Ten Strategies for Moving *Principles to Action* to Action

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First, let us define the landscape.

Principles to Actions

Goals and purposes:

The primary purpose of *Principles to Actions* is to fill the gap between the development and adoption of CCSSM and other standards and the enactment of practices, policies, programs, and actions required for their widespread and successful implementation.

Principles to Actions

Overarching message:

Effective teaching is the nonnegotiable core that ensures that all students learn mathematics at high levels and such teaching requires a range of actions at the state or provincial, district, school, and classroom levels.

Principles to Actions:
Ensuring Mathematical Success for All

- **Teaching and Learning**
- **Access and Equity**
- **Curriculum**
- **Tools and Technology**
- **Assessment**
- **Professionalism**

Principles to Actions:
Ensuring Mathematical Success for All

Mathematics Teaching Practices

- **Establish mathematics goals to focus learning.**
- **Implement tasks that promote reasoning and problem solving.**
- **Use and connect mathematical representations.**
- **Facilitate meaningful mathematical discourse.**
- **Pose purposeful questions.**
- **Build procedural fluency from conceptual understanding.**
- **Support productive struggle in learning mathematics.**
- **Elicit and use evidence of student thinking.**

Now pause and think about what we are asking K-12 teachers of mathematics to do.

- **Make math work for all or nearly all**
- **Balance skills (answers) with concepts (understandings) and enable application**
- **Pay more than lip service to reasoning and sense-making**
- **Engage and motivate all students**
- **Employ rich tasks**
- **Implement the letter and the spirit of the Common Core**
- **Make effective use of technology and on-line tools and resources**
- **Navigate incredibly diverse classes and very demanding parents**

That is, teach in distinctly different ways.

Let’s present this as a logical, deductive string:

A Progression of Insights

- **We are charged with making math work for a much greater proportion of students.**
- **But typical instructional practice of showing, telling and practicing to get "right answers" only works for about 1/3.**
- **To complicate matters, today's world requires reasoning, solving problems, constructing viable arguments (SMPs).**
- **Thus math classes must reflect a different set of instructional practices – productive struggle, alternative approaches and multiple representations, discourse, explanations, conjectures and justifications (MTPs).**
- **But, this is different, difficult to do, requires time and risk-taking.**
- **Which is why we must have collaborative structures and coaching to support envisioning, practicing and providing feedback as we raise quality and impact.**

In other words:

We have the answers.

What will it take to see all of this in place in every classroom within which mathematics is taught?

First, it will take:

A significant shift in beliefs and mindsets.

So promulgate and instigate the use of the six Principles to Actions tables of Productive and Unproductive Beliefs to generate broad discussion of how the productive beliefs need to guide mathematics program decision-making.

Beliefs and Obstacles

Access and Equity – page 63

Unproductive beliefs	Productive beliefs
Students possess different innate levels of ability in mathematics, and these cannot be changed by instruction. Certain groups or individuals have it while others do not.	Mathematics ability is a function of opportunity, experience, and effort—not of innate intelligence. Mathematics teaching and learning cultivate mathematics abilities. All students are capable of participating and achieving in mathematics, and all deserve support to achieve at the highest levels.

Beliefs and Obstacles

Teaching and Learning – page 11

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 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.

These tables constitute a powerful resources.

Let’s use them.

Second, it will take:

Understanding, unpacking, practicing, experimenting with, getting back on the P to A Mathematics Teaching Practices

