Teaching Quantitative Reasoning with Corequisite Support

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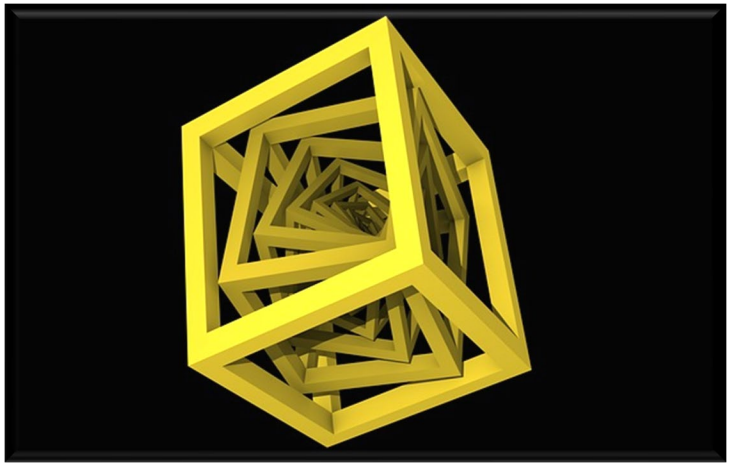
In Partnership with Complete College America



Hi! I’m Tammi.

- Full-time math faculty and Department Chair at Cuyamaca College
- Math Coach for the California Acceleration Project
- Facilitator for the Dana Center, CCA, and others throughout the nation
- Married and mother of two (18 and 20)

What we will discuss

- A brief history including the creation of Quantitative Reasoning (QR) with Corequisite Support
- Curriculum design principles
- A typical day in the corequisite QR classroom
- Supporting faculty with a community of practice

A brief history

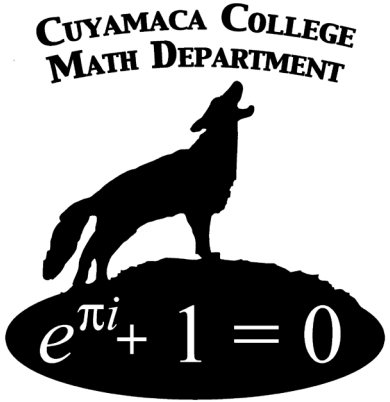
Data – 4% of students 3 levels below made it through TL math

