



The background image shows a classroom setting. A female teacher in a white lab coat is standing and pointing at a whiteboard. Several students are seated at long wooden tables, some using laptops. The whiteboard contains mathematical content, including a graph and a limit problem. The overall atmosphere is one of active learning and collaboration.

Active Learning in Math as a Tool to Promote Equity

Kelly Spoon
Math Faculty

Mesa's Online Success Team Member
San Diego Mesa College



What is active learning?

Type your definition of active learning in the chat.

You can reply and react to other posts!

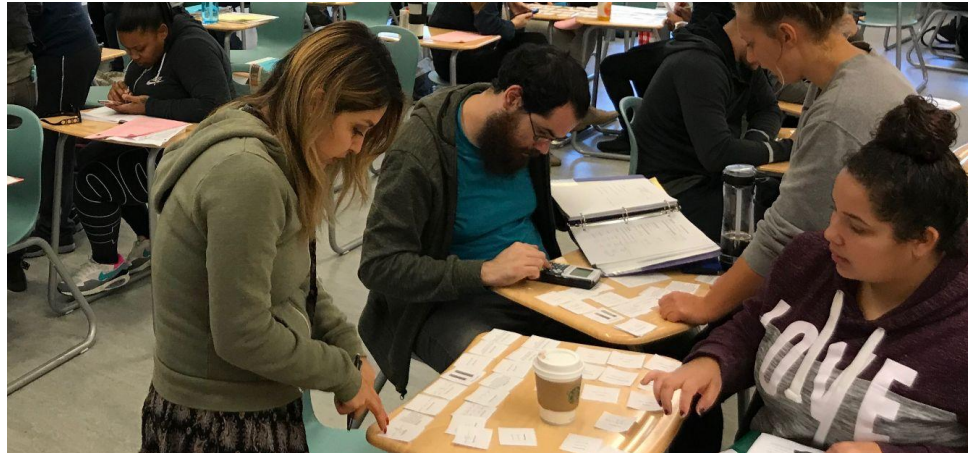


1:00



| ACTIVE LEARNING

Students are **actively engaging** with the content through **meaningful activities**.



How does active learning promote equity?

Give your answers in the chat.

You can reply and react to other posts! 👍💕

1:00





Dan Meyer @ddmeyer · 19h



Okay I think I figured out the three phases of my career so far:

Kids, I want you to understand the brilliance of ...

- 1 ... MY ideas.
- 2 ... MATH ideas.
- 3 ... YOUR ideas.

How does this map onto your own teaching story?