- **Establish mathematics goals to focus learning.**
- **Implement tasks that promote reasoning and problem solving.**
- **Use and connect mathematical representations.**
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- **Build procedural fluency from conceptual understanding.**
- **Support productive struggle in learning mathematics.**
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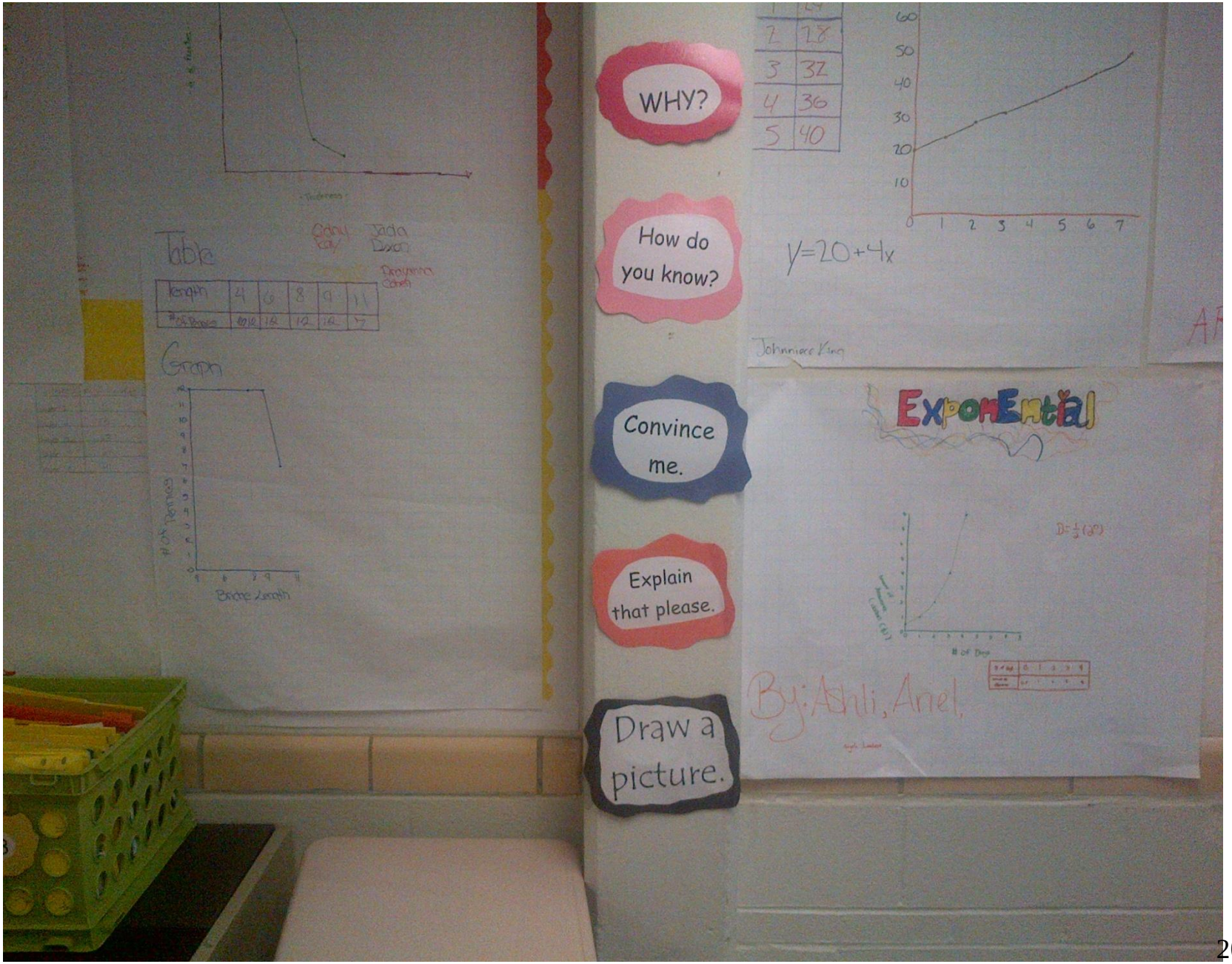
So use the 6 or 7 page sections in P to A on each MTP for book study. Post them in the room where PLCs meet. Use them to guide coaching. Embed them into teacher evaluation protocols

So create, distribute and post a set of discourse clouds that supports the 8 MTPs


WHY?
How do you know?
Convince me.
Explain that please.
Draw a picture.
Table
Graph
Length
Bridge Length
Johnniece King
ExponEntial
By: Ashli, Anel

Third, it will take:

The translation of these practices and the Common Core SMPs into a shared vision of effective teaching and learning.

Does your school or district have a common, written Vision of Effective Teaching and Learning Mathematics?

Why not?

Steal some and adapt them.

Fourth, it will take:

Elevating the importance of, and attention to, SMP #3:

Construct viable arguments and construct the reasoning of others

(the Common Core Trojan Horse)

SMP #3: CVA&CRO

First, the practices of constructing arguments and critiquing reasoning represent a powerful cross-disciplinary approach that are as relevant in mathematics as they are in English language arts, science and social studies. As such, they help to break down the subject specific silos and support an understanding that communicating, justifying and critiquing are essential components of all learning.

