Making an IMPACT Through Student Engagement

Presented by Nancy J. Sattler
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45th Annual AMATYC Conference
November 16, 2019, Milwaukee, Wisconsin
This presentation will . . .

- Discuss the AMATYC IMPACT document and the four pillars of PROWESS
- Share guiding principles for student engagement
- Define Active Learning
- Offer up some suggested engaging activities
- Allow time for participants to create an activity
- Allow time for sharing
IMPACT
IMPROVING MATHEMATICAL PROWESS AND COLLEGE TEACHING
AMATYC IMPACT:
PRoficiency, OWnership,
Engagement & Student Success

Four Pillars of PROWESS
AMATYC’s Standards Documents

1995 *CROSSROADS IN MATHEMATICS*
Standards for Introductory College Mathematics Before Calculus

2006 *BEYOND CROSSROADS*
Implementing Mathematics Standards in the First Two Years of College

2018 *IMPACT: IMPROVING MATHEMATICAL PROWESS AND COLLEGE TEACHING*
Affirms the previous standards with current research
Vision

When the ideas of IMPACT are implemented, students are empowered to be mathematically proficient, take ownership for their learning, and be engaged in the learning process. Faculty will focus on facilitating a conceptual understanding of mathematics and procedural fluency, in addition to student engagement and success, with the support of their institution.
Engagement
Developing Intellectual Curiosity and Motivation in Learning Mathematics
Guiding Principles for Student Engagement

Students should have opportunities to...

- interact with each other often.
- develop as mathematical thinkers by engaging in inquiry-based learning through exploration, conjecturing, questioning, sense making, and seeking alternate solution paths.
- make mistakes and collectively learn from them.
- work in a physical setting that promotes teamwork, builds respect for one another’s ideas, and critique the thinking of others.
Active Learning

“Active learning engages students in the process of learning through activities and/or discussion in class, as opposed to passively listening to an expert. It emphasizes higher-order thinking and often involves group work.” (Freeman et al., 2014)
ACTIVE LEARNING & STUDENT PERFORMANCE

In a traditional classroom...

Classroom Lecture

- 60% of what they hear
- 50% of what they see
- 30% of what they read

Active Learning
- 90% of what they do
- 70% of what they say and write
- 50% of what they see and hear

Passive Learning
- 40% of what they hear
- 20% of what they see
- 10% of what they read

Reading
- Attending a lecture
- Viewing images
- Watching movies & demos

Giving a talk & group discussion
- Practicing & just doing it
How faculty deliver the curriculum can increase student's active engagement and knowledge acquisition making it more important to student learning than the content.
5 Practices for Productive Discussions

1. Anticipate Likely Student Responses
2. Monitor Student Work
3. Select Students to Present Their Work
4. Sequence Student presentations
5. Make connections
Principles of Active Learning

- students’ deep engagement in mathematical thinking (PRoficiency),
- instructors’ interest in and use of student thinking (Ownership),
- student-to-student interaction (Engagement),
- instructors’ attention to equitable and inclusive practices (Student Success)
Active Learning can involve

- Clicker questions
- Worksheets
- Case Studies
- Computer simulations
- Collaborative activities
- Communication activities
Composition of Functions

- Create problems with answers
- Create a puzzle with this information
- Give to students to solve working with partners or groups
Create a game  -- Students need to match the sides to form a large triangle
Have students play Rational Exponents WIN

(This game can be adapted to many mathematical concepts)
Have students create their WIN Grid

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Choose any nine of these numbers and put them in your grid.

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Find the value of the following

- $2^{-1}$
- $8^{-2}$
- $2^{-5}$
- $10^0$
- $(\frac{1}{4})^{-1}$
- $(\frac{2}{3})^{-1}$
- $(\frac{3}{4})^{-3}$
- $(\frac{5}{6})^0$
- $25^{\frac{1}{2}}$
- $16^{\frac{1}{4}}$
- $32^{\frac{1}{5}}$
- $81^{\frac{1}{4}}$
- $125^{\frac{1}{3}}$
- $27^{\frac{2}{3}}$
- $27^{\frac{2}{3}}$
- $325^{\frac{3}{5}}$
Discuss how you might use of these ideas in your own classroom
What do you do in your own classroom?
Would you like your students to be more engaged in class? Are you wondering what you can do to rejuvenate yourself so that you are more engaged as a member of the mathematical community? Do you already have great information or activities involving faculty or student engagement? Head to IMPACTLive! on the AMATYC website and find innovations your colleagues are using or contribute innovations and ideas of your own.
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