19



24



155







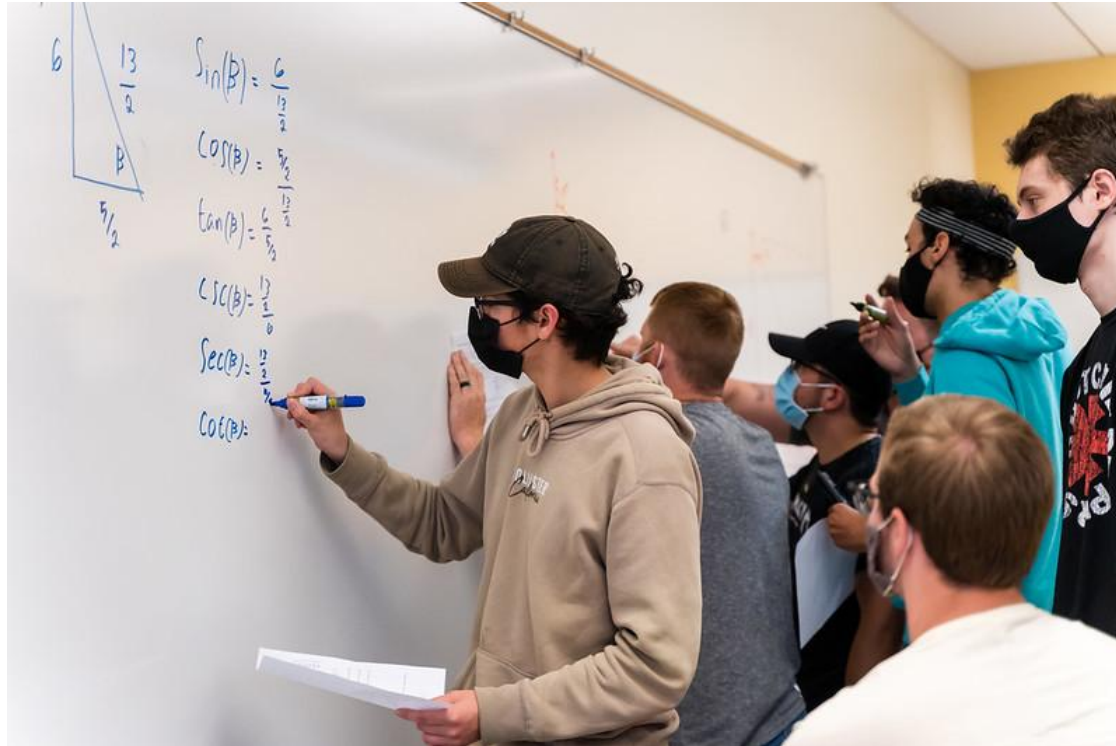
| PROMOTING EQUITY

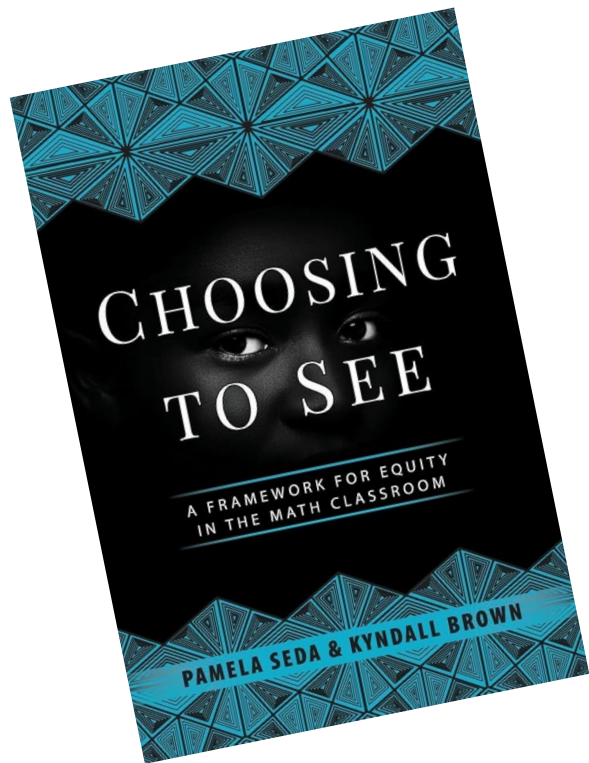


Successful instruction starts with **student knowledge**, with whatever students know now. – Dan Meyer



| ACTIVE LEARNING FOR BELONGING





Include others as experts

Create classroom environments that extend beyond the teacher as the sole authority to develop competence and confidence in others as experts, including the students themselves.

Be **C**ritically Conscious

Take the time to understand how negative stereotypes impact diverse learners and actively work to erase the effects of those negative stereotypes on the educational outcomes of marginalized students.

Understand your students well

Learn about your students, their families and their communities for the purpose of improving instruction (not making assumptions).

Use **C**ulturally relevant curricula

Use instructional materials in ways that help students see themselves as doers of mathematics and help them overcome the negative stereotypes and messages regarding who is--and who isn't--mathematically smart.

Assess, Activate and build on prior knowledge

Value the prior knowledge that students bring to the classroom, both personal and cultural, and leverage that knowledge as a resource for creating new knowledge.

