

Be rational

Get real

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MATH JOKES

PRODUCTIVE GROUP WORK IN MATHEMATICS: SOCRATIC SEMINAR

San Luis High School

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Why? Because, as Socrates said, ***“The unexamined life is not worth living.” Freedom of expression is essential and is worth talking about.***

BEFORE WE START...

- Turn to your table partners and tell each other something positive about working with San Luis students today.
- Choose a tablemate to share her/his positive teaching experience.

LEARNING GOAL

- I can incorporate the major principles of differentiated instruction into my instructional practice in order to significantly increase students' achievement in mathematics.



PURPOSE

Our purpose today:

1. is to learn about engaging students in a Socratic Seminar in mathematics.
2. is to think about how Socratic Seminar is related to purposefully grouping students and differentiated instruction.

SCALES

DIFFERENTIATED LEARNING

4 – Sustaining Capacity:

- I design instruction, assessments, evaluation, and the classroom learning environment based on district and school curriculum expectations and on a general sense of the learning needs of the students in my class. I **model and help** students complete mathematical tasks in **whole group, small groups and individually**. I **purposefully and flexibly** group students on a regular basis and I **consistently** design a variety of learning experiences for my students that address their unique social and mathematical learning needs using **formative data**. Additionally, I seek opportunities out to **collaborate and share** with my peers on how I specifically do this.

DIFFERENTIATED INSTRUCTION STRATEGIES

- Grouping Cards
- Four Corners
- Think Tac Toe
- Pass the Problem
- **Socratic Seminar**

SOCRATIC SEMINAR

- **A method to try to understand information by creating an in-class dialogue based on a specific text.**
- **Participants seek deeper understanding of complex ideas through rigorously thoughtful dialogue, rather than memorizing bits of information or meeting arbitrary demands for 'coverage.'**

SOME BENEFITS OF...

1. Builds Students' Mathematical Literacy Skills
 - a) **Promotes Critical Mathematics Reading Skills**
 - b) **Promotes Listening & Speaking Skills**
 - c) **Promotes Mathematical Language Use & Accountable Talk**
 - d) **Emphasizes Mathematics Problem Solving Skills**
 - e) **Increases Students' Metacognitive Awareness**
2. Raises Students' Self-Esteem
3. Promotes Conflict Resolution Skills
4. Emphasizes a Respect for Diverse Perspectives
5. Validates Students' First Languages
1. Creates a Community of Inquiry
2. Creates a Positive Learning Environment
3. Creates a Collaborative Culture
4. Promotes Mathematical Language Use
5. Promotes Wait Time Practice so Students Have Time to Think
6. **Differentiates the Instruction (Peer Support and ZPD)**
7. Promotes Wonder and,
8. It's Engaging!!!

BENEFITS FOR ENGLISH LANGUAGE LEARNERS

- 1. Less stressful to speak in class after preparing at home**
- 2. Less stressful because no expectation of one right answer**
- 3. Autonomy to choose one's own contributions**
- 4. Extra time available to make a response**
- 5. Opportunity to incorporate home language**
- 6. Peer modeling of reading mathematics text**
- 7. Promotes equity and empowerment**

PREPARING A SEMINAR PART I: SELECTING A TEXT

- **Select a piece of mathematics content, or an actual text about a particular rigorous mathematics topic, that addresses an important mathematical concept that students will struggle with.**
- **Consider:**
 - **How interesting and thought-provoking the text or mathematics is to your students**
 - **How relevant the text or mathematics is to the Cambridge curriculum**
 - **How important and rigorous the mathematics is.**

PREPARING A SEMINAR PART II: PREPARING THE TEXT

- **Copy the text in reduced size so there is a large margin all around.**
- **Students are to mark up the text with:**
 - 1. Notes (including word definitions, etc.)**
 - 2. Quotes (for discussion)**
 - 3. Notes regarding connections to previous learning**
 - 4. Questions (Bloom's 5 and 6, to ask others)**
 - 5. Pieces of the text or mathematics problem that makes them wonder**
 - 6. Potential Mathematical Strategies**
 - 7. Potential Solutions**
 - 8. Summary**
- **Text markup is for writing things to say to classmates during dialogue and builds in individual student accountability as marked-up text is a part of the SS grade.**

PREPARING A SEMINAR PART II: PREPARING THE MATH QUESTION

➤ Teacher:

- Writes an opening question to begin. This can be an Essential Question from the mathematics domain you are working with students on. For example, *“How can you solve a system of equations or inequalities?”* or, *“Can systems of equations model real-world situations? How?”*
- NAEP
<http://nces.ed.gov/nationsreportcard/itmrlsx/detail.aspx?subject=mathematics>

Question A: If x is a real number, what are all values of x for which $x > -3$ and $x < 5$?