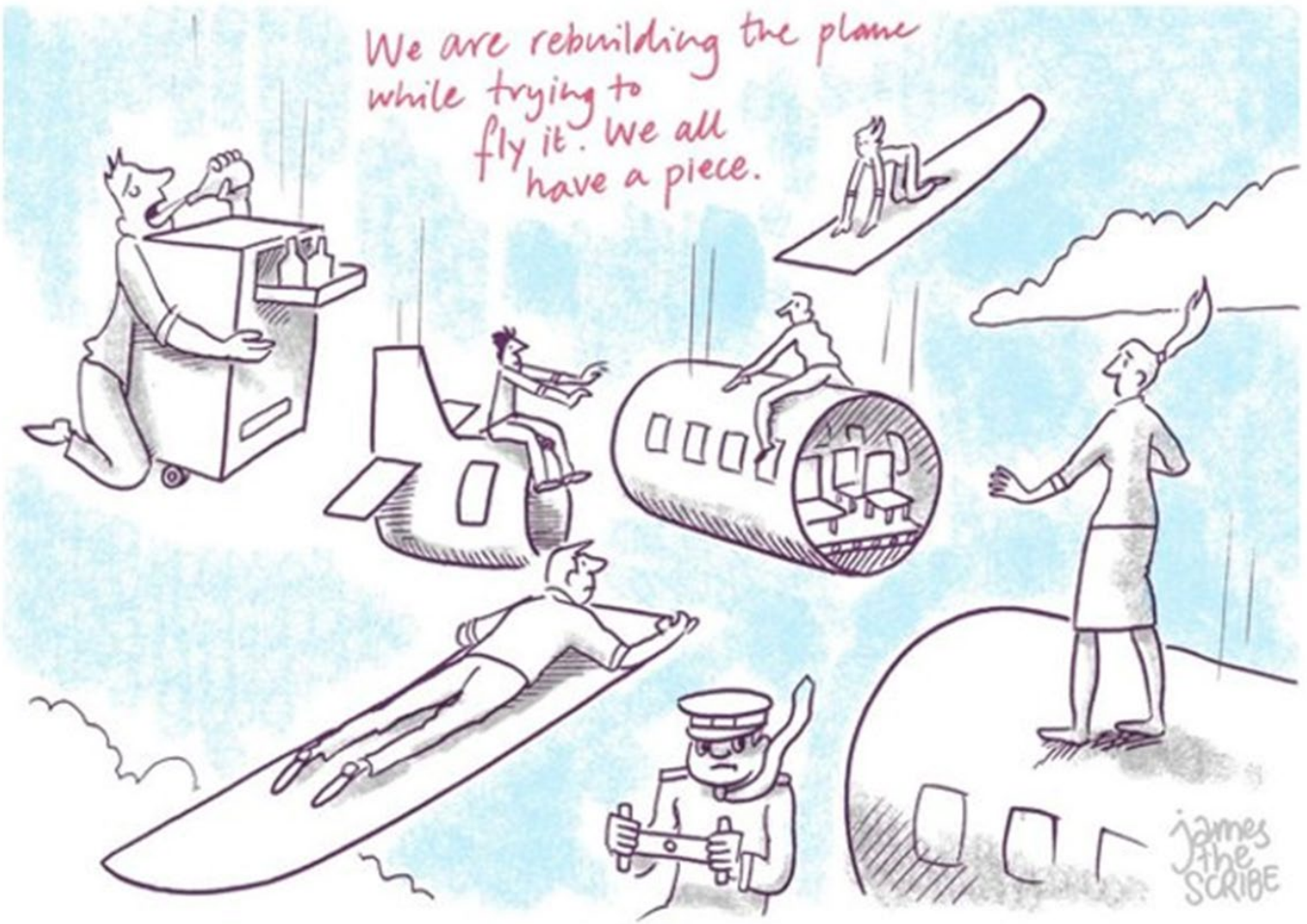
Realization – something needed to change

We couldn't do worse than we were already doing

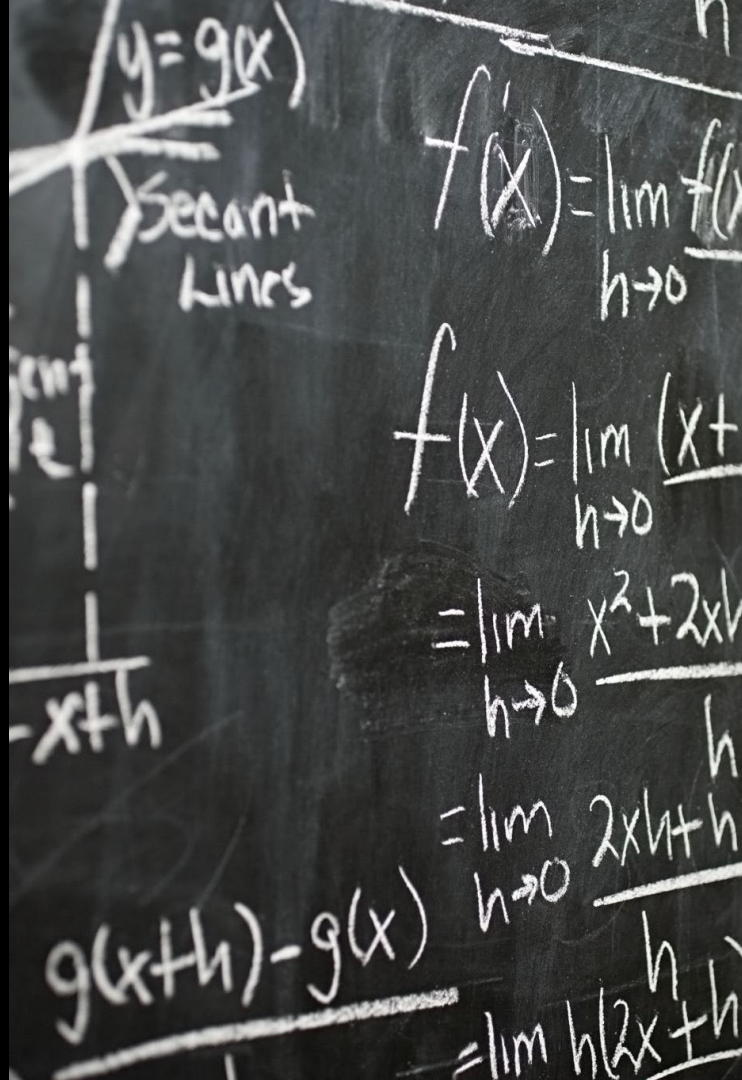
Leap of faith (jump off the cliff) – gave access to transfer-level math, offering corequisites

