Conceptual Algebra... with a side of Algebra

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Alumna of Teach North Texas, Fall 2012
- Took one of the 1st Conceptual Algebra courses

Former HS Algebra 1, Geometry, & Algebra 2 teacher:
- Dallas ISD
- Carrollton-Farmers Branch ISD, at a New Tech school

Master Teacher/Lecturer:
- Step 1 and 2 COMBO
- Conceptual Algebra
Ultimately, I want to spark a conversation on how we can better:

1. center Conceptual Teaching & Learning
2. fill Gaps in Student Understanding
3. promote Student Voice

...Because there’s so much I could talk about!
What is “Conceptual Algebra”?

★ Course Description (Overview)
★ Where is this course in my program’s (math) catalog?
★ Strong Foundation to Build Upon
Course Description (Overview)

→ Provide content knowledge that:
  ○ engages students in mathematical thinking
  ○ promotes inquiry-based learning
  ○ emphasizes hands-on learning and technology

→ “Conceptual” = understanding the WHY

→ Formerly “Conceptual Algebra and Geometry” (where topics in both content areas were covered)
Where is this course in my program’s catalog?

*Note: This is not the complete catalog.*

**Conceptual Algebra**

*Prerequisites: Step 2 or COMBO, Knowing & Learning (may be taken concurrently), and Pre-Calculus

**STEP 1 & 2 COMBO**

- STEP 1
- STEP 2
- Knowing & Learning
- Classroom Interactions
- PBI
- Apprentice Teaching

**FUNCTIONS AND MODELING**

- Advanced Study of the Secondary Mathematics Curriculum
Strong Foundation to Build Upon

→ Math activities and resources
  ○ Hands-on, mind-on
  ○ Opportunities to explore new strategies and tools
  ○ Demonstrations (“Put on your Student Hat”)
  ○ Comparable to Professional Development

→ Readings, videos, articles, etc.

→ Discussions - Small & Whole Group
→ Written Reflections
Quick Pause

I have time for 1-2 questions.
My Starting Place

- “How can I increase this course’s impact?”
- My Observed Gaps in Student Understanding
- Project-Based Instruction
“How can I increase this course’s impact?”

1. Identify the current impact of the course.
   - Great stepping stone and support for lesson planning
   - Many students reference experiences and resources from the course.

2. Evaluate the purpose of the course. Does it need to change?
   - Ultimately, why do they need to take this class?

3. Find at least one “gap” to fill and get started.
   - Ask a colleague or Thought Partner
   - Observe
My Observed Gaps in Student Understanding

1. **The Myth**
   “I have to teach 5E bell-to-bell when I become a teacher.” So, the model is abandoned.

2. **Intentional Planning**
   From what each E means, to using high-yield instructional strategies wisely, to considering student metacognition.

3. **Procedural vs Conceptual**
   What the difference is when teaching

4. **The Checklist Mindset**
   Engaging, hands-on, and/or student-centered = instantly “conceptual”

5. **Teacher, not Facilitator**
   Teacher-centered thinking demonstrated in lesson planning and class discussions.
Project-Based Instruction (my Bread & Butter)

- Entry Event
- Entry Document
- Driving Question(s)
- Pacing Calendar
- Knows/Need to Knows
- Culminating Product
- Presentation with Authentic Audience
- Student Choice & Voice
- Workshops/Lessons
- Feedback:
  - Peer Feedback via CFGs (Critical Friends Groups)
  - Mandatory Instructor Consultations
- Individual Assessment of Knowledge and Thinking
From here, I created and embedded a Project that fills their gaps and...
...centers **student** learning & understanding-- not their own.

**WHY?**
Because **how** we plan (and implement) our lessons impacts how students learn conceptually.
The Project

★ Crafting the Driving Question
★ What I have students produce
★ The Showcase
Crafting the Driving Question

2019 - 2020
How can I create student-centered, conceptual, and engaging 5E lesson components that can be used in my future classroom?

