Students Attaining Difficult Mathematics by Employing Psychological Techniques

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Introduction

- As a mathematics instructor at a community college, you see a variety of students from a variety of backgrounds, with different learning styles.
- What we know already:
  - Currently, only 20 percent of students who begin higher education at two-year institutions graduate within three years.
  - 60 percent of all community college students place into remedial education classes, which include developmental mathematics.
  - up to 70 percent of community college students placed into developmental mathematics don't complete the sequence (The Carnegie Foundation, 2011)

Introduction

- What we know already:
  - The data show that most do not: students either get discouraged and drop out all together, or they get weeded out at each articulation point, failing to pass from one course to the next (Bailey, 2009).
  - Developmental mathematics becomes a primary barrier for students ever being able to complete a post-secondary degree

My Experience with developmental mathematics students

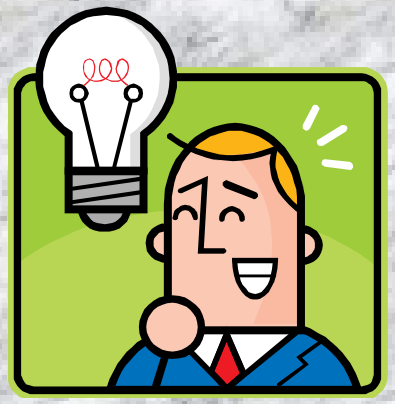
- This is who I see, your experience my different:
  - 18 – 21 year olds who don't necessarily see the importance of coming to every class
  - Non-traditional students who are hard-working but lack necessary preparation
  - Students who are prepared but don't see the purpose of the material
  - Model students

My Experience with developmental mathematics students

- All roads lead to the
  - FRUSTRATED STUDENT

My Experience with developmental mathematics students

- Personal experience with frustration in a classroom
  - Eye opening
  - Is this how my students feel?
  - Other reasons besides lack of preparation?
  - 2008 study by Strong American Schools found that nearly four in five remedial students nationwide had a high-school GPA of 3.0 or higher. (Boss, 2010)



More Reasons for frustrations

- Sweller, et. al (1998)
  - proposed that there are three types of "load" that affect working memory: extraneous load, intrinsic load, and germane load
    - Extraneous load: the way materials/concepts are presented
    - Intrinsic load is the level of learner skill combined with the type/scope of materials that have to be learned. Here learners have to develop schemas or processes to learn difficult concepts.
    - “Germane load is the amount of resources a person willingly allocates to tasks that require the development of schemas and automaticity.” (Spybrook, 2008)

More Reasons for frustrations

- “instructional procedures are most effective when unnecessary cognitive load is kept to a minimum" (Clarke, Ayres & Sweller, 2005, p.16).
- Lack of schema development for developmental mathematics courses due to unnecessary contributions to extraneous load / previous courses did not manage intrinsic load effectively (Spybrook, 2008)

Minimize frustrations

- Learners form new schemas in working memory by integrating incoming information with prior knowledge that also will require resources for maintaining information in long-term memory (Clark, Nguyen, & Sweller, 2006).
- Schemas minimize the extraneous memory load and make learning a task a bit easier… This is important to developmental mathematics students – as mathematics is seen as complex

How do we tie it all together?

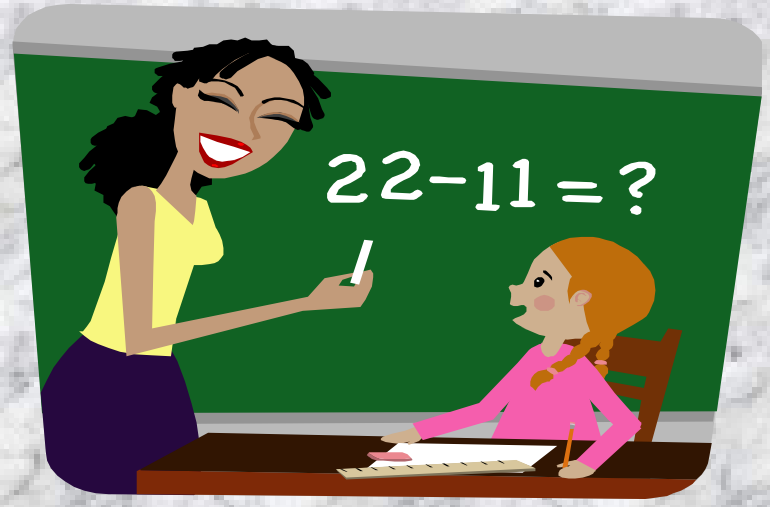
- One fun way of tying concepts together is the use of mnemonics in the classroom or curriculum.
- What are mnemonics?
  - a device (such as a rhyme or acronym) used to aid recall (Wordnetweb)

Some mnemonics we use and don't know it:

- http://www.eudesign.com/mnems/_mnframe.htm

Mathematics mnemonics

- PEMDAS
  - Not necessarily the most correct but effective
  - Examples



Purpose of my title

- Students Attaining Difficult Mathematics by Employing Psychological Techniques
- SADMEP
  - Send All Doggone Money Even Pennies
  - Used for solving simple equations
  - Not always applicable but effective

How do I use it?

- Let's try a few examples….

Summary

- Developmental mathematics students present with unique issues that require novel and relatable approaches to reach them
- This is just my fun way of doing it…

Questions or Comments?

References

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