Question B: If x is a real number, what are all values of x for which $x > -3$ or $x < 5$?

➤ Yummy Math

www.yummymath.com

PREPARING THE SEMINAR PART III: PURPOSEFULLY GROUPING STUDENTS

- Prior to the day of the seminar, purposefully choose students for both the inner and outer circles.
- Pair each inner circle student with an outer circle partner.
- Purposefully choose a student from the inner circle group to facilitate the discussion once you open the seminar with the opening question.
- Prepare students for their participation in either the inner or outer circle the day before the seminar. However, do not let students know which circle they are in.
 1. **Review the text or mathematical content that will be used for discussion.**
 2. **Provide students with the opening question so they can continue to prepare at home.**
 3. **Have students mark the text or math content.**
 4. **Provide outer circle students with a note-taking form for critiquing their inner circle partner.**

PREPARING A SEMINAR PART IV: SETTING NORMS

- **Seminar is NOT a debate! It is dialogue.**
- **Students politely acknowledge ideas they may not agree with.**
 - 1. Engaging in argumentation not arguing**
 - 2. Using the text or math content as evidence**
- **Equal participation is a graded requirement! Students need to monitor themselves. How?**
 - **Ask open-ended questions.**
 - **Wait for replies.**
 - **Build on others' ideas and refer directly to the text or mathematical content as often as possible.**

PREPARING THE SEMINAR PART V: SETTING UP THE CLASSROOM

- **Arrange chairs/desks into two concentric circles, both facing inward.**
- **Select an inner and outer circle (not to be known by students in advance).**
- **Distribute evaluation sheets for outer circle.**
- **Students should sit in their assigned circle with their marked text, pencil ready.**
- **Teacher writes the opening question on the board, and reads it aloud.**

CONDUCTING THE SEMINAR: INNER CIRCLE

- You ask the opening question.
- After about 2 minutes to think about the opening question, say “Begin.”
- Inner circle students are to have a discussion only with other inner circle participants.
 1. **However, you may want to stop the inner circle from time to time and have students turn to their outer circle partner and have a 1 minute discussion.**
<https://www.youtube.com/watch?v=sv87Nhc7c-s>
 2. **Consider having an empty chair in the inner circle for one person at a time from the outer circle to join the inner circle for a few minutes.**
- Hand-raising is not needed.
- Students are responsible for equal participation and respect. Only one person speaks at a time.
- Pauses will occur! Do not interrupt them.
- Students are to continue until you call “Stop.”

CONDUCTING THE SEMINAR: OUTER CIRCLE

Outer circle listens and takes notes to critique the dialogue (During and after inner circle)

After the teacher says “Stop”, outer circle has about 2 minutes to prepare comments for their inner circle partners regarding their participation.

- **Level of partner’s contribution**
- **Active listener? Body language? Eye contact?**
- **Used to text/problem as evidence for comments.**
- **Respectfully disagreed with others**
- **Spoke only when no one else was speaking**
- **Watched airtime**

You may need to model for the outer circle how to critique participants in the inner circle respectfully. Consider showing a clip of students engaged in a Socratic Seminar and have students practice critiquing the inner circle respectfully.

CONDUCTING THE SEMINAR: OUTER CIRCLE

- **Then, each shares specific instances of:**
 - **What was great about today's dialogue?**
 - **Why?**
 - **What needed to be improved? Why?**
 - **Was the text thoroughly discussed?**
 - **Anything missing?**

CONDUCTING THE SEMINAR: TEACHER

➤ **The teacher is a special case of the outer circle:**

- 1. Use a diagram/marking system during dialogue; collect thoughts during inner/outer circle break.**
- 2. Take notes during outer circle; then critique/compliment both inner and outer circle.**
- 3. Close seminar by asking if any students would like to give/receive additional feedback.**

➤ **DO NOT** give in to temptation to participate *during* either circle, even if things seem to be uncomfortable!

AFTER THE SEMINAR: EVALUATION

- **All participants hand in their marked up text**
- **Outer circle participants hand in their critique**
- **Optional: inner circle self-critique**
- **Inner: grade is a combination of marked text, equal/respectful participation, outer circle evaluation, and an individual grade from teacher**
- **Outer: grade is a combination of marked text and an individual grade from teacher based on participation and giving thoughtful feedback**

QUESTIONS GAME: SOCRATIC SEMINARS FOR MATHEMATICS MATHEMATICS TEACHER (NCTM)

HOW CAN THIS VIDEO BE APPLIED TO USING A NEW STRATEGY WITH STUDENTS?

- [Dog with Big Bone](#)

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