

## Philosophy Guiding the Instruction

$f(\text{active learning modalities}) = |\text{rich learning opportunities}|$

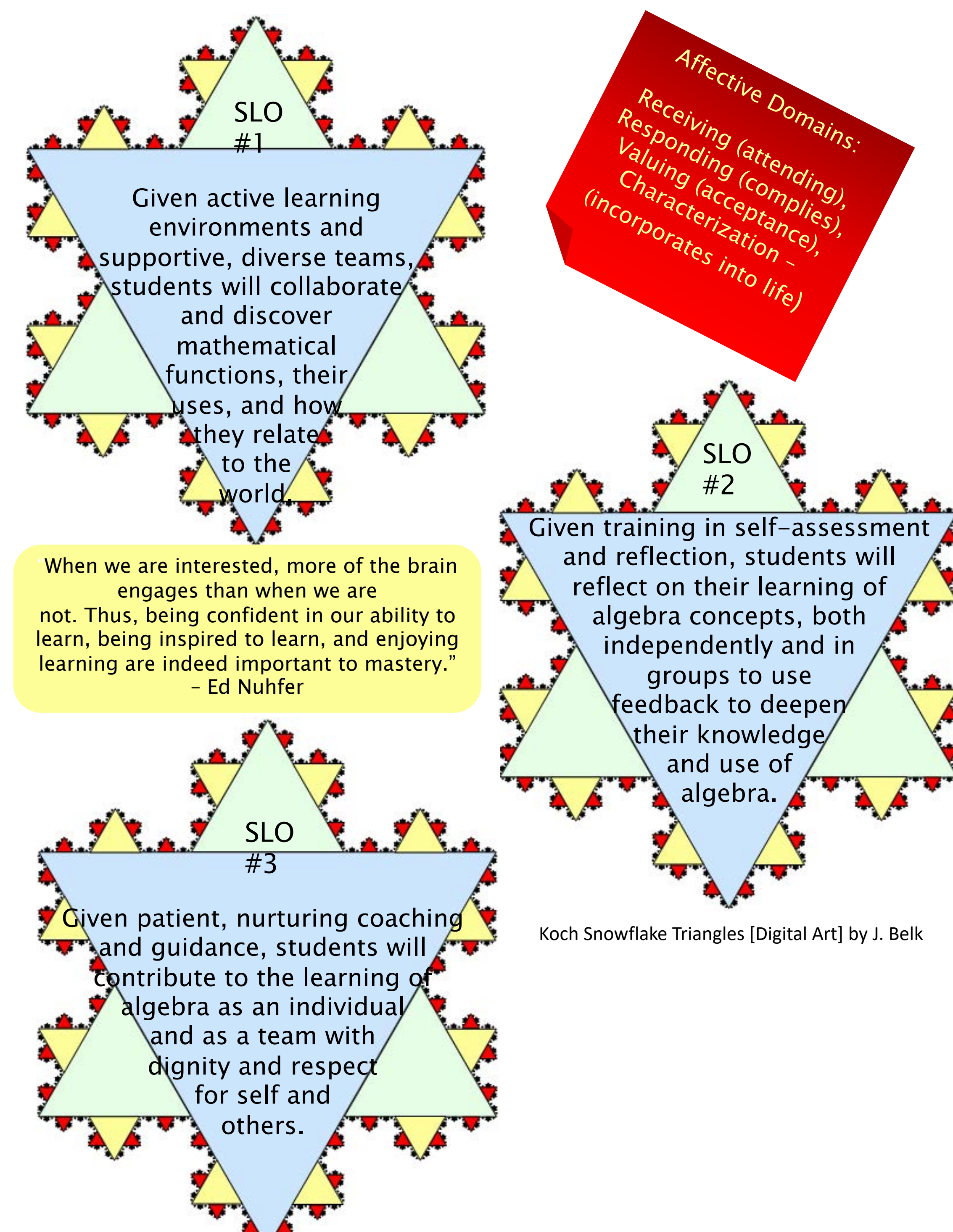


Möbius or Möbius Strip [photo] by alexlmx

The culture of my classroom that guides the instruction revolves around four main values. They are infinitely intertwined and during the course all are touched by every student through the course design:

- treat everyone with dignity and respect
- discover learning
- coach and guide students to make discoveries
- connect what students already know to what they will discover to allow learning to be moving, reflective, active, and fun.