Release control

Empower your students to take ownership of their learning by focusing on sensemaking and allow them to make choices about things that are important to them in the classroom.

Expect more

Hold high expectations for all students and avoid deficit views of diverse learners.

| ACTIVE LEARNING FOR LEARNING



| ACTIVE LEARNING FOR **SOFT SKILLS**



| ACTIVE LEARNING FOR DIFFERENTIATION





Shared Notes + Q&A:

[https://tinyurl.com/
ActiveLearningMath](https://tinyurl.com/ActiveLearningMath)



Photo from San Diego Mesa's Flickr Album

| TODAY'S ROADMAP



ON SITE

Active learning
options in a
**physical
classroom**



SYNCHRONOUS

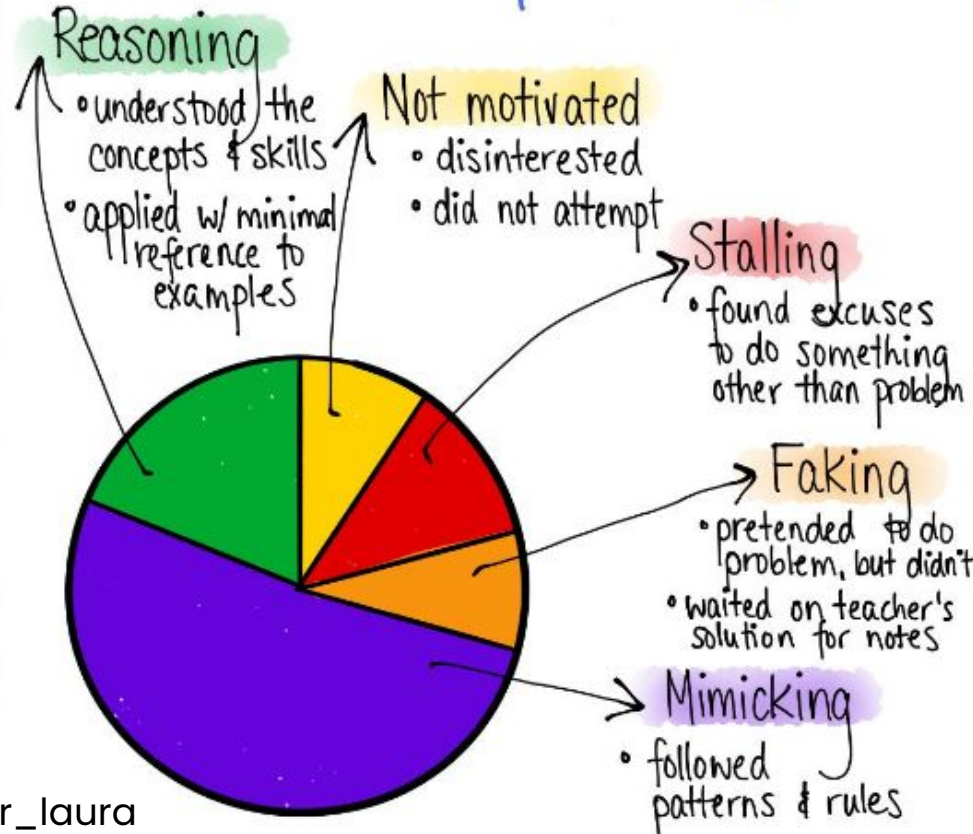
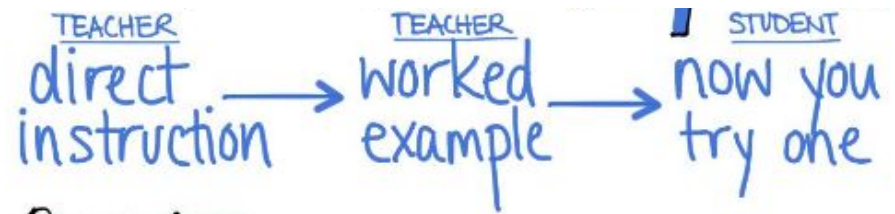
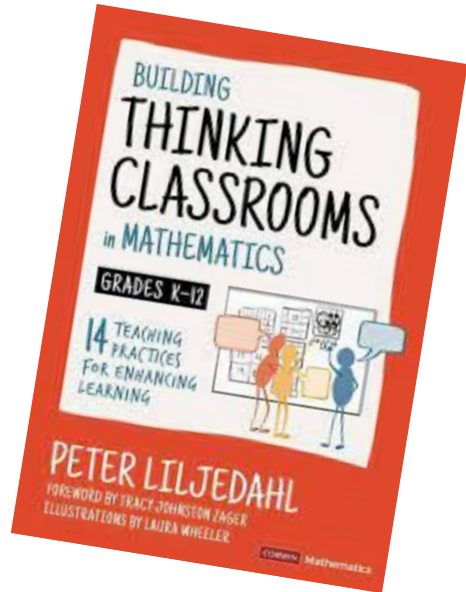
Active learning
options on
Zoom



