Developing a Summer Bridge Program to Support Sophomore, Transfer, and Other Continuing Students

Process, Challenges, & Results

PRESENTED BY

Lisa Oakes, Activity Director

Paulina Cano, STEM Academic Coordinator

FANGS

Finding the Antidote to Negativity and Promoting Growth Mindset for Sophomores

ST. MARY'S UNIVERSITY
SCHOOL of SCIENCE, ENGINEERING AND TECHNOLOGY

DEPARTMENT OF BIOLOGICAL SCIENCES

St. Mary's University

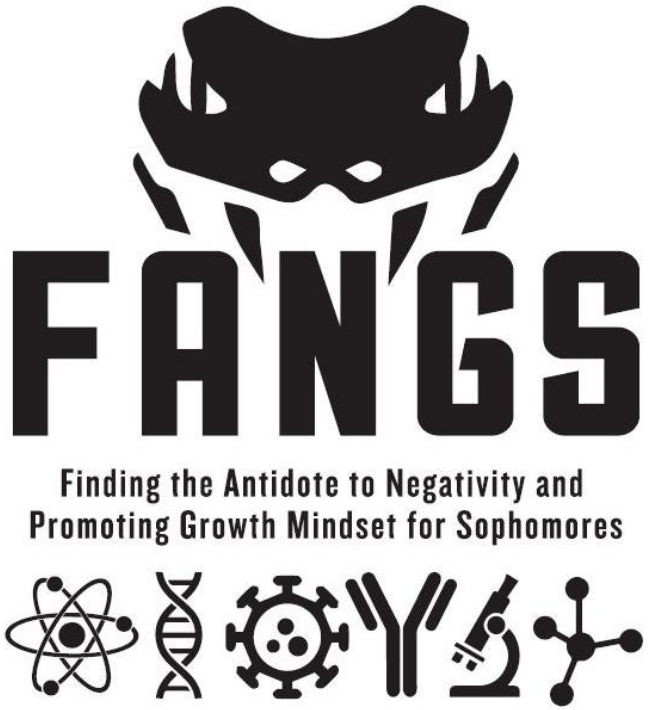
- Catholic Marianist University
- Located in San Antonio, Texas
- Undergraduate enrollment of 2300 students
  - 70% are Hispanic
  - 50% live on campus
  - 80% of first time freshmen live on campus
  - 70% come from Texas
- 36% of student population is in STEM
- Mascot is Rattler Man

Purpose of this Presentation

The presentation will emphasize the planning process and challenges encountered in developing an STEM summer bridge program to support sophomore, transfer and other continuing students.

1. Planning process, structure of program and challenges
2. Assessment process
3. Moving forward…
4. Discussion and Q&A

Finding the Antidote to Negativity and promoting Growth mindset for Sophomores



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FANGS provides a student-centered experience that is committed to the success of second year biology majors transitioning to:

- **Cell and Molecular Biology**
- **Cell Biology**
- **Genetics**
- **Organic Chemistry**

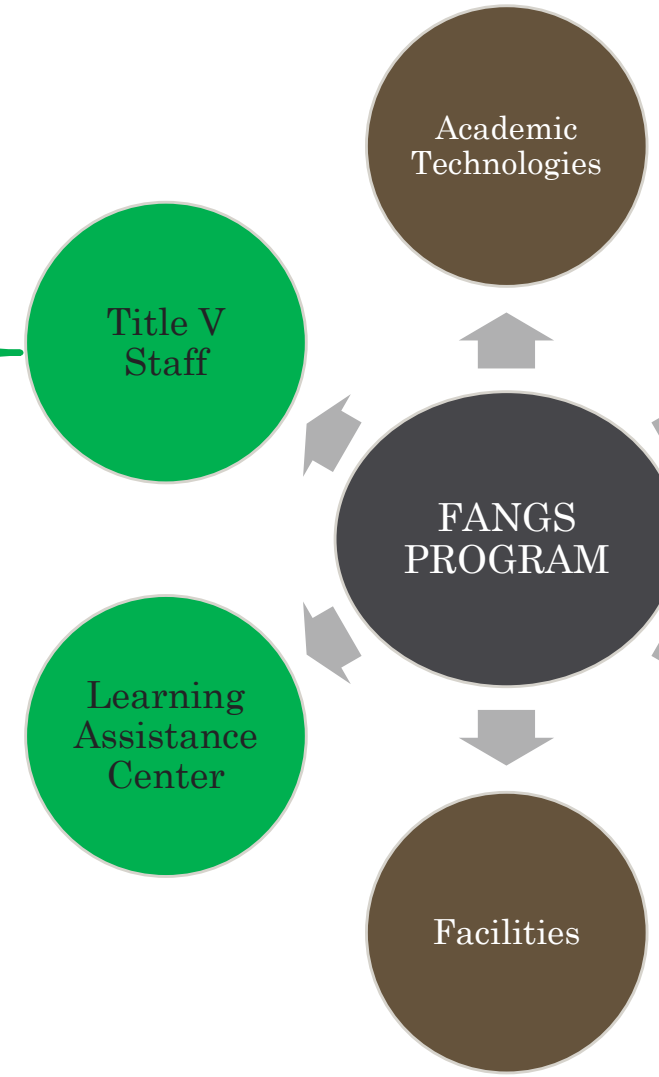
Objectives of FANGS

- **Identify challenges in their learning related to the content and activities of the program.**
- **Develop a strategy to tackle similar obstacles in their second year courses.**
- **Gain a better understanding of the connection between their courses and their discipline.**