## Student Learning Outcomes



## Course Learning Outcomes

1. Simplify all types of algebraic expressions
2. Solve linear and quadratic equations and inequalities
3. Solve college algebra word problems
4. Factor polynomials
5. Use function notation to evaluate, graph, and combine functions including composition
6. Solve exponential and logarithmic equations
7. Graph first and second-degree equations
8. Graph polynomial, rational, exponential, and logarithmic functions

## Active Learning Strategy

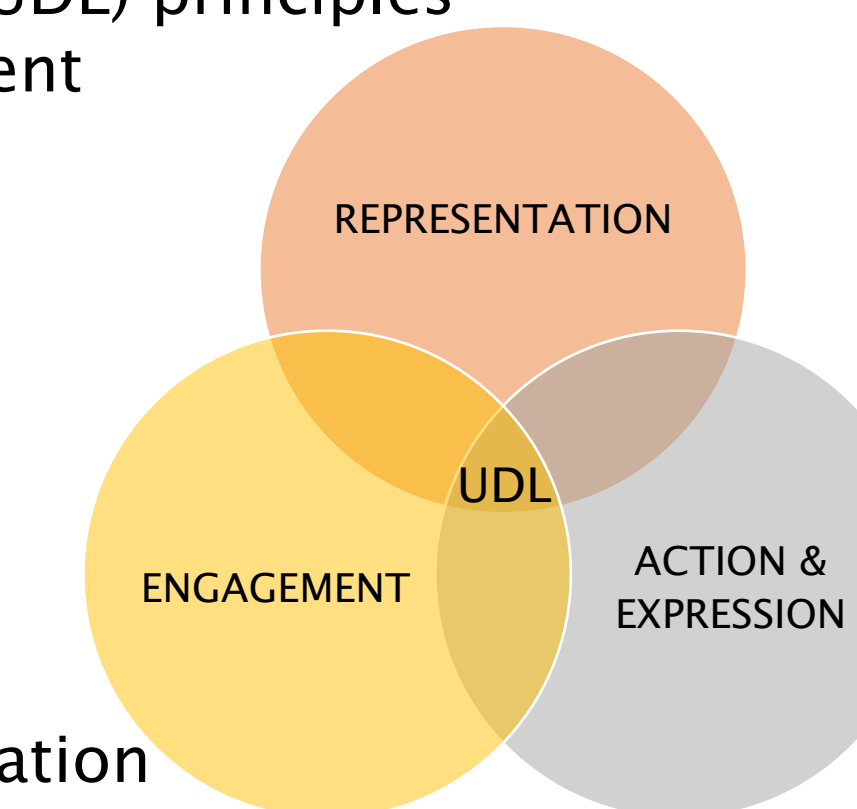
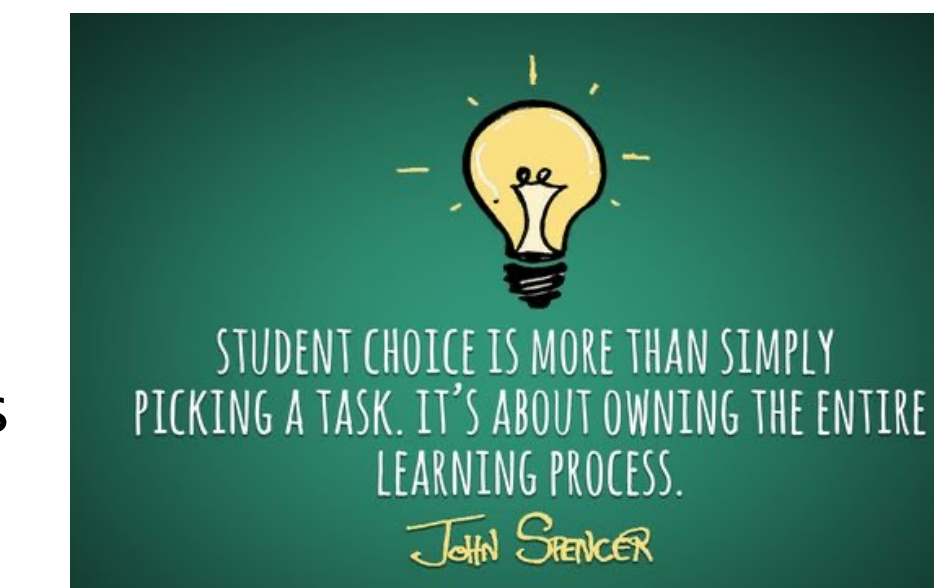
I chose a combination of active learning strategies, some which were already a part of the course and others that I chose to begin applying.