ASYNCHRONOUS

Active learning
options on
Canvas

BUILDING THINKING CLASSROOMS



Sketchnote by @wheeler_laura

VNPS

VERTICAL
NON
PERMANENT
SURFACES






INCREASED
KNOWLEDGE
MOBILITY



STANDING

- ➔ BETTER POSTURE
- ➔ IMPROVED MOOD
- ➔ INCREASED ENERGY

TIPS FOR VNPS SUCCESS

- CLOSE NOT CROWDED 
- ONE MARKER PER GROUP 
- THOUGHTS WRITTEN BY SOMEONE ELSE
- HOLD MEMBERS ACCOUNTABLE TO EXPLAIN GROUP'S THINKING
- DIFFERENT COLOUR MARKER  FOR THE TEACHER
- KEEP OLD/WRONG THINKING 



equity

- INCREASED RELIANCE ON EACH OTHER INSTEAD OF TEACHER
- STUDENTS DO NOT FEEL ANONYMOUS WHEN STANDING
- OPPORTUNITIES FOR REAL-TIME DIFFERENTIATION
- NEW COMPETENCIES EMERGE
- SKILLS DEVELOPED: PATIENCE, COMMUNICATION, PERSEVERANCE

VRG



FLIPPITY

VISIBLY RANDOM GROUPS

TIPS FOR VRG SUCCESS



NEEDS TO BE VISIBLE



SWITCH GROUPS EVERY HOUR/TASK



NO INDEPENDENT THINK TIME BEFORE COLLABORATING



EXPLICITLY TEACH AND GIVE FEEDBACK ON INCLUSIVE AND EFFECTIVE COLLABORATION



KNOWLEDGE MOBILITY



RELIANCE ON TEACHER

BORROWING IDEAS → KEEP THINKING



equity

- ELIMINATION OF SOCIAL BARRIERS
- WILLINGNESS TO COLLABORATE
- MORE STUDENTS DO MORE THINKING
- KNOWLEDGE COMES FROM GROUPS
- PUTS STUDENTS' UNBELIEVABLE CAPACITY FOR EMPATHY IN MOTION

| CARD SORTS



Hey, students!

Go to student.desmos.com and type in:

57N F7E

| TYPES OF CARD SORTS

OPEN ENDED

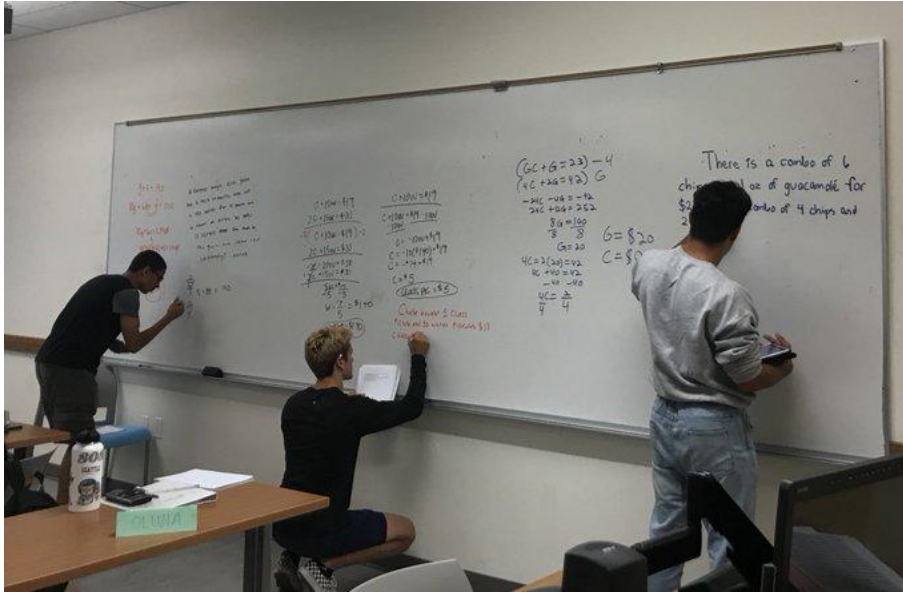
Free exploration
highlighting
what students
notice.

CATEGORIES

Multiple
representations,
comparing &
contrasting.

ORDERED

Proofs and
introducing
difficult
algorithms.



Do you have any other favorite active learning protocols for the physical classroom?

| THE ZOOM CLASSROOM



ON SITE

Active learning
options in a
**physical
classroom**



SYNCHRONOUS

Active learning
options on
Zoom



ASYNCHRONOUS

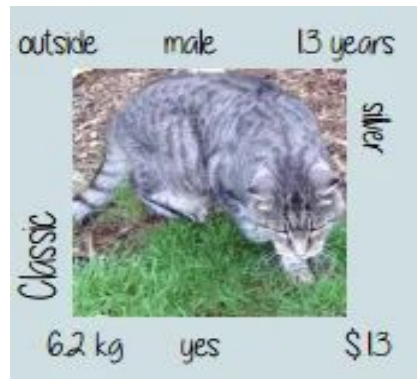
Active learning
options on
Canvas

Which one doesn't belong?

A



B



C



D



Which one doesn't belong?

$$\frac{d}{dx} [e^{2x}]$$

$$\frac{d}{dx} [e^x \cdot e^x]$$

$$\frac{d}{dx} \left[\frac{e^x}{e^{-x}} \right]$$

$$\frac{d}{dx} [(e^2)^x]$$

| DESMOS ACTIVITY BUILDER

<https://teacher.desmos.com/>

The screenshot shows the Desmos Classroom website. At the top left, the text "desmos classroom" is displayed next to a search bar containing the word "Search" and a magnifying glass icon. A vertical navigation menu on the left side includes the following items: "Home" (underlined), "Most Popular", "Featured Collections", "Polypad Manipulatives", "YOUR STUFF", "Dashboard History", "Classes", "Custom Activities", "Collections", "PINNED COLLECTIONS", "#MenuMath", "#MenuMath tasks", and "Stats Medic AP Statisti...". The main content area features a large banner for "Desmos Math 6–A1" with the text "Celebrate every student's brilliance with the Desmos Math 6–A1 curriculum. Available in English and Spanish." and two buttons: "Sample our Lessons" and "Start a Trial". Below the banner is a "Featured Collections" section with a "View All" link. Two collection cards are visible: "K–5 Lessons and Activities" by Desmos Classroom (1 activity and 4 collections) and "Starter Screens" by Desmos Classroom (7 activities). The background of the banner and collection cards features a colorful illustration of two children, a boy and a girl, standing in a landscape with mountains and a lake, looking at a tablet together.