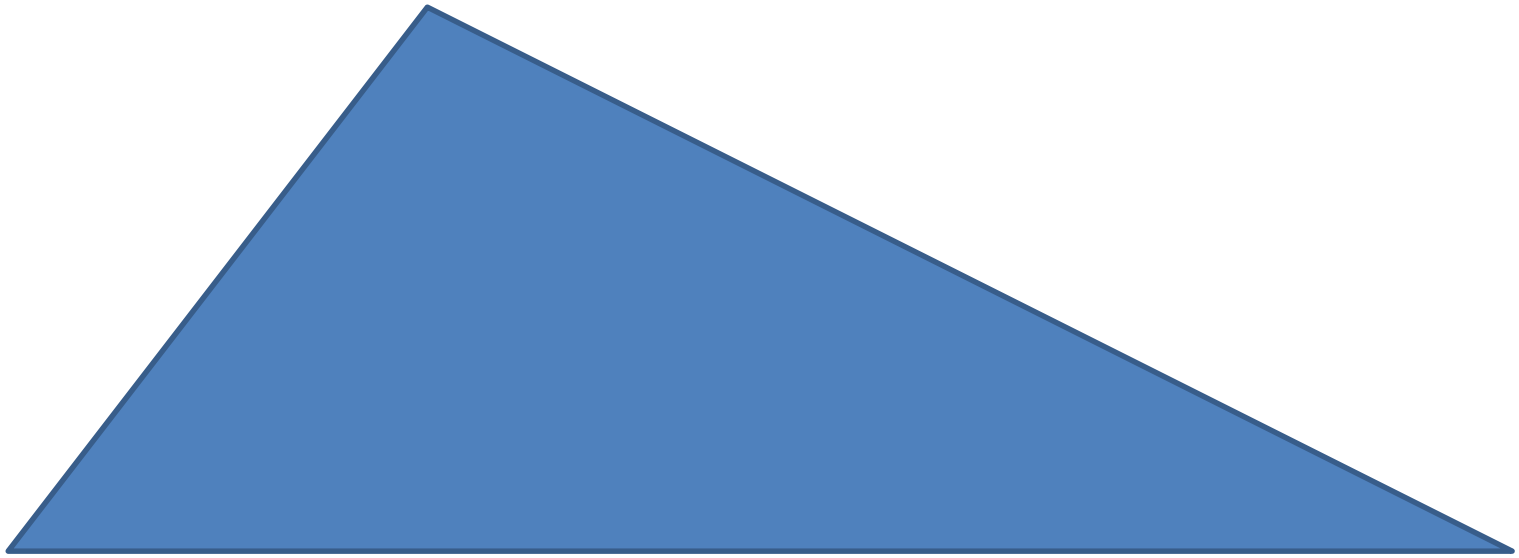
SMP #3: CVA&CRO

Second, this practice is a joy to embrace because it represents a long-overdue shift in helping dig us all out of the multiple-choice, skill-based, remember how, rule-based focus that emerged, to the detriment of all students and teachers, from No Child Left Behind. Test-prep memorize and regurgitate practices have little to do with thinking and reasoning and cheat students out of the opportunities consistently found in highly effective schools and gifted classrooms.

SMP #3: CVA&CRO

But the primary reason this practice strikes me as so important is its implications for teaching. In order for students to construct viable arguments, they must be asked “why?” or expected to “explain your thinking” or directed to “convince the class.” In a class where the shared expectation is that all answers need to be justified, students are consistently constructing arguments. They are communicating their understanding and demonstrating their thinking process.

What do you see?



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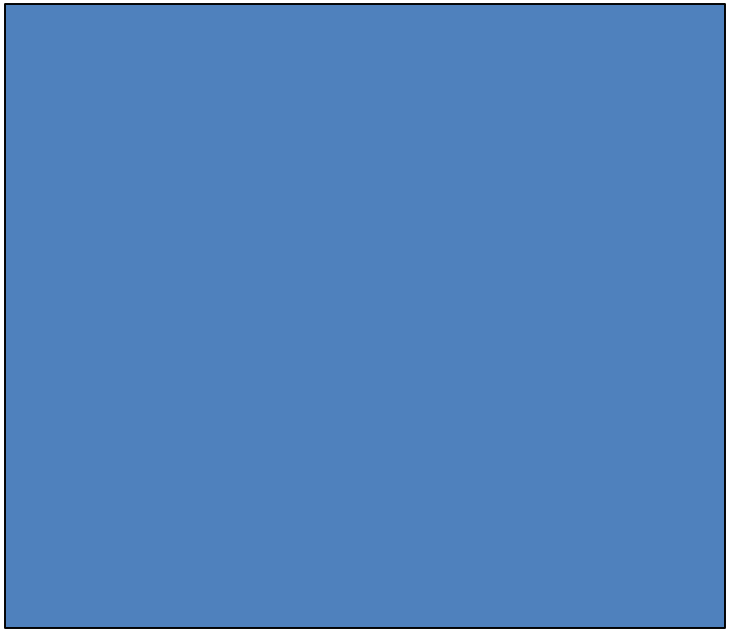