- I hung the poster I created at the summer institute in my classroom and used it as a visual representation to explain what *Student Learning Objectives (SLOs)* I had determined for the class and why there were important. Student input and discussion followed.
- I have used a required *Preview Activity* for several semesters. Students are given the opportunity to determine the grade they would like to earn in the class and time during class to make a plan to reach that goal. They turn in the worksheet and I give them feedback and return it to them the next class period. This helps to create autonomy and independence. This is followed up at midterm with a *Midterm Reflection Activity* that allows them to reflect on their learning so far and determine if they need to make any changes to reach their goal.
- Each time a new module or lesson was introduced, the *flipped classroom strategy* was employed. Students would watch the assigned videos prior to class and take notes on vocabulary and main concepts. There were also practice problems that were optional.
- When students arrived in class, *team-based learning* was implemented. They would have an *individual readiness assurance test (iRAT)* over the videos. I would then collect the tests and then they would convene into randomized small groups to collaborate and take the same test as a team (*tRAT*) in Canvas. Teams were allowed 5 attempts on the tRAT. At the end of the time allotted for the tRAT, I would return their iRAT papers and as a class we would determine which concepts that would have *mini-lectures*.
- At least one classroom activity related to content occurred in every class. These activities were related to real-world mathematical scenarios in order to help student apply what they were learning to the real world. *Discussions* were always a large portion of the activity.
- Outside of the classroom the students were given *self-assessments* in the form of *assignments and quizzes*. In the classroom, students are asked to complete *pre-, mid- and post-surveys* that monitor their metacognitive growth over the semester.
- Throughout the semester the students worked on a course project. It had areas of individual choice so that students could show what they had learned with some independence. During the project they had to collaborate with another student to gain feedback on their project. The students *created the collaboration rubric (peer evaluation)* that was used for the grade.