Challenges

a) **Difficulty incorporating chosen objectives into the content and activities of the program**

Collaborative Effort



Project Director
Activity Director
STEM Academic Coordinator
Program Assistant

Department Chair
Genetics Professor
General Biology Professors
Pre-Health Professions Advisor

Post-Doctorate Volunteers from UTHSCSA

Director of the Learning Assistance Center
Peer Tutors

Organic Chemistry Professors

FANGS

Challenges

a) Difficulty in incorporating the objectives into the content and activities of the program

b) Planning committee had not worked together before and had limited programming experience

c) Different levels of buy-in

d) Scheduling conflicts

e) New academic technology was being introduced at the university level (Canvas)

Planning Timeline

February -March

- Initial meeting with planning committee
- Brainstorm and decide on program format, schedule, theme, topics and objectives
- Select academic skills to target (critical thinking, grit and metacognition)
- Determine logistics and budgetary needs
- Step by step document is developed
- Secured the use of lab time for program

Planning Timeline

April - May

- Focus on developing content and activities for program
- Develop assessment and evaluation pieces
- Develop student syllabus

Planning Timeline

June - July

- Academic skills information and lesson plans are developed
- Faculty will develop lesson plans, activities and worksheets

Planning Timeline

August

- Upload resources to Canvas
- Program took place

Challenges

a) Difficulty in incorporating the objectives into the content and activities of the program

b) Planning committee had not worked together before and had limited programming experience

c) Different levels of buy in

d) Scheduling conflicts

e) New academic technology was being introduced at the university level (Canvas)

f) Beliefs of fixed traits amongst some members of planning committee

g) Unequal distribution of workload amongst faculty

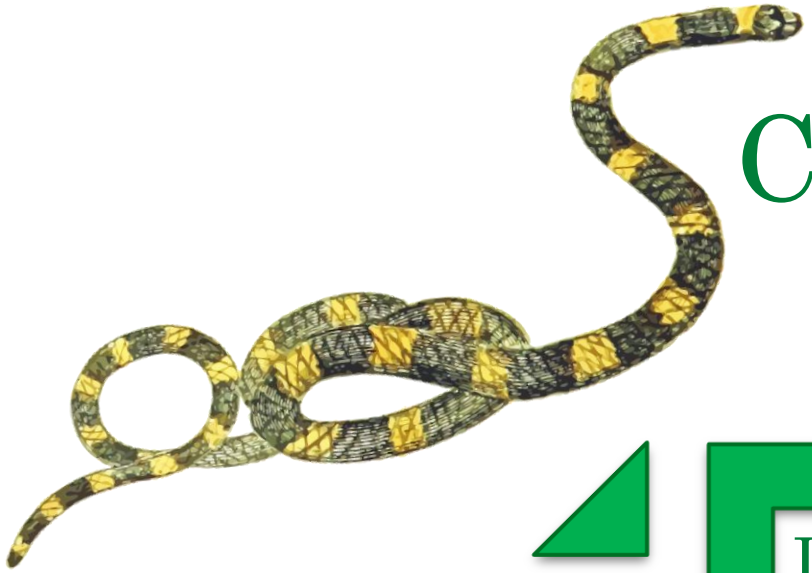
h) Overlapping activities during the summer with other programs

FANGS

Structure of Program

- Three days during the first week of classes utilizing students' lab time
- Started at 2:00pm and ended at 5:40pm
- Mandatory for all students registered in Cell and Molecular Biology, Cell Biology, Genetic Principles and Organic Chemistry

FANGS



Content of the Program

Day 1

Overview of venoms, proteins, inorganic and organic compounds

Quantitative skills and conversions

Review of the importance of Grit

Day 2

Components and Cells

Amino acids, peptide bonds and polypeptide formation

Review importance of Metacognition

Day 3

Genetic mutations and developing an antidote to venom

Review importance of Critical thinking skills

FANGS

Distribution of Students

- Students were divided in 20 teams with 5-6 students each
- Students were evenly distributed based on science and math GPA and gender)

Team Numbers	Assigned Protein & Snake
1-4	Oxiuranus scutellatus (Taipan snake)
5-8	Notechis scutatus (Tiger snake)
9-12	Ophiophagus hannah (King Cobra)
13-16	Pseudechis australis (King brown snake)
17-20	Crotalus adamanteus (Eastern diamond-back rattlesnake)