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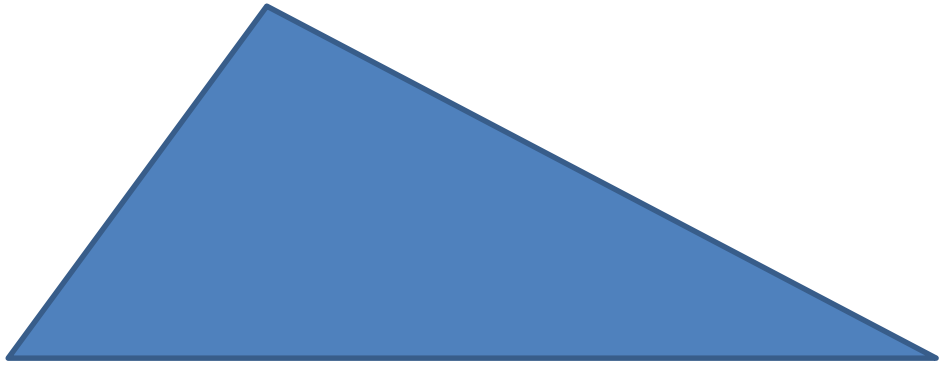

Identify three things you see.

Convince us.

On your white boards, A triangle is:

Compare to google/wikipedia

What is a triangle?

- a plane figure with three straight sides and three angles.

  "an equilateral triangle"

- a thing shaped like a triangle.

  "a small triangle of grass"

- a situation involving three people or things, especially an emotional relationship involving a couple and a third person with whom one of them is involved.
- noun: **eternal triangle**; plural noun: **eternal triangles**

Fifth it will take:

Providing much greater access (differentiating) on the basis of alternative approaches and multiple representations.

(Banishing the one right way to get the one right answer.)

For example:

What is 8 + 9?

Vs.

Convince me that 9 + 8 = 17.

8 + 9 =

17 – know it cold

10 + 7 – add 1 to 9, subtract 1 from 8

7 + 1 + 9 – decompose the 8 into 7 and 1

18 – 1 – add 10 and adjust or double - 1

16 + 1 – double plus 1

20 – 3 – round up and adjust

Who's right? Does it matter?

For example:

Picture in your mind's eye:

"Three quarters"

Sixth, it will take:

Aligned, high-quality, instructional materials we are honored to use and balanced assessments toward which we want to teach.

Great On-line Math Resources

https://sites.google.com/site/greatccssmathresources/

Emergent Math http://emergentmath.com/my-problem-based-curriculum-maps

Learn Zillion: www.learnzillion.com

Inside Mathematics: www.insidemathematics.org

Illustrative Mathematics: www.illustrativemathematics.org

Conceptua Math: www.conceptuamath.com

NCTM Illuminations: http://illuminations.nctm.org

Balanced Assessment: http://balancedassessment.concord.org

Mathalicious: http://www.mathalicious.com

Dan Meyer's three act lessons: https://docs.google.com/spreadsheet/ccc?key=0AjIqyKM9d7ZYdEhtR3BJMmdBWnM2YWxWYVM1UWowTEE

Thinking blocks: http://www.thinkingblocks.com

Decimal squares: http://www.decimalsquares.com

Math Assessment Project: http://map.mathshell.org/materials/index.php

Yummy Math: www.yummymath.com

National Library of Virtual Manipulatives: http://nlvm.usu.edu/en/nav/vlibrary.html

Seventh, it will take:

High quality, connected, adequate time allocated interventions and intensification for struggling students.