2021 - present
How can I create student-centered, conceptual, and engaging 5E lesson components that empower all students?

- Teacher, not Facilitator -
Teacher-centered thinking demonstrated in lesson planning and class discussions.
What I have students produce

1. Engage | Explore with Explain 1 | Explain 2
   Students choose TWO and an area of emphasis (based on specific Course Units)

   - Vertical Alignment
   - Scope and Sequence
   - Rationale for Time Length
   - Limitations
   - Misconception Accommodations

2. A presentation tool (poster, slideshow, etc.) to showcase learning and product idea(s) at the end of the semester.

- The Myth -
  "I have to teach 5E bell-to-bell when I become a teacher." So, the model is abandoned.

How can I create student-centered, conceptual, and engaging 5E lesson components that empower all students?
The Showcase - A Gallery Walk  Fall 2019

1. Similar to a Conference Poster Session
2. Presentations answer the Driving Question
3. Social Exchange (feedback, discussions)
4. Invitation sent to education professionals, i.e. program faculty and staff, dean, etc.
The Showcase - A Gallery Walk

Spring 2020

Event Schedule

- 10:00 – 10:05 AM
  Participants join and explore.

- 10:05 – 10:15 AM
  Round A

- 10:15 – 10:25 AM
  Round B

- 10:25 – 10:35 AM
  Round C

- 10:35 – 10:45 AM
  Round D

- 10:45 – 10:50 AM
  Closing Remarks

- 10:50 – 11:00 AM
  Participants exit.
The Showcase - A Gallery Walk  

Fall 2023
Quick Pause

I have time for 1-2 questions.
The “New” Curriculum (Overview)

★ **Unit 1** - Introduction to Conceptual Learning & Teaching (6-7 weeks)

★ **Unit 2** - The Concrete-Pictorial-Abstract approach (2-4 weeks)

★ **Unit 3** - Teaching Conceptually with Technology (2 weeks)

★ **Honorable Mention** -- PrBL unit
Unit 1 - Intro to Conceptual Learning & Teaching

- What does conceptual learning look like?
  - Teacher VS Student
- Activity Before Content (ABC) Method
  - Emphasizing student prior knowledge.
  - “Students don’t come to us as blank slates.”
- Unpacking the Process Standards
- Mathematical Proficiency Strands
  - Then, making connections to the Process Standards.
- Procedural VS Conceptual
- Misconceptions (and strategies to address them)
Unit 2 - The Concrete-Pictorial-Abstract approach

1. What is it? What is it not?
   ○ Make Frayer Models (Individual, Group, Class)

2. Wikki Stix
   ○ “Resource Haul”

3. Algebra Tiles “training”
   ○ The basics: Integer Operations
   ○ Solving Linear Equations
   ○ Factoring Polynomials
Unit 3 - Teaching **Conceptually** with Technology

2 weeks

- Develop criteria for selecting technology that supports conceptual learning/teaching

- Introduction to CBRs (Calculator-Based Rangers)
  - Activities from Texas Instruments “Classroom Activities” webpage

- Exploration of Content-Specific Technologies
Quick Pause

I have time for 1-2 questions.
Final Thoughts

★ Implementation: A Conversation for Another Day
★ Promoting Student Voice
Implementation: A Conversation for Another Day

Model effective teaching through student-centered, engaging, and conceptual learning experiences

Build and be a community of mathematics teachers... through “Professional Development”

Students learn through “Inception”.
Promoting Student Voice

1. Daily Discussions
2. Peer Feedback
3. “Talking Sticks” (tool)
4. In-class Workdays
5. Instructor Consultations for GUIDANCE
6. Choice in their Project Topics & Planning
7. Develop Class Definitions/Notes
8. Share Reflections
9. Showcase with Education Professionals
Questions? Comments?

What can I clarify or extend for you?

Let’s connect:
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Credits.

Presentation Template: SlidesMania, Slidesgo and Freepik

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