Upholding Academic Values in a Math Classroom During the Pandemic

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Current trends
Effects of the Pandemic

Transition to online classes impacted:

❖ Lessons
  - Less in-class content
  - Student engagement?
  - Tricky real-time feedback

❖ Exam proctoring
  - Third-party or Zoom-proctored
  - Unsupervised
  - Cheating?

Effects of the Pandemic

Precalculus students:

- Anxiety
- Under-preparedness
- Academic integrity

The lack of socializing with students and getting help from them in class.


I had enough previous knowledge for the lectures this week

The lectures were interesting

I feel that I understand the subject

I feel confident answering questions about the topics so far

No ways, proctored exams are ridiculous in an online setting.

Unfortunately, the only way to preserve integrity is to have proctored exams.

What is the hardest part of studying from home?

How can we preserve academic integrity?
What percent of college students resort to cheating during the pandemic?

- Less than 30%: 3
- Between 31-60%: 4
- Between 61-90%: 4
- More than 90%: 0
Staggering Data

Admitted cheating (Sotille & Behrend)

- **Before**: online $\approx$ classroom (about 32%)
- **Now**: 20% increase

Cheating rate on ProctorU (by Washington Post):

- **Before**: < 1% (340,000 exams)
- **Now**: 8% (in 1.3 million exams)

Average number of requests on Chegg per day (Lancaster & Cotarlan)

- **Now**: 20,025 questions in STEM areas per day (196% increase).


https://www.tc.columbia.edu/articles/2021/march/how-to-stop-students-from-cheating-online-be-interesting/
How to reduce the temptation? Can we change our students’ mindsets?

**Studying deeper could be the key**
Do students know the difference between *studying* and *learning*?

- Students cram for tests → less long-term retention & learning
- Not learning → anxiety → tempted to cheat
Grade vs. Knowledge

Anonymous survey

- Calculus II
- 15 students

Which one is more important?

How much each matters?
What Do Students Say?

For some classes, I think knowledge matters much more, but since I am only taking stats after this, and no other calc I only really care about the grade.

Knowledge is important but with how the world and schools are built having those grades will take you up to better schools.

I won’t be using advanced math in my life after taking all my classes. But the grade I get matters to my future step, which is transferring. That’s why grade matters more than knowledge personally for my math class.

Knowledge is more applicable for life, but in terms of school grades matter more for scholarships.
Can we change our students’ mindsets?
Dr. McGuire: Effective & Efficient Learning

Dr. Saundra Yancy McGuire (Chemistry)

- Director Emerita: Center for Academic Success at LSU.
- Assistant Vice Chancellor at LSU.
- Over 400 academic presentations (46 states, ten countries).
- Honors and awards, including the Presidential Award.

Area of work and research:

- Growth mindset.
- Metacognitive learning strategies.
Dr. McGuire’s Resources

Educational books and presentations:

- Teach Students How to Learn: *Strategies You Can Incorporate into Any Course to Improve Student Metacognition, Study Skills, and Motivation* (2015)
- Teach Yourself How to Learn: *Strategies You Can Use to Ace Any Course at Any Level* (2018)
- Metacognition: *The Key to Acing Chemistry* (https://youtu.be/yGBfd7LeGMM)
Strategy: Mastery of Concepts Through Study Cycle

PREVIEW
- Before class, skim new material.
- Note big ideas.
  5-15 minutes

TEST
- Can I teach this material to someone?
- Are my study methods effective?

ATTEND
- Go to class!
- Take notes.
- Ask questions.

STUDY
Schedule several focused study sessions per class each week.
  30-50 minutes

REVIEW
- Read notes.
- Fill in gaps.
- Develop questions.
  10-15 minutes

Adapted from Frank Christ’s FLRS system.
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https://www.lsu.edu/cas/earnbettergrades/note-based.php
# Study Session

<table>
<thead>
<tr>
<th></th>
<th>Time</th>
<th>Activities</th>
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<tbody>
<tr>
<td><strong>Setting the Goal</strong></td>
<td>1-2 min</td>
<td>Determine the task</td>
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<td>- What is the outcome of the study session?</td>
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<td>- What will be accomplished?</td>
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<tr>
<td><strong>Focused Learning</strong></td>
<td>30-45 min</td>
<td>Interact with the material:</td>
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<td>- Organize notes</td>
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<td>- Read book in detail</td>
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<td>- Process information</td>
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<td>- Solve problems and practice</td>
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<td><strong>Rewarding Oneself</strong></td>
<td>10-15 min</td>
<td>Break:</td>
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<td>- Talk with a friend</td>
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<td>- Stretch, move around</td>
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<td>- Short game</td>
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<td></td>
<td></td>
<td>- Snack</td>
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<tr>
<td><strong>Quick Review</strong></td>
<td>5 min</td>
<td>Review the materials:</td>
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<td>- Write summary</td>
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<td>- Say it out loud</td>
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<td>- Draw a concept map</td>
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[https://styluspub.presswarehouse.com/landing/TSHL](https://styluspub.presswarehouse.com/landing/TSHL)
Expected Outcomes from Implementing the Study Cycle

- Good planning and organization → lasting work habits.
- Deep learning and retention → increased confidence.
- Less cramming → relieves last-minute test anxiety → reduces need for cheating.
How to motivate and engage students online?