desmos classroom

[Home](#)
[Most Popular](#)
[Featured Collections](#)
[Polypad Manipulatives](#)

YOUR STUFF
[Dashboard History](#)
[Classes](#)
[Custom Activities](#)
[Collections](#)

PINNED COLLECTIONS
[#MenuMath](#)
[#MenuMath tasks](#)
[Stats Medic AP Statisti...](#)

Desmos Math 6–A1

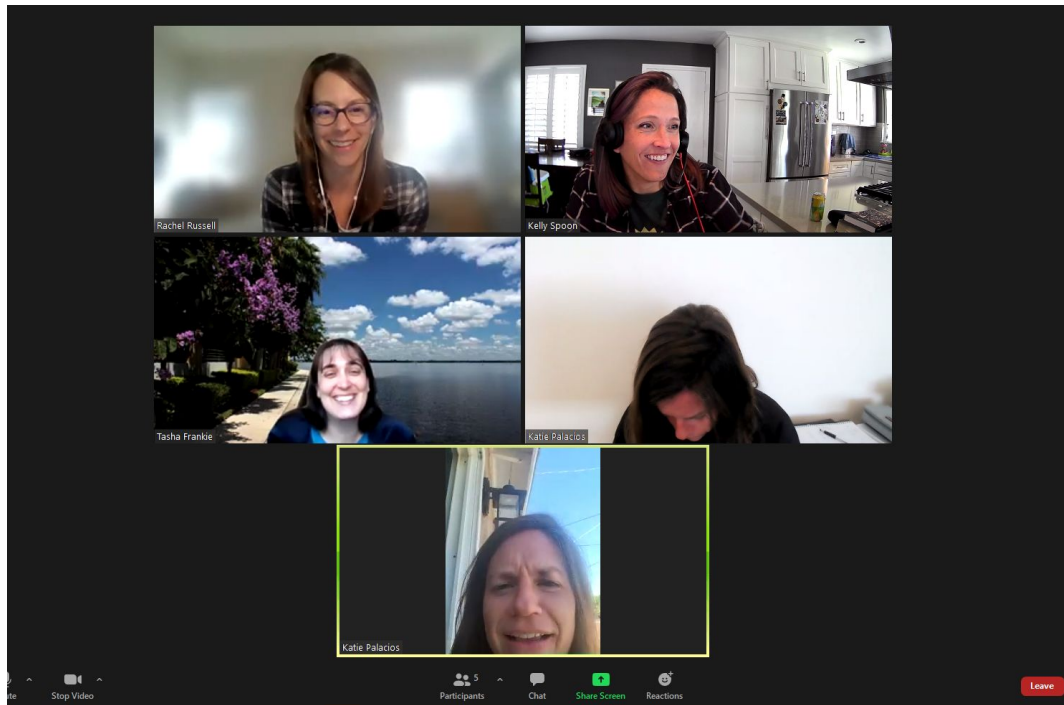
Celebrate every student's brilliance with the Desmos Math 6–A1 curriculum. Available in English and Spanish.

[Sample our Lessons](#) [Start a Trial](#)

Featured Collections [View All](#)

K–5 Lessons and Activities
By Desmos Classroom | 1 activity and 4 collections
Explore our new K–5 Collection—everything from digital lessons to print activities, to Polypad and daily math routines. Lessons, activities, and screens are added all the time, so keep coming back!

Starter Screens
By Desmos Classroom | 7 activities
These activities offer starter screens that you can copy and paste into your activities. They are divided here by their different purposes.



