

Understanding a New Way of Experiencing Mathematics

Traditional Classroom	Today's Classroom
<p>Most of us grew up in a traditional math classroom setting where it most likely consisted of the following routine.</p> <p>Teacher would:</p> <ul style="list-style-type: none">● Put up answers to homework on board.● Lecture on new concepts by presenting step-by-step procedures for students to memorize.● Assign new homework for students to work on independently.● Repeat the process for the next day with the exception of quiz/test day.	<p>Students now learn math in an engaging, collaborative environment that consists of the following routine.</p> <p>Students and Teachers will:</p> <ul style="list-style-type: none">● Work through, solve, and create a justification for how they solved the math exercise.● Actively engage in the math experience by exploring concepts and making connections; during this discovery phase, math education is at its best.● Construct viable arguments and critique the reasoning of others; students develop problem solving skills through this process that will be beneficial beyond the math classroom.

Did you notice that in the traditional model above, every bullet point on the left starts with the word *teacher*? However, in the current environment (on the right, above) students are expected to actively **engage** in their learning environment with their peers and their teacher/facilitator.

Managing Expectations

It is no longer possible to be the student who lays low and waits for the teacher to display a solution. Math classes now require the reasoning skills that life outside of school demands. Students are expected to use critical thinking to engage by making sense of problems and persevering in solving them. Students are also expected to work in teams, small groups or pairs, share ideas, critique each other's reasoning and develop knowledge in a hands-on environment.

This does not mean that students are teaching or left to fend for themselves. A student-centered classroom involves students discovering ideas, questioning one another, and presenting their findings. Teachers are continuously responding to students' ideas and needs throughout the classroom time.

Collaborative Learning

Research supports that the best way to have students write, discuss, and present their findings is by working in a collaborative setting rather than just taking notes in a lecture setting. Through collaboration with the teacher as a facilitator, students begin to stretch their minds, achieve deeper levels of learning, have better information retention, and gain a greater sense of ownership for learning the material. Students are encouraged to ask other students to address any misconceptions they and/or their peers may be experiencing during class time. We recognize that this is a process that is not learned overnight. **Collaborative work is definitely more challenging for the students and instructors alike.** It will take time to get acclimated to and feel comfortable with the collaborative learning process. In addition, it is our goal to develop a growth mindset with our students. A growth mindset teaches persistence through problems - even when the solution does not seem straightforward or easy. With this mindset, it is the struggle, the reaction to failure, and the overcoming of failures that develops higher level learners (critical thinkers).

What does a collaborative classroom look like?

A teacher will present a problem or a task and ask students to attack it as a team. The teacher then facilitates a discussion (large group or small groups) to understand how student reasoning may or may not be mathematically sound. Learning from each others' ideas and developing an understanding of the objective for the days lesson or series of lessons better prepares students for 21st century learning.

Below are links to address traditional lecturing in the classroom.

- <http://blogs.kqed.org/mindshift/2012/02/dont-lecture-me-rethinking-how-college-students-learn-2/>
- <http://news.sciencemag.org/education/2014/05/lectures-arent-just-boring-theyre-ineffective-too-study-finds>

Below are links to articles addressing collaborative learning in the classroom:

- <http://www.edutopia.org/stw-collaborative-learning>
- <http://www.gdrc.org/kmgmt/c-learn/44.html>
- http://www.thirteen.org/edonline/concept2class/coopcollab/index_sub3.html
- <http://tep.uoregon.edu/resources/librarylinks/articles/benefits.html>

If you have made it to the end of this document, thank you for taking the time to understand our timely and important shift in teaching and learning at Metea Valley High School (MVHS). Our goal is to prepare every student for LIFE success!