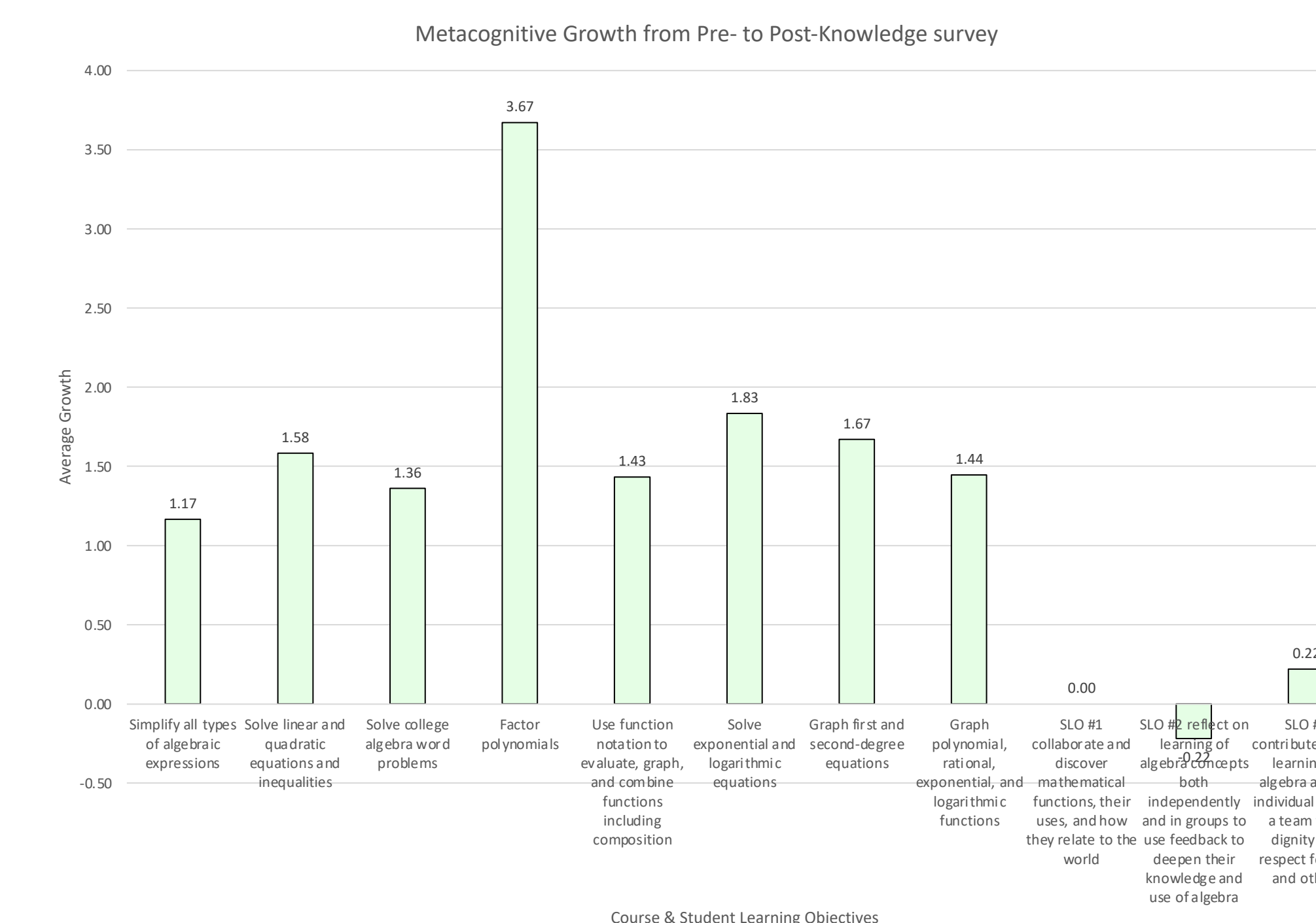
## Inclusion

In this course gamification and UDL principles are implemented to encourage diversity, equality and inclusion. Highlights of these strategies include:

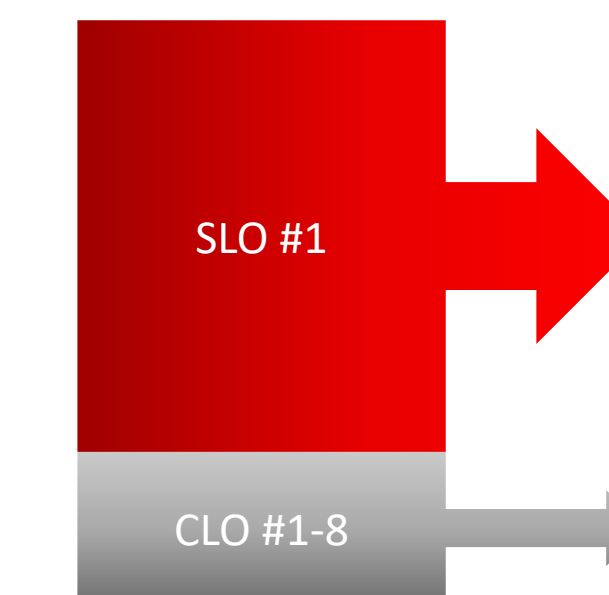
- ❖ Gamification
  - ❑ Student Choice in Learning
    - individual quizzes
    - group discussion
    - online discussion
    - reading
    - videos
    - classroom activities
    - online activities
    - self-assessments
  - ❑ Student Choice in Earning
    - 225 total points per lesson to choose from
    - 165 points maximum to earn from the 225
    - Grading scale based on points
- ❖ Universal Design for Learning (UDL) principles
  - ❑ Multiple means of engagement
    - individual quizzes
    - group discussion
    - online discussion
    - reading
    - videos
    - classroom activities
    - online activities
    - self-assessments
  - ❑ Multiple means of representation
    - textbook reading within the lesson
    - Canvas pages editing using accessibility checker
    - videos within the lesson include closed captioning (cc) and/or transcripts
    - extra videos related to content include cc
  - ❑ Multiple means of action and expression.
    - Quizzes with multiple attempts
    - Learning software allows 3 missed attempts before marking incorrect
    - Learning software allows unlimited attempts of similar problems
    - Learning software includes videos related to the problems and a contact instructor button
    - Common assessment project that optimizes individual choice and autonomy



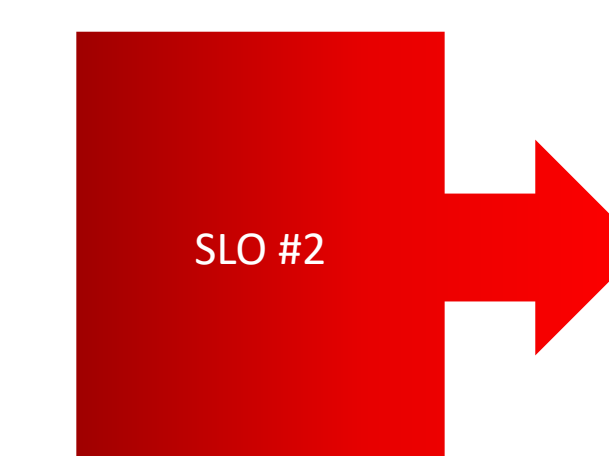
## Results of Metacognitive Growth



## Assessment



**Formative assessments:**  
Knowledge Surveys – pre, mid, and post  
Muddiest point – interspersed  
iRAT – new content  
tRAT – new content  
Ask me a question – interspersed  
Discussions in class  
Class Activities  
Lesson Quizzes – unlimited attempts  
**Summative Assessments:**  
Exams – two per semester  
Common Assessment Project