(especially double doses in K, 3, 6 and 9)

Long Reach HS

Howard County (MD) recognized that there were a significant number of 9th graders who were not being successful in Algebra 1. To address this problem, the county designed Algebra Seminar for approximately 20% of the 9th grade class in each high school. These are students who are deemed unlikely to be able to pass the state test if they are enrolled in a typical one-period Algebra I class. Algebra Seminar classes are:

- **Team-taught with a math and a special education teacher;**
- **Systematically planned as a back-to-back double period;**
- **Capped at 18 students;**
- **Supported with a common planning period made possible by Algebra Seminar teachers limited to four teaching periods;**
- **Supported with focused professional development;**
- **Using Holt Algebra I, Carnegie Algebra Tutor, and a broad array of other print and non-print resources;**
- **Notable for the variety of materials and resources used (including Smart Board, graphing calculators, laptop computers, response clickers, Versatiles, etc.);**
- **Enriched by a wide variety of highly effectively instructional practices (including effective questioning, asking for explanations, focusing of different representations and multiple approaches); and**
- **Supported by county-wide on-line lesson plans that teachers use to initiate their planning.**

Eighth, it will take:

The time, leadership and opportunity for collaborative structures.

To collaborate, we need time and structures

- Structured and focused department meetings, grade level meetings, course committees, and PLCs
- Before school breakfast sessions
- Common planning time – by grade and by department
- Pizza and beer/wine after school sessions
- Released time 1 p.m. to 4 p.m. sessions
- Hiring substitutes to release teachers for classroom visits
- Coach or principal teaching one or more classes to free up teacher to visit colleagues
- After school sessions with teacher who visited, teacher who was visited and the principal and/or coach to debrief
- Summer workshops
- Department seminars

Vehicles, not ends

- Collegial classroom visits and debrief discussions
- Task analysis
- Collaborative planning
- Co-teaching and co-planning
- Common readings
- Lesson study
- Instructional rounds
- Analysis of student work
- Data reviews and actions
- Video analysis
- Learning communities
- Gallery teaching
- Common problem resolution discussions and plans

Never forget:

It's not a PLC that magically makes a difference. It's the content of, and follow-up and change that emerges from, the professional sharing and interaction that enhances the day-in-and-day-out opportunities for kids to learn mathematics!

Ninth, it will take:

Knowledgeable, assertive, passionate, sensitive, respectful coaching.

Question #1

Why would you tell a teacher whom you are coaching to differentiate,

when you could be modeling differentiation in his/her classroom? (“who got the same answer in a different way?)

Question #2

Why would you tell a teacher whom you are coaching about missed opportunities (“why?”, a chance to probe, a representation),

when you yourself could have done that during the lesson?

Question #3

Why would you talk about using representations in the abstract,

when you could have drawn a bar model or silently gone to Desmos?

Question #4

Why would you ever observe an entire lesson,

And not provide oral and written feedback, an opportunity to discuss the lesson, and begin to craft an action plan ?

Co-teaching without co-teaching Interjecting myself into the class without being a distraction

- “85”: The perfect moment, from the back of the room for: “Really, why is that?”, “Hold it a sec, can you convince your partner that it’s 85? [PAUSE] Go ahead and try it.” (becomes great folder for discussion about missed opportunities and reasoning and alternative approaches)

Co-teaching without co-teaching Interjecting myself into the class without being a distraction

- While students are explaining or teaching is talking away abstracting, slide up to the board or the computer and capture the explanation with a picture or a diagram. You rarely need to do anything else to get the discussion focused on what you're written or drawn.

Co-teaching without co-teaching Interjecting myself into the class without being a distraction

- 2 and 2/3: [and from the back of the room:] “Cool. Did everyone of you do it that way? No? Can you come up and show us another way? Anyone else?

For example:

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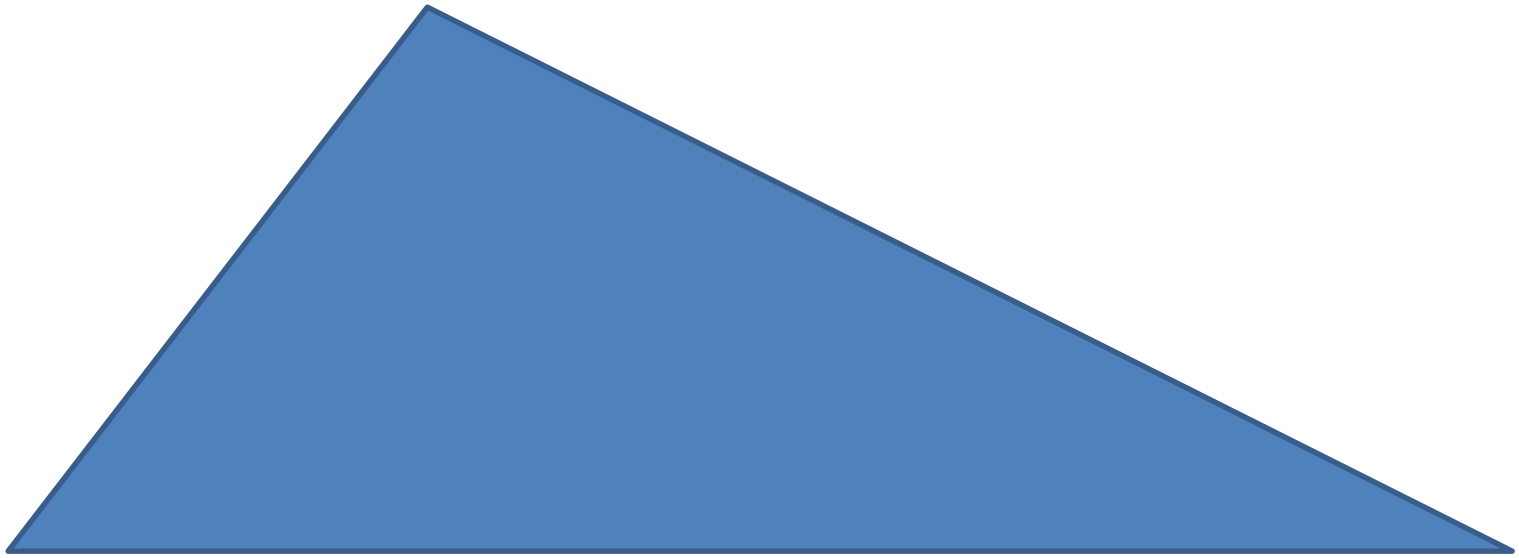

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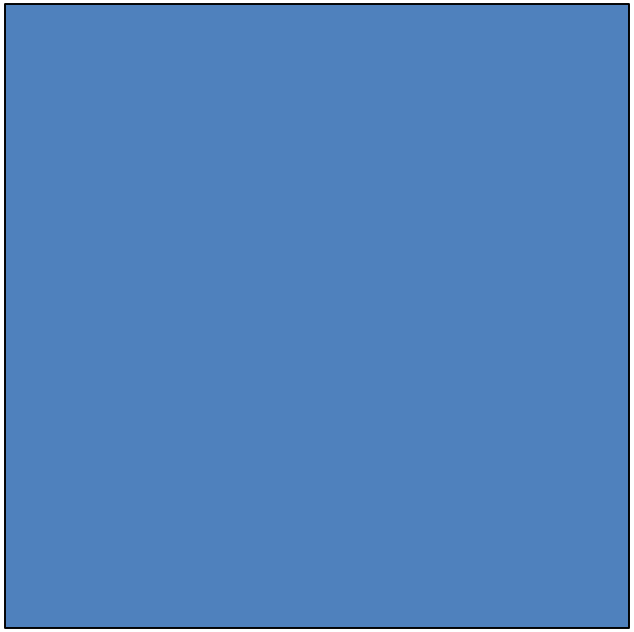

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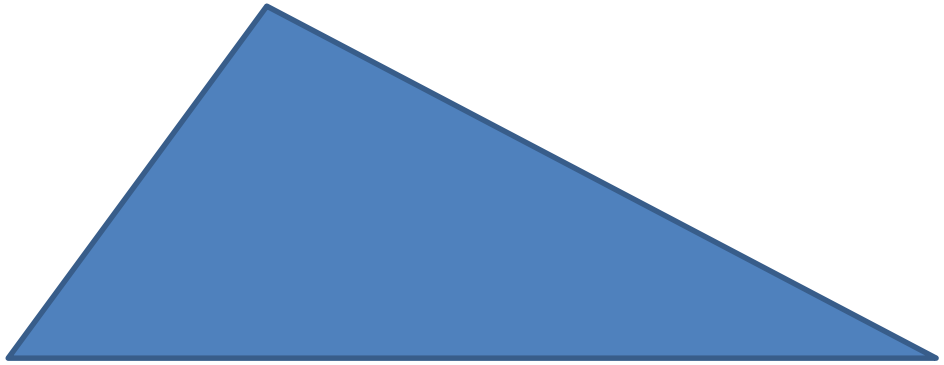

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That’s how coaching can significantly enhance the quality of teaching and thus student learning.

Tenth, it will take:

Your individual and collective initiative!

Do it, do it well, do it even better!

Thank you.

Now what are you waiting for?