Do you have any other favorite active learning protocols or tech tools for the Zoom classroom?

| TAKING IT TO CANVAS



ON SITE

Active learning
options in a
**physical
classroom**



SYNCHRONOUS

Active learning
options on
Zoom



ASYNCHRONOUS

Active learning
options on
Canvas

STRUCTURE

- Ignite
- Chunk
- Chew
- Review

Unit 2: Displaying Data - Due Wednesday 1/3

Unit 2 Introduction
Jan 3 | View

Unit 2 Pre-Activity: Reading Graphs
Jan 3 | 1 pts | Submit

2.1 Displaying and Summarizing a Categorical Variable
Jan 3 | View

2.2 Displaying and Summarizing a Numeric Variable #1
Jan 3 | View

2.2 Displaying and Summarizing a Numeric Variable #2
Jan 3 | View

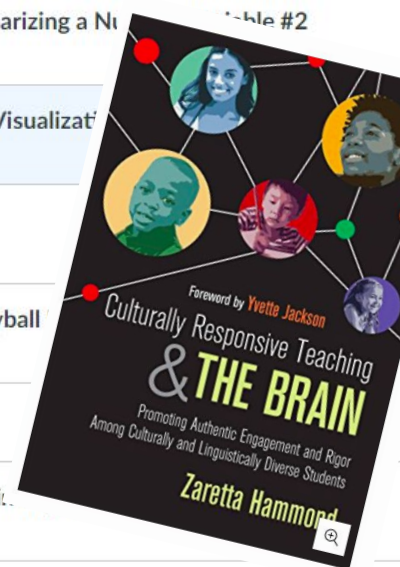
2.3 Accessibility in Data Visualization
Jan 3 | View

Knowledge Check #2
Jan 3 | 1 pts | Score at least 0.7

Unit 2 Activity: Moneyball
Jan 3 | 2 pts | Score at least 2.0

Module 1 Debrief

Module 1 Discussion: Stats in the News
Jan 4 | 3 pts | Score at least 3.0



EMBEDDING FORMATIVE ASSESSMENTS

Math 119 Hybrid: 6.2 Intro

... took many, many random samples from a population and calculated a confidence interval for each sample. $C\%$ of the confidence intervals would contain the true proportion p .

Watch later Share

Assumptions and Conditions

We can construct confidence intervals for p if the following **assumptions** are satisfied:

1. The sampled values must be **independent** of one another.
2. If you have a survey, the sample should be a **simple random sample**. If the data comes from an experiment, subjects should have been randomly assigned to treatments.

Watch on YouTube

... not been made using replacement, the sample size must be no larger than 10% of the population. Usually, populations are so large that

Understanding Check

When constructing a confidence interval for a proportion or mean of a finite population, a condition is that the population size be at least 10 times the sample size. The reason for the condition is to ensure that

- the sampling method is not biased
- the degree of dependence among observations is negligible
- the sample standard deviation is a good approximation of the population standard deviation
- the sample size is large enough
- the central limit theorem is applicable

Check

Reuse Embed

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MATH 119

Education is what remains after one has forgotten what one has learned in school.



Announcements

Syllabus

Modules

Sign Up for 1-1

Welcome!

I'm glad to have you as part of our statistics community for this whirlwind 4-week course. I'm still in the process of editing everything, including the syllabus, but wanted to get you in and playing with Canvas (plus seeing what you've signed up for) early.

To begin the course, click the button to start with the [Orientation Module](#)

Want to Connect?

- Canvas Inbox, Pronto
- Email me at kspoon@sdccd.edu
- Make an appointment using [Sign Up for 1-1](#)
- We'll also connect in the module activities each week.



Do you have any other favorite active learning protocols or tech tools for a Canvas classroom?

I INSTRUCTIONAL MOVES

- Flipped classroom as a first step
- Explain motivation for activities
- Highlight student voice



Kelly Spoon
kspoon@sdccd.edu

**THANK
YOU**



ADDITIONAL RESOURCES

- [The Supportive Role of Active Learning in a Calculus Course on Low PreCalculus Proficiency Students](#)
- [Adventures in Corequisite Calculus Blog](#)
- [Which One Doesn't Belong](#)

CREDITS: This presentation template was created by Slidesgo, including icons by Flaticon, and images by Unsplash.