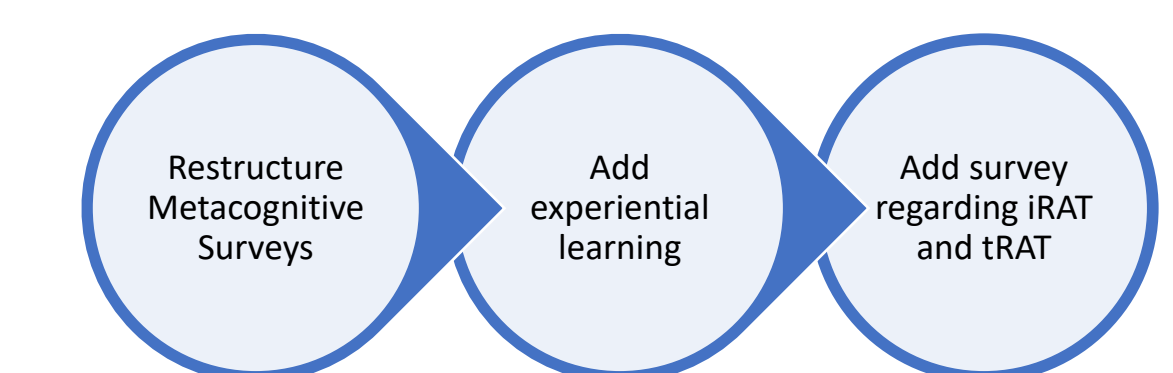
**Formative assessments:**  
Knowledge Surveys – pre, mid, and post  
Discussions in class  
Class Activities  
Lesson Quizzes – unlimited attempts  
**Summative Assessments:**  
Exam Reflections – two per semester  
Common Assessment Project Collaboration



**Formative assessments:**  
Knowledge Surveys – pre, mid, and post  
Discussions in class  
Class Activities  
Lesson Quizzes – unlimited attempts

Pre-, mid-, and post-knowledge surveys were used to measure metacognitive baseline and growth. I determined at midterm if there were areas that needed re-teaching or follow-up based on the growth data. At the end of the semester I compared the pre- to mid- and the pre- to post-knowledge surveys to get an idea of areas that I need to change for future semesters. I then changed my course lesson schedule to accommodate those areas the next semester. I also looked at trends and possible reasons for either extremely low or extremely high growth. In the area of affective domain I found that the students already came in with a high understanding of those objectives and so there wasn't any growth showing at midterm. I believe the reason for this is the age group of the majority of the class being 30–35 years old.

## Next Steps



## References

- Active learning spectrum. UWYO Science Initiative. (2024, March 14). <https://www.uwyo.edu/science-initiative/lamp/active-learning-spectrum/index.html>
- alexlmx. (2015). *Möbius or Möbius strip* [stock photo]. Adobe Stock. [https://stock.adobe.com/images/mobius-or-moebius-strip/98120097?prev\\_url=detail](https://stock.adobe.com/images/mobius-or-moebius-strip/98120097?prev_url=detail)
- Anderson, L., & Krathwohl, D. A. (2001). *Taxonomy for learning, teaching and assessing: A revision of Bloom's Taxonomy of Educational Objectives*. New York: Longman.
- Belk, J. (2007). *Koch Snowflake Triangles* [Digital Art]. Wikimedia Commons. [https://commons.wikimedia.org/wiki/File:Koch\\_Snowflake\\_Triangles.png](https://commons.wikimedia.org/wiki/File:Koch_Snowflake_Triangles.png)
- Bloom's Taxonomy. Centre for Teaching Excellence, University of Waterloo. <https://uwaterloo.ca/centre-for-teaching-excellence/catalogs/tip-sheets/blooms-taxonomy>
- Nuhfer, E.B. (2023). *Chapter #3 – The Affective Domain (document)*. LAMP Summer Institute.
- Spencer, J. (2016). *10 ways to incorporate student choice in your classroom*. Medium. <https://medium.com/@spencerideas/10-ways-to-incorporate-student-choice-in-your-classroom-e07baa449e55>

Thank you to Vicky Mayfield, my friend and collaborator, who introduced me to LAMP.

Thank you to Rachel Mim Watson, Christy Boggs, Ed Nuhfer, Jay Fahlsing, and all of the 2024 Luminaries for an incredible life-changing experience this year.