Enhancing engagement in Zoom
Active Learning: Groupwork in Zoom

Zoom breakout rooms

2-4 problems per group (Google slides)

Class presentation

An example of groupwork:
https://docs.google.com/presentation/d/1KJabM6LF-rLcUKhn0iMGZTrVwemJI4YOXcb9zEwNVjc/edit#slide=id.ge5cbe3b832_0_82
8. A particle with a charge of $-2.50 \times 10^{-8}$ C is moving with an instantaneous velocity of magnitude 40.0 km/s in the $x$-$y$ plane at an angle of 50° counterclockwise from the $+x$ axis. What are the magnitude and direction of the force exerted on this particle by a magnetic field with magnitude 2.00 T in the (a) $-x$ direction and (b) $+z$ direction?

(a) $B$ in $-x$ direction

$F = qvB\sin(\theta) = (-2.50 \times 10^{-8}) (40 \times 10^3 \text{m/s}) (0.5) \sin(130°)$

$F = 0.015 \text{N}$

(b) $B$ in $+z$ direction

$F = qvB \sin(90°) = (2.50 \times 10^{-8}) (40 \times 10^3 \text{m/s}) (2)$

$= 0.002 \text{N}$
Other strategies
What are some of your teaching strategies?

<table>
<thead>
<tr>
<th>Oral exams</th>
<th>Polls</th>
<th>Geogebra classroom interactive activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multiple problems, can miss two and still get a perfect score</td>
<td>&quot;Discussions&quot; within canvas, rather than live</td>
<td>Wheel Decide</td>
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<tr>
<td>GeoGebra homework problems</td>
<td>Desmos activities during class</td>
<td>mini-projects</td>
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<tr>
<td>Sharing my screen and letting students annotate graphs, etc.</td>
<td>Discussions requires them to comment on another post</td>
<td>Collaborative work using Google suiteDesmo</td>
</tr>
<tr>
<td>Journal entries where they explain a concept</td>
<td>discussion board problem and the problems are based on conceptual</td>
<td>Using OneNote to give lecture templates and have group work spaces.</td>
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My class is asynchronous and I am assigning weekly participation assignments to ensure students are participating in a timely manner. I create those under Canvas => Assignments and link it to Canvas => Discussion so that students can post comments.
Less Emphasis on Exams & More Relevance

- **Reduced exams’ weight**: 90% → 80%.
- **Project-based** learning (groups, choice topics).
- **Real-world applications**, connect concepts to majors.
Affective Domain

- **Growth mindset**: math as skill.
- **Grit**: perseverance makes a difference.
- **Metacognition**: students reflect on their work.
- **Mindfulness**: relaxation techniques → build emotional resilience.

https://pixabay.com/illustrations/attitude-mindset-joy-belief-4023442/

https://pixabay.com/illustrations/meditation-sensing-observing-being-1023539/
Additional materials
Additional Materials

- **Dr. McGuire’s Presentation Materials on Learning Strategies**: Visit the official website for Dr. McGuire’s book “Teach Students How To Learn” (through the StylusPub) and then click on Resources → Presentation Resources. https://styluspub.presswarehouse.com/browse/book/9781620363164/Teach-Students-How-to-Learn
Additional Materials

- **Google Slides Activity**: As shared during the presentation:
  
  https://docs.google.com/presentation/d/1KJabM6LF-rLcUKhn0iMGZTrVwemJI4YOXcb9zEwNVjc/edit?ts=60f624ca#slide=id.ge529ed27b2_19_0

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**Faculty Group 1: coastal**

Solve $5x^2 - 17x - 12 = 0$

$x = 4, x = -0.6$

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**Faculty Group 2: interior**

Solve $12x^2 - 16x + 5 = 0$

$a = 12, b = -16, c = 5$

$12(5) = 60, 60 = 10^2, -10 + (-6) = -16$

$12x^2 - 10x - 6x + 5 = 0$

$2x(6x - 5) - 10(6x - 5) = 0$

$(2x - 1)(6x - 5) = 0$

$2x - 1 = 0$ or $6x - 5 = 0$

$x = \frac{1}{2}$, or $x = \frac{5}{6}$

Consider the equation $12x^2 - 16x + 5 = 0$, where $a = 12, b = -16c = 5$.

Then we have $a \cdot c = 12 \cdot 5 = 60$ and we would like to factor $60 = m \cdot n$, such that $m + n = b = -16$ i.e. $m = -6, n = -10$. Then

$12x^2 - 16x + 5 = 12x^2 - 6x - 10x + 5 = 6x(2x - 1) - 5(2x - 1) = (6x - 5)(2x - 1)$

then $12x^2 - 16x + 5 = 0 \implies (6x - 5)(2x - 1) = 0 \implies x = \frac{5}{6}, \frac{1}{2}$
Additional Materials

- **Mathigon**: As shared during the presentation (thanks so much Fatima Priloeau for sharing the info!!!): [https://mathigon.org/](https://mathigon.org/)
Additional Materials

- **The actual Mentimeter presentation.** It is possible to adopt the presentation (with a basic free account). To access the presentation, follow this link: https://www.mentimeter.com/s/8d5f5bffd22277a02995d9273436bd6/ff4fb48a3c0f
References


- Edutopia: Yes, metacognition can be taught. Seven great questions to get students get thinking about thinking. <https://twitter.com/edutopia/status/108822134223007745?lang=en>.


References


Credit for Images
Images (in order of appearance)

- Logo for Zoom <https://zoom.us/>.
Images

- “Thank you” by Kevin Butz from Unsplash <https://unsplash.com/photos/6hsfmat-t7k>.