Continuous improvement




We are rebuilding the plane while trying to fly it. We all have a piece.
James the SCRIBE

We not only changed placement and access to transfer-level math, but we also changed how we teach.



Changes to Teaching Pedagogy

GOODBYE LECTURE

If lecture worked for developmental education students, they wouldn't need remediation – so clearly, lecture-based instruction does not meet their learning needs

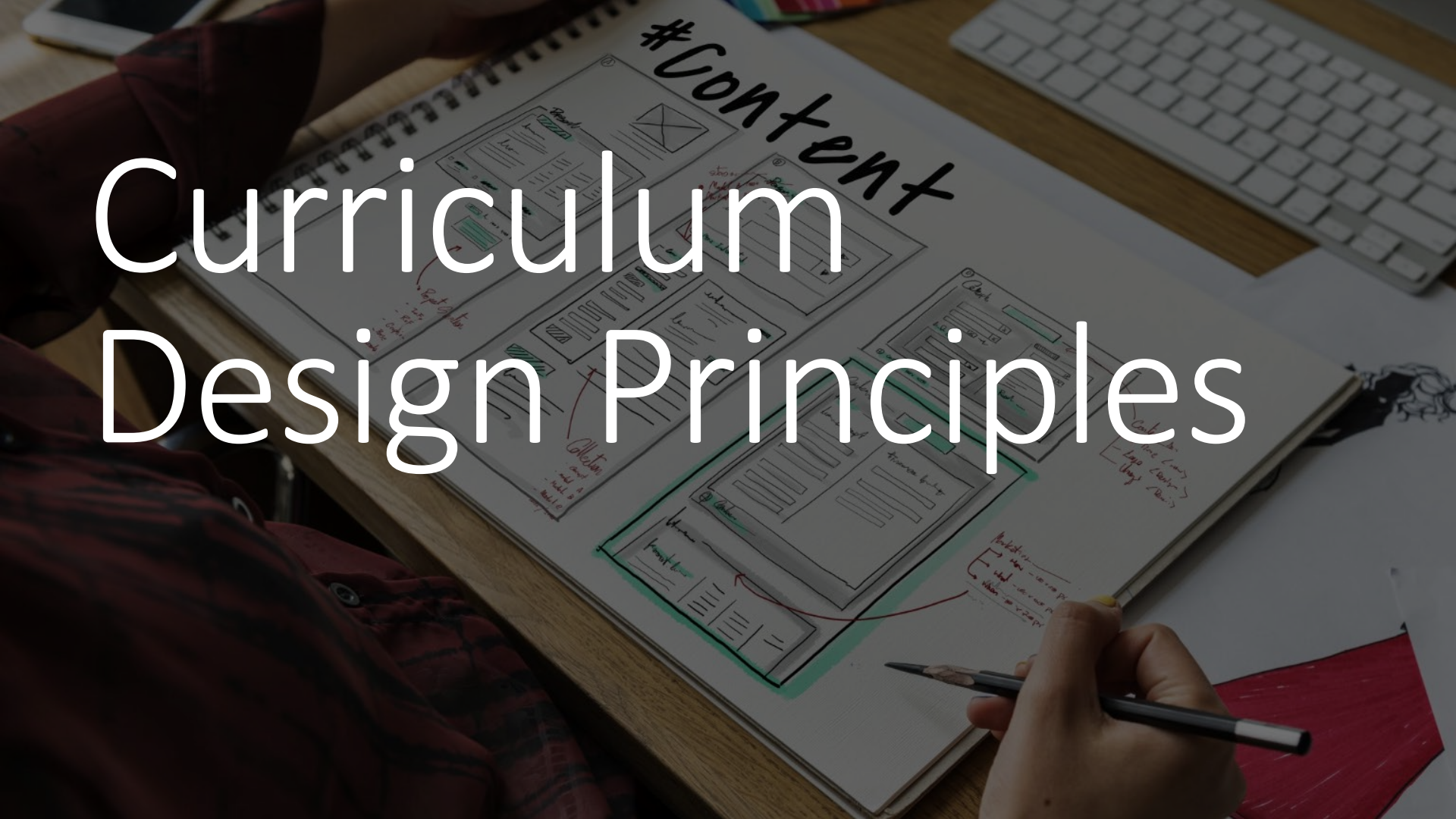
(Boylan & Saxon, 1999)