FANGS

Challenges

a) Difficulty in incorporating the objectives into the content and activities of the program

b) Planning committee had not worked together before and had limited programming experience

c) Different levels of buy-in

d) Scheduling conflicts

e) New academic technology was being introduced at the university level (Canvas)

f) Diverse priorities about which academic skills to address

g) Beliefs of fixed traits amongst some members of planning committee

h) Unequal distribution of workload amongst faculty

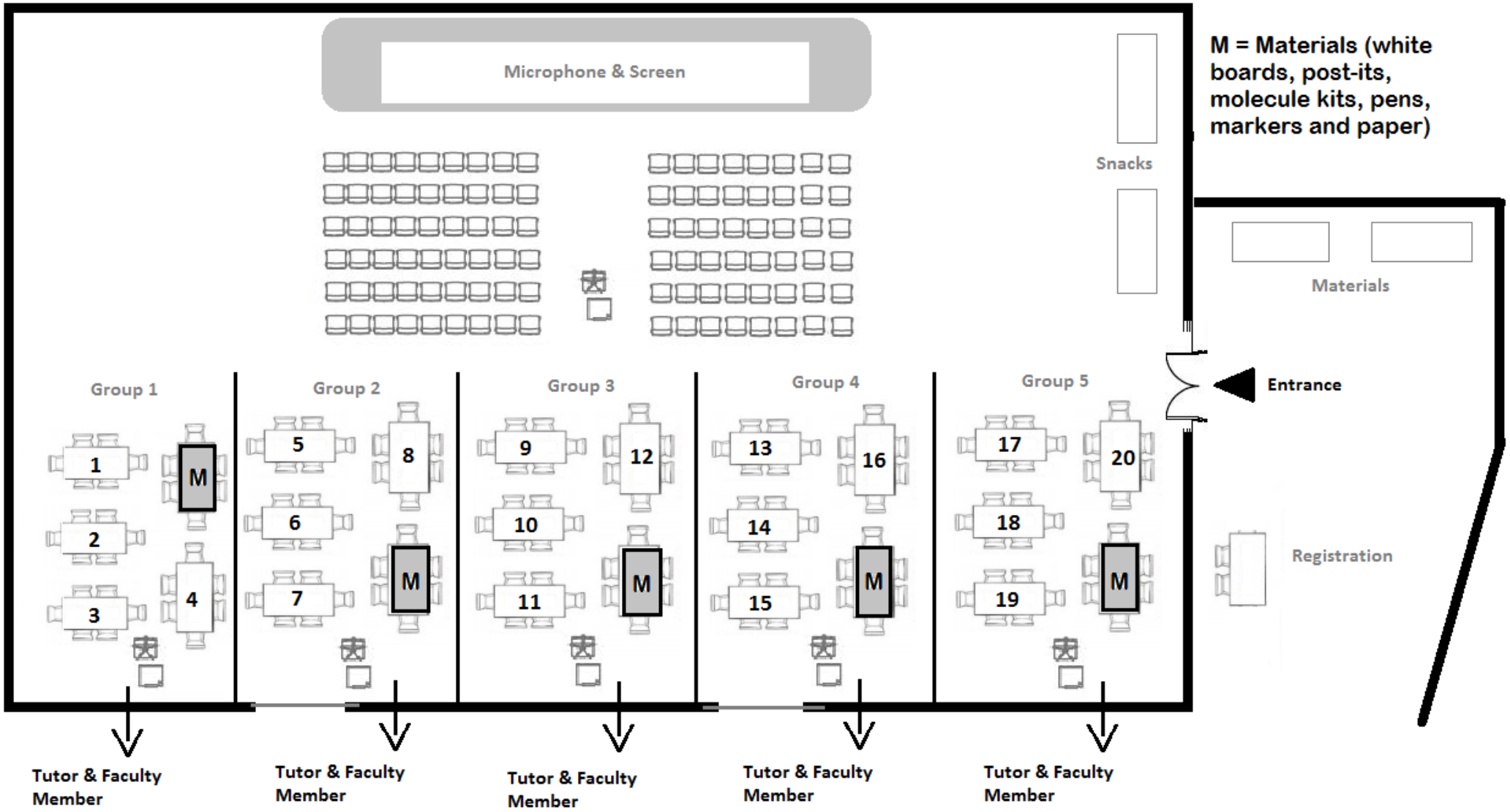
i) Overlapping activities during the summer with other programs

