mathematical point. Why would doing this help us get the answer? They justify their conclusions, are able to communicate to others what they think and why they think that. They also must be good listeners so they are able to follow other students' reasoning about solving a problem and be able to say whether that reasoning makes sense to them or leaves questions. Mathematical argument is not like an everyday argument. It is based on mathematical points.


### 6. Attend to precision.

Students should be precise (a) in their communication so others understand what they mean; (b) in their calculations; and (c) in their explanations of what the work or data they are presenting means. They should use the precise language of mathematics, use terms accurately, and label their work with care.



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## Academic Discourse: The Role of Language in Learning

- The most significant moment in the course of intellectual development, which gives birth to the purely human forms of practical and abstract intelligence, occurs when speech (language) and practical activity converge (Vygotsky, 1976).
- **Vygotsky: Speech (language) plays an essential role in the organization of higher psychological functions.**


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## Academic Discourse: the Role of Language in Learning

- Reliance on inner speech increases and is more persistent every time the situation becomes more complicated and the goal more difficult to attain.
- Academic discourse enables students to acquire the language they will convert to inner speech to guide them in completing high cognitive demand academic tasks, i.e., reading, writing, math, science.


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## Math and Academic Discourse

- Encouraging math talk so students can clarify their strategies to themselves and others and compare the benefits and the limitations of alternative
- One important way to make students' thinking visible is through "math talk" –talking about mathematical thinking.
- Students and teachers actively talk about how they approached various problems and why.
- **An emphasis on "math talk" helps teachers be more in touch with their students' thinking, and they are learning from their students.**


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## Effective Forms of Math Academic Discourse

- The discourse around rethinking or correcting the mistake or misconception can lead to new brain structures that embrace the new knowledge.
- This kind of activity helps students move toward a growth mindset that tells them they are capable of learning and diminishes the view of "I'm just not good in math."
- Developing a math learner identity increases students' academic performance significantly


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## Mathematics Achievement

- PISA (programme for international student assessment—used to compare achievement across countries, has a section about attitudes and beliefs) from 13 million students showed that the lowest achieving students worldwide were those who used a memorization strategy—those who thought of math as a set of methods to remember and who approached math by trying to memorize steps.
- **The highest achieving students were those who thought of math as a set of connected, big ideas. “America has more memorizers than almost any country in the world,”** Jo Boaler, Stanford University


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## Fixed Mindset vs Growth Mindset about Math Learners

- Whereas research shows the plasticity of the brain and the **ability of students to develop smartness through hard work and challenge**, some schools bombard students with the messages that ability is fixed and that some students have talent and intelligence while others do not.


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## Power of Academic Growth Mindset

- The most successful countries in the world base schooling and grouping practices on growth mindset messages and beliefs, communicating to students that learning . . . is a product of effort (Stigler & Hiebert, 1999; Sahlberg, 2011).

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## Power of Growth Mindset

- Dweck's studies show that around 40% of US students display a growth mindset and 40% a fixed mindset, while the remaining 20% show mixed profiles.
- When students undertake an intervention to move them from a fixed to a growth mindset they immediately start performing at higher levels in school (Dweck, 2006a in Boaler, 2013).

[www.wwwords.co.uk/FORUM](http://www.wwwords.co.uk/FORUM)

FORUM Volume 55, Number 1, 2013


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## Third Space

- Need *think, ink, pair, share* – has potential to unleash capital. Students need time to reflect.
- In the third space, the teacher communicates that everyone has capital that is negotiable here and valuable not just to you, but to everyone. We all need access to your capital.


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## Mistakes Can be a Good Thing

- **Research has shown that mistakes are important opportunities for learning and growth, but students routinely regard mistakes as indicators of their own low ability.**
- Students and teachers should value mistakes and move from viewing them as learning failures to viewing them as learning achievements.
- **When students think about why something is wrong, new synaptic connections are sparked that cause the brain to grow. This small scientific fact has profound implications for teaching and learning.**


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## Principals' Practices and Recommendations:

- PLCs are an example of where we are fighting a systemic theme that is in education where people are used to working independently. PLCs push against that, so it's hard. However, we have to be patient and continue to push and support staff because we can and should have highly effective teams if we are going to improve student learning outcomes for all students.
- We need increased/improved **math academic discourse**
- Observation of best practices "seeing others" within a school with the site's own kids
- Visit one another across schools
- Share and analyze effective practices through viewing videos of their own classrooms during PLC time


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## Principals' Practices and Recommendations

- Monitor the level and quality of discourse
- Use the rubric in Principles to Action as a guide to the monitoring and reflective practices
- Teachers grappling together. **Teacher as learner.** Provide dissonance to help teachers understand both the math and pedagogy needed. This is important to understand the progression of the math standards.
- Math teachers need opportunities to engage in academic discourse with other teachers so they can implement it in math class.


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## Baseline Data: Commendations

- In all math classrooms visited, every teacher was actively teaching—teachers are invested in their students’ learning.
- All principals participated in learning walks—School administrators are committed to improving learning for all AND closing gaps.
- Most students are “on task” in 100% of math classrooms visited.


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## Baseline Data: Areas of Growth toward Academic Discourse

- In 44% of math classrooms visited, less than half the class was engaged in academic discourse.
- In 51% of math classrooms, the teacher did all or most of the talking.
- While we observed activities where for students talked to each other, we rarely observed resources to support academic discourse (frames, structures, defined roles, etc.)
- We observed few instances where teachers walked around and listened to students talk (as a way to assess student learning.)
- While data was not explicitly collected on it, students often had insufficient or no “think time.”


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## Value of Think Time

- Think time is that opportunity for the student to process the language constructed in engagement with the teacher and turn it into inner speech to promote her/his own learning.
- When all students have engaged in think time, they all can contribute to the academic discourse that ensues in the classroom.

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## Recommendations: Guaranteed, Viable Curriculum

- Analyze CASSPP data to determine which standards were problematic in grades 5/6 and 8/9.
- Concentrate on these grades for learning walks among conducted internally at school sites as well as by district
- Study the various effects of grade span transition and how they impact math learning.
- Build understanding and appreciation of the “vertical math curriculum.”
- Develop math curriculum coherence among and across classrooms, including SAI classes.

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## Recommendation

- Emphasize analysis of California Math Standards to ensure that instruction and assessment are aligned with the standards.


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## Recommendations: PLCs

- Research the amount of time math teachers are working in PLCs.
- Strengthen teachers' PLC discourse related to the four questions with an emphasis on implementing academic discourse.


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## Recommendations: PLCs

- Transform school culture from a focus on teaching math to a focus on learning math.
- Develop a philosophy and create a culture of “student-focused” decision-making.
- Build on students’ mistakes to create new thinking.


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## Recommendations

- Structure the school day and/or use resources to ensure teachers have time to reflect, collaborate and deepen one another’s understandings of how students learn math.
- Ensure that elementary and middle school teachers have deep math content knowledge, as well as math content pedagogy.


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## Recommendations: Student Engagement (Through Academic Discourse)

- Increase dramatically opportunities for students to engage in meaningful discourse.
- Increase the amount of time students have to think/reflect before talking.
- Increase understanding of the components of academic language.
- Scaffold academic discourse activities to support all students.
- Focus on student engagement in all grades and content areas for at least three years

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**“There is no such thing as teaching: there is only learning.”**

– Socrates

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