HELLO ACTIVE CLASSROOM

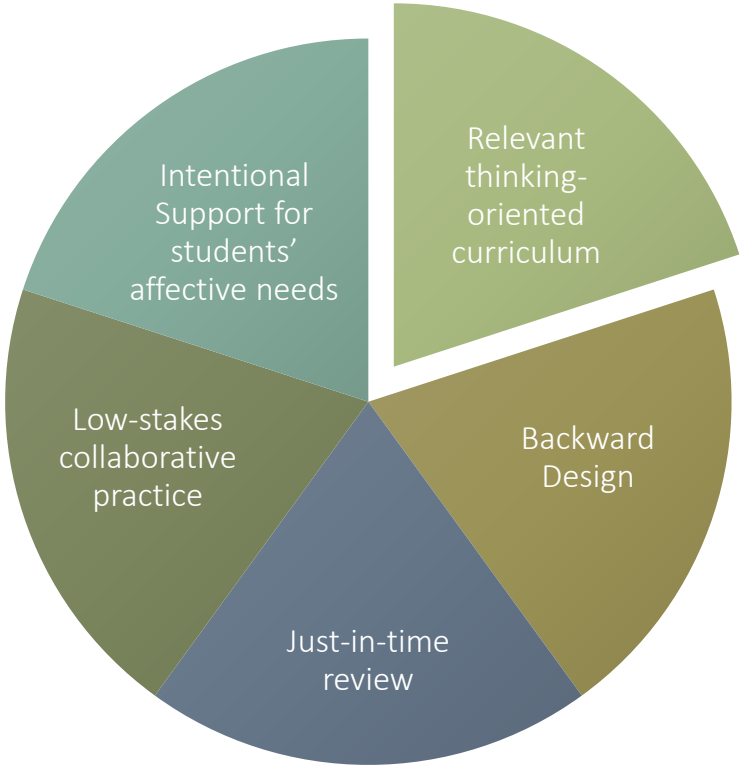
Students need opportunities to practice college-level tasks in a low-stakes classroom environment

The connection and community that comes from group learning is especially important for marginalized populations of students.

(Hern & Snell, 2013; Tinto, 1997)



Curriculum Design Principles



California Acceleration Project Design Principles

Read more about these design principles.

Relevant Thinking-Oriented Curriculum

This kind of curriculum asks students to engage with issues that matter, wrestle with open-ended problems, and use resources from the class to reach and defend their own conclusions.

Conceptual and contextual. Not rote or procedural.

High-challenge and high-support!

The role of teaching

Math teaching is a cultural activity, with more variability across different countries than within a country.

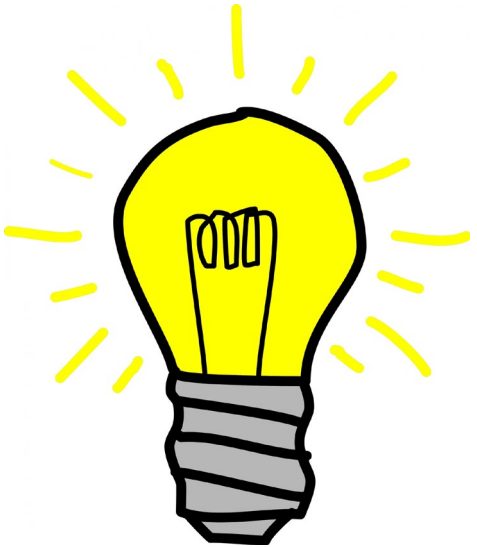
But all high-performing countries shared a set of common features…

Source: TIMSS 1995 video study, Stigler, et.al.