j) Effective scheduling of content activities and academic skills' discussions

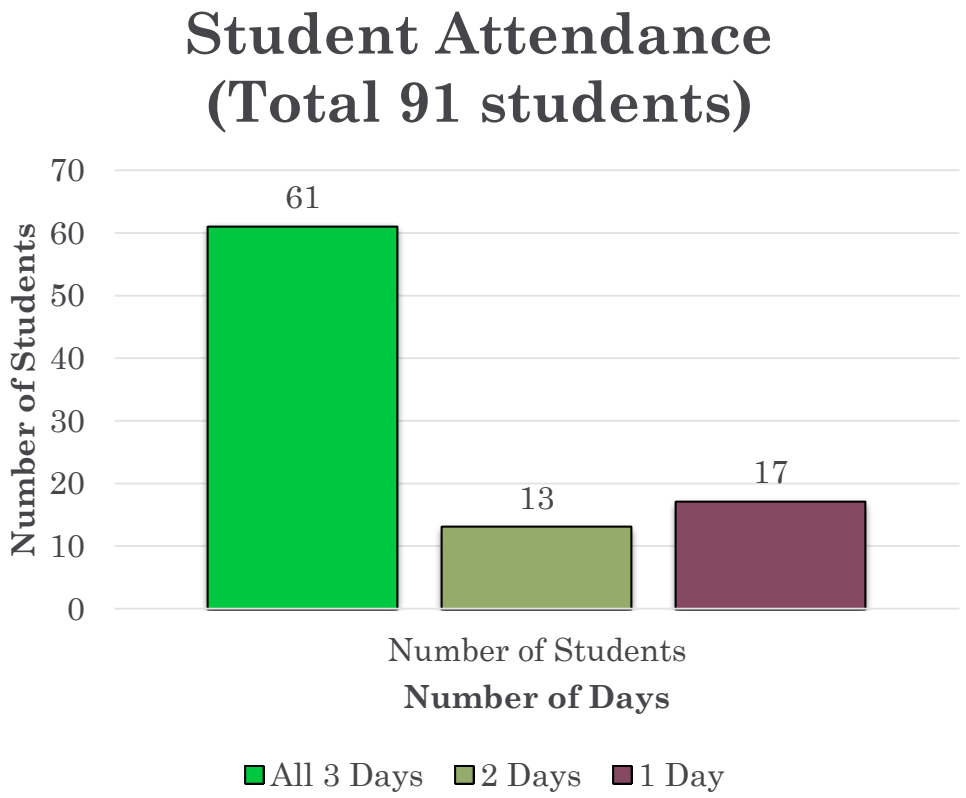
- Little flexibility

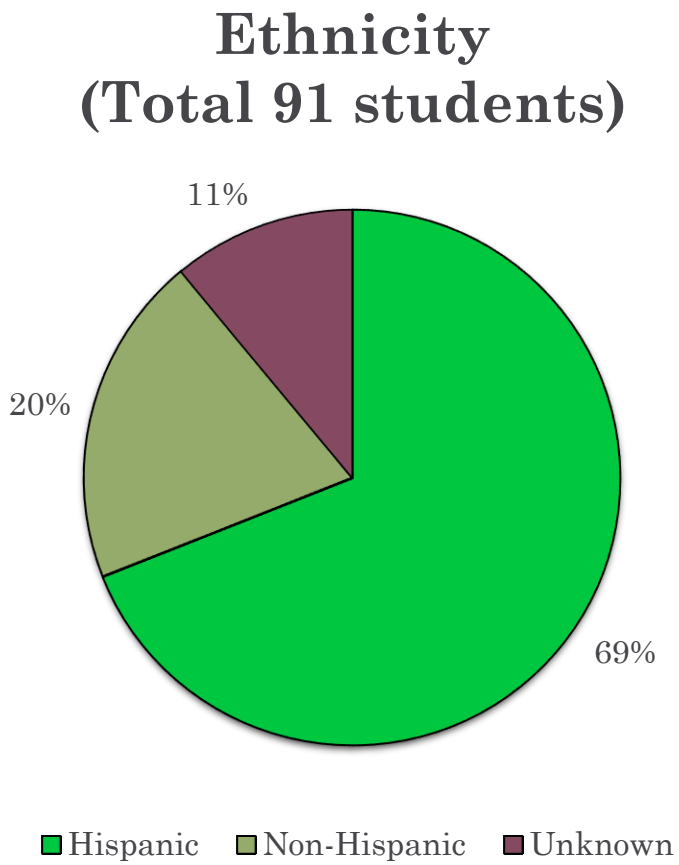
- Regimented schedule

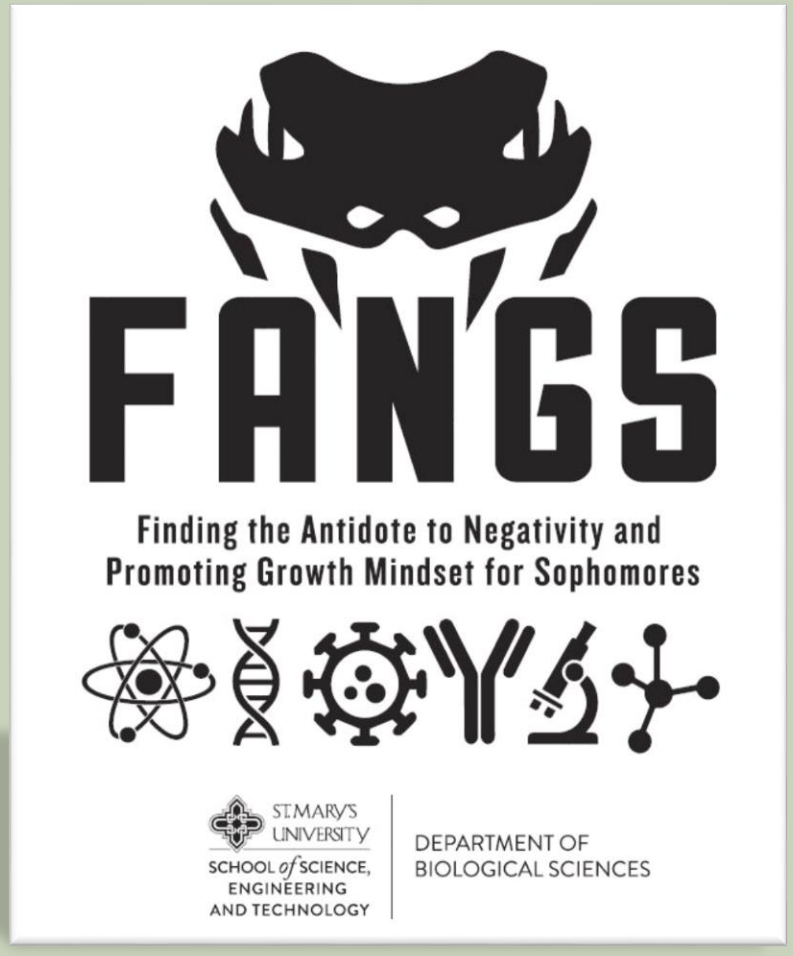
Floor Plan Distribution



FANGS Participants



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Assessment

Assessment Process

1. Discussed outcomes of interest & Proposed definitions for academic skills

Grit

Powerful motivation to achieve one's objective. Perseverance of effort is the driving force in achievement realization, promoting the overcoming of obstacles along the path to accomplishment.

Metacognition

The process of actively and skillfully conceptualizing, applying, synthesizing, and evaluating information to reach an answer or conclusion.

Critical Thinking