Types of Learning Opportunities Needed for Deep Understanding

For deep learning, with understanding, students need recurring and sustained opportunities for:

- Productive struggle – with important mathematics
- Explicit connections – among concepts, procedures, problems, situations
- Deliberate practice – increasing variation and complexity over time



SOURCE: Stigler (2015)

High challenge requires high support

Ways to provide support:

- Communicating in all that we do and say that we believe in students' abilities to learn math
  - Positive feedback in public, constructive feedback in private
  - High expectations
  - Syllabus says what we practice
- Backward design and just-in-time review
- Lots of low-stakes collaborative practice
- Attending to the affective side of learning

Backward Design

Which type of math do students need for their chosen path-way?

Align review to those specific college-level requirements

QR serves non-STEM majors, design with that in mind

Just-in-time Review

Student success and persistence are highest when the [review] is relevant and contextualized.

(Rutschow & Schneider, 2011)

Provide the support students need to grapple with challenging tasks

No front-loading of material – students review skills as they come up with the QR curriculum

We are not teaching all the concepts from pre-transfer classes

Low-stakes collaborative practice

Low stakes opportunities to practice, get feedback, make mistakes and try again!

- Think-pair-share
- Speed dating
- Group work
- Ambassador exchange

Here is a toolbox of low-stakes collaborative practice activities to use in your classroom!

Attending to the Affective Domain

Students we are used to teaching in transfer-level classes:	• Freshmen who were very successful in high school • Students who successfully navigated developmental classes & know the 'rules' of college
Students we will be teaching now in transfer-level classes:	• Freshmen who might have struggled with math in high school • Students who feel like they don't belong in the class/college • Students who don't know the 'rules' of college

How can we keep students engaged while attending to their affective needs?

Attending to the Affective Domain

1. Get to know your students and their individual needs – connect students with people, not just resources (warm handoff)

   Find out what your campus has to offer in terms of basic rights (food, housing, transportation).
2. Discuss feelings and attitudes towards math - normalize failures and celebrate mistakes.
3. Integrate affective domain activities into your curriculum on topics such as Metacognition, Growth mindset, Grit.
4. Rethink policies and practices that make rebounding from failure impossible, or that don't allow for mistakes in the learning process.

Faculty need to reflect on classroom policies and procedures to see how they can "reduce students' fear, increase their willingness to engage with challenging tasks, and make them less likely to sabotage their own classroom success."

(Hern & Snell, 2013)

My Syllabus: Revisions

It's not about being perfect when you're learning. We make mistakes and fix mistakes, which is an important part of the learning process. In this class, you will have opportunities to revise every assignment.

My Syllabus: Late Work

The best learning experience is one in which you keep pace with the posted due dates on Canvas as it helps you digest the material with deeper understanding. With this, I understand that life happens and sometimes it is not possible to get something done by the due date. So, don't be worried if you miss something; instead talk with me. However, if you are generally not keeping up with the class, I will contact you to meet so we can figure out how I can support you.

The need to turn in late work occurs for a variety of reasons (you were sick, had a family emergency, etc.). The important thing is to talk to me about it so that I can support you. If you know that you are going to be absent or an emergency arises, please let me know and see if it is possible to turn in an assignment early or make it up on a different day.

A typical day in the QR with corequisite support classroom

QR with Corequisite Support

- Started Fall 2020
- One section of 3-unit QR course linked to 1-unit support course taught by the same instructor in back-to-back time slots. Contact hours: 4 hours a week
- Placement
  - QR is open to everyone
  - Students can choose QR with support
- Class max: 40 students
- Grading:
  - Two separate grades
  - Corequisite is Pass/No Pass
- Peruse my syllabus

The Student-centered Classroom

“New” students = new way of teaching.