The act of thinking about one's own thinking, regulating, and measuring one's own learning. Critical analysis of the learning strategies one uses and how they are employed when making decisions.

Assessment Process

2. Reviewed validated scales for academic skills

Grit

- 12 items
- Rated: 1 = Not at all like me – 5 = Very much like me (*higher #s good*)
- Sample: ***I am a hard worker.***

Metacognition

- 6 items
- Rated: 1 = Strongly disagree – 5 = Strongly Agree (*higher #s good*)
- Sample: ***I am aware of thinking techniques or strategies concerning the topic I am working on.***

Critical Thinking

- 11 items
- Rated: 1 = Very easy – 5 = Very difficult (*lower #s good*)
- Sample: ***Identifying both stated and unstated assumptions in an argument.***

Assessment Process

3. Asked faculty to contribute content items

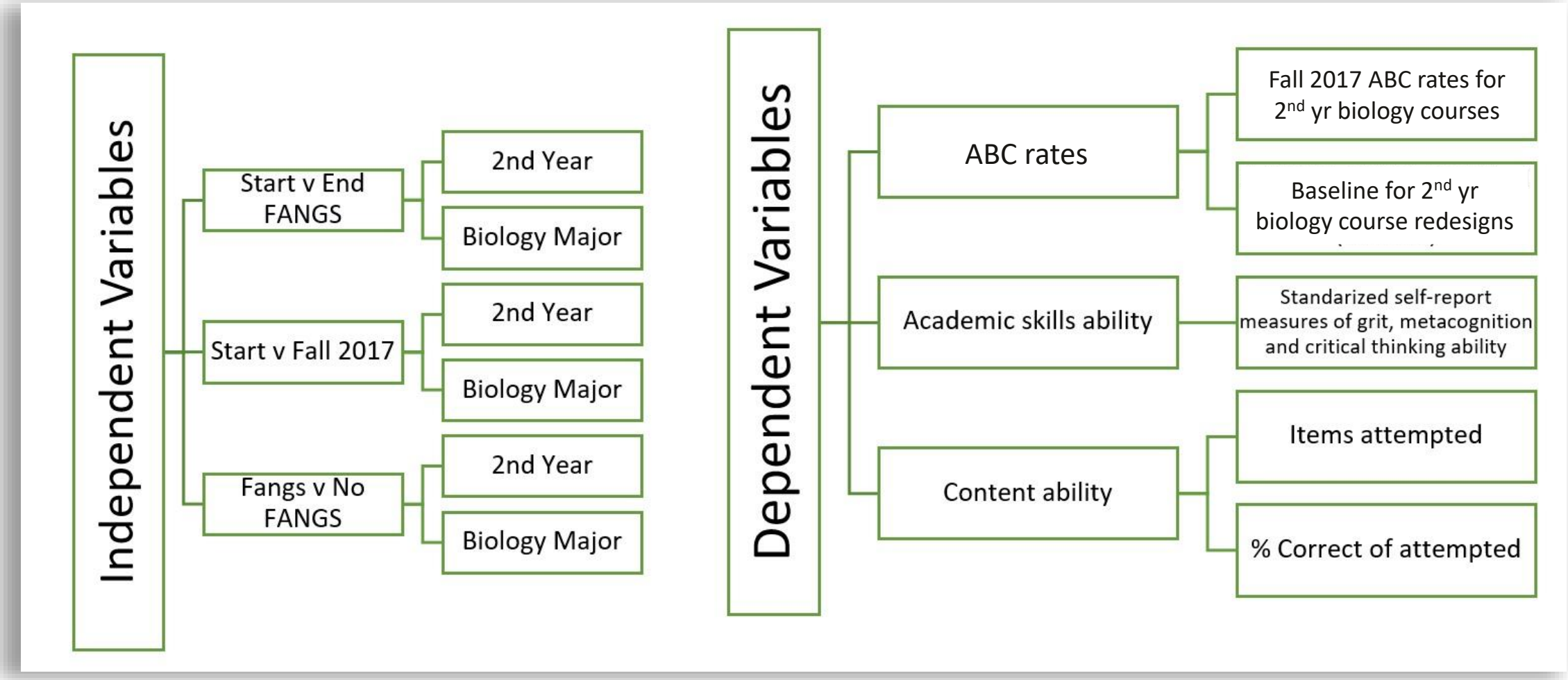
- 11 items
- Multiple choice
- Sample:

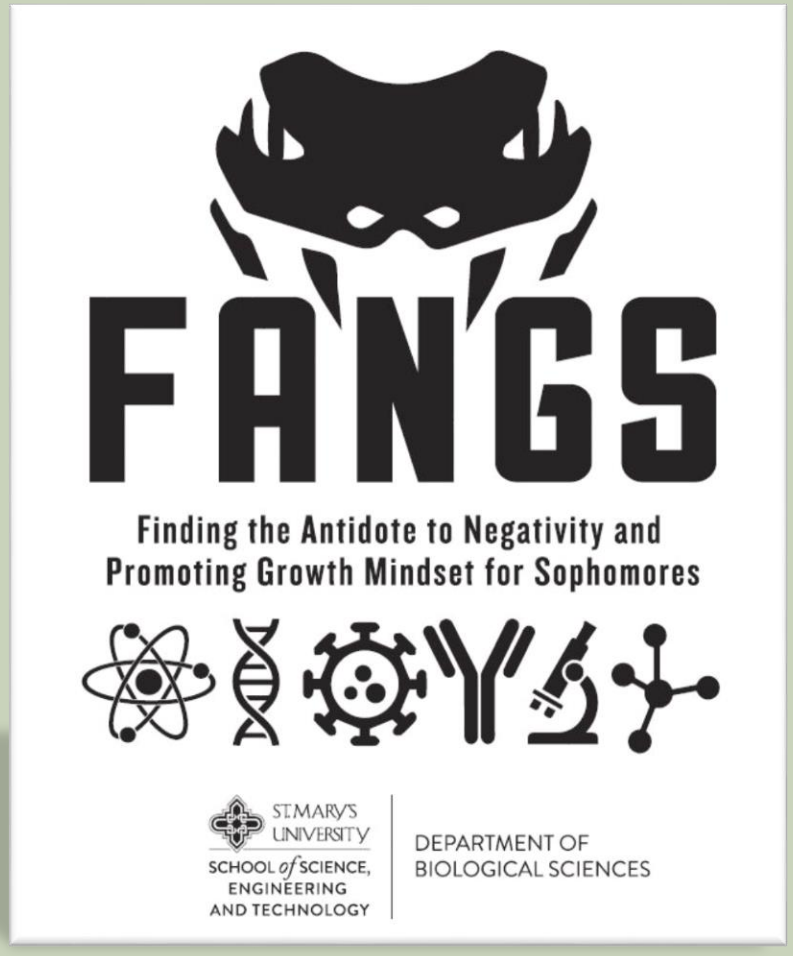
Which of the following statements is true?

a. Venom from different snakes is lethal at the same dosage.
b. Venom can serve multiple purposes for different snakes.
c. Venom components cannot be beneficial.
d. Venom targets individual cells.