The focus of activity shifts from the teacher to the learner, and class time is spent on:

- Discussion
- Collaborative work
- Productive struggle, and
- Contextualized just-in-time review

My Classroom

A Sample QR Lesson & Project-based Assessment

LESSON 1-5: HOME BUYING

Learning Objectives:

- Use compound interest formulas to analyze financial issues
- Use formulas to determine the mortgage payment when buying property

Easy, right? Wrong!

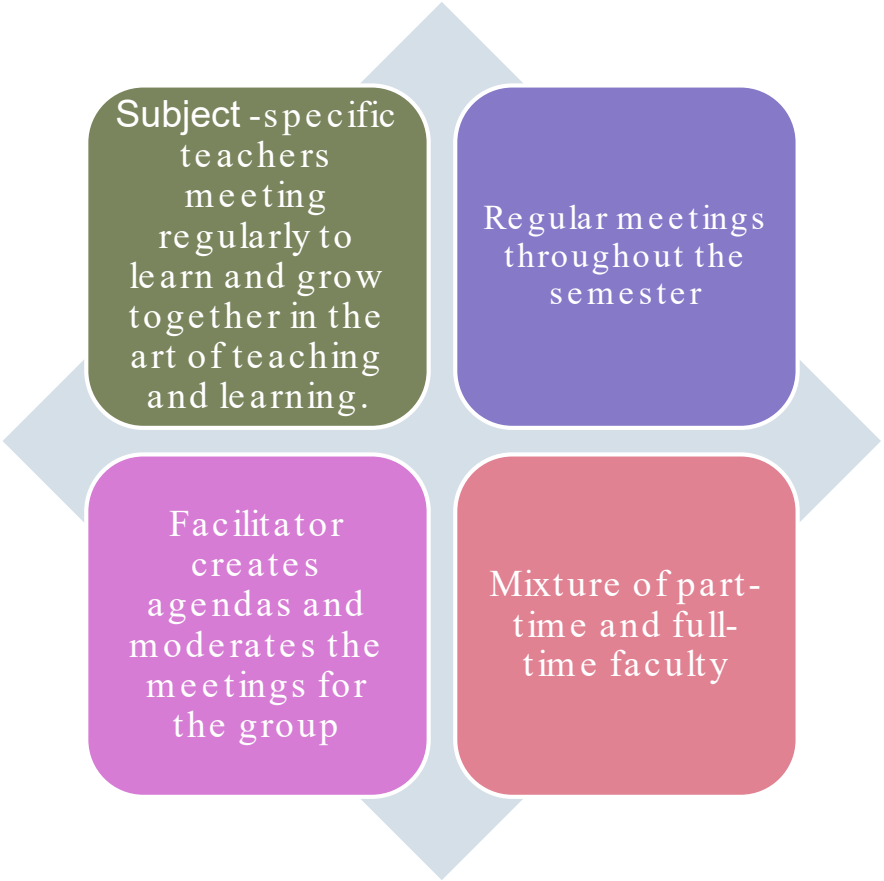
Lessons learned:

- We were expecting all of these changes and we were prepared for these changes, but students were not.
- We had all of the lesson plans and materials we could have dreamed for, but our cookie-cutter lesson plans didn’t allow for personal teaching styles and preferences
- We were trying something new and different (just like our students). We needed to know that mistakes and failures were normal (just like our students). And we needed support (just like our students).

Supporting Faculty with a Community of Practice

Community of Practice (COP)

"Communities of practice are groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly." (Wenger-Trayner, 2015)



COP in the Math Department at Cuyamaca College

Ongoing Support Through a COP

Goals for COP:

- Change expectations of faculty
- Support implementation of pedagogical reforms
- Provide intentional support for the affective domain of our faculty
- Evolves with time

Attending to the Affective Domain of our Faculty

Address the fears of the faculty

Safe environment for full-time and part-time faculty

Pay people for their time

Change is scary.
But change is needed.

Resources

Suggested Readings:

- Toward A Vision of Accelerated Curriculum & Pedagogy
- Math Corequisite Models & Lessons Learned
- The College Fear Factor & Laziness Does Not Exist

Class Materials:

- Resources for an interactive QR classroom
- Group tickets for randomized groups of 3
- Affective Domain Activities
- Low-stakes collaborative practice activities

Questions?

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