Assessment Process

4. Proposed a potential model & Determined timeline of assessment

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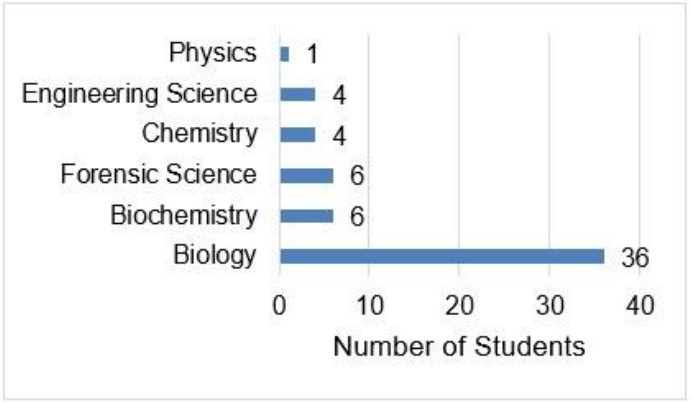
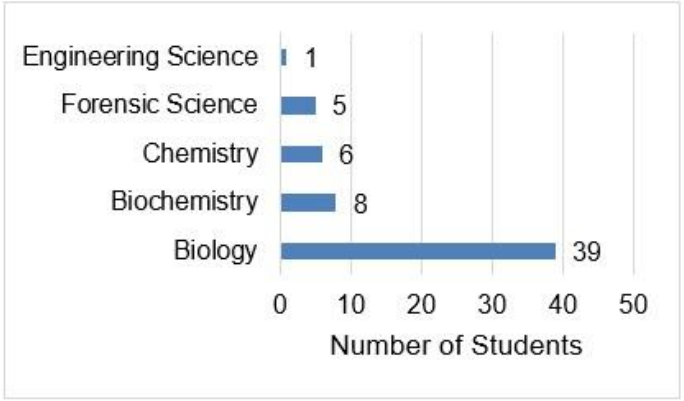
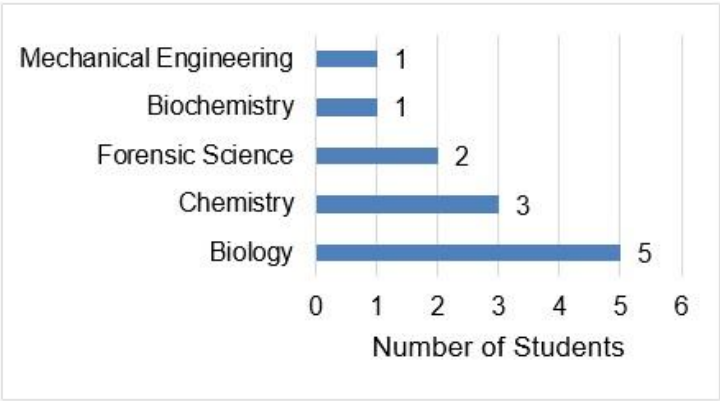
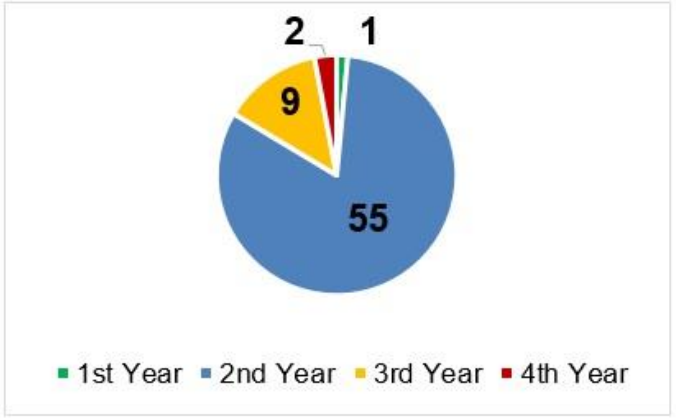
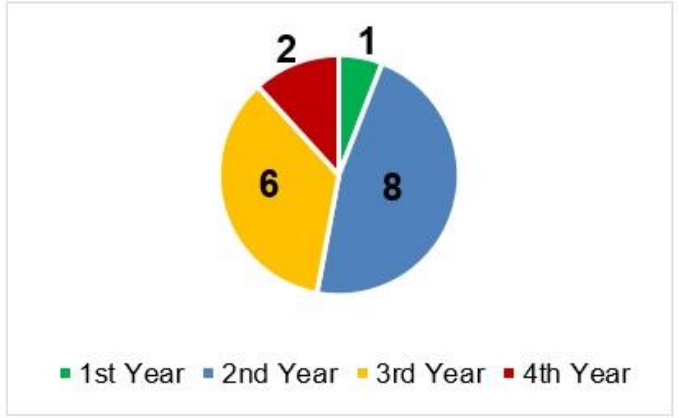
Findings

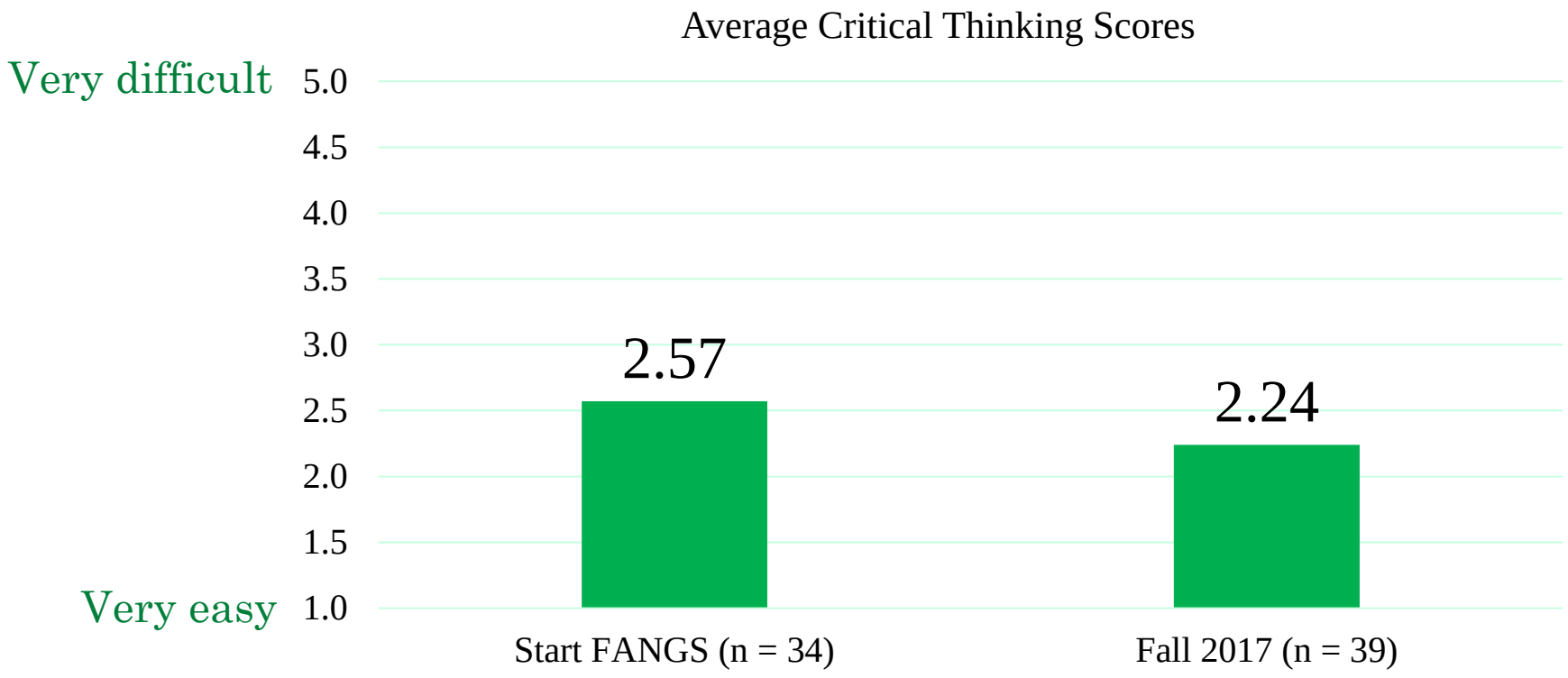
Demographic Information

START of FANGS (*N* = 81)	FALL 2017: FANGS (*N* = 67)	FALL 2017: NO FANGS (*N* = 17)
Undergraduate Major (N = 57 Respondents)	**Undergraduate Major (N = 59 Respondents)**	**Undergraduate Major (N = 12 Respondents)**
		
Year in Program (N = 58 Respondents)	**Year in Program (N = 67 Respondents)**	**Year in Program (N = 17 Respondents)**
		

Critical Thinking (Average Score)

2nd Year (Biology Majors): Start of FANGS v End of Fall 2017

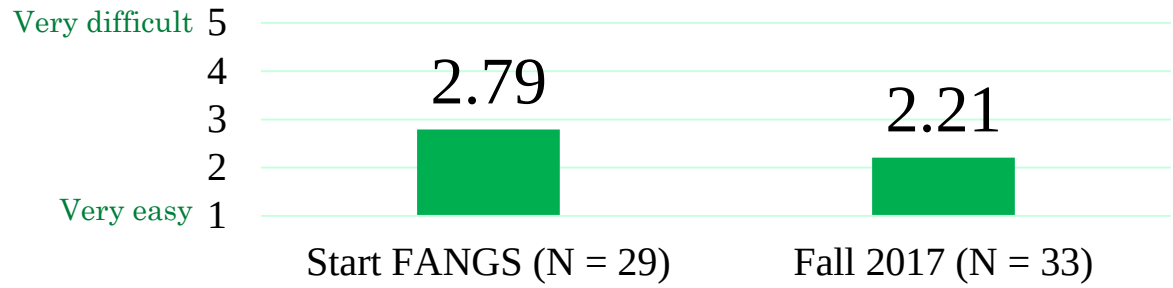
- Critical thinking scores improved by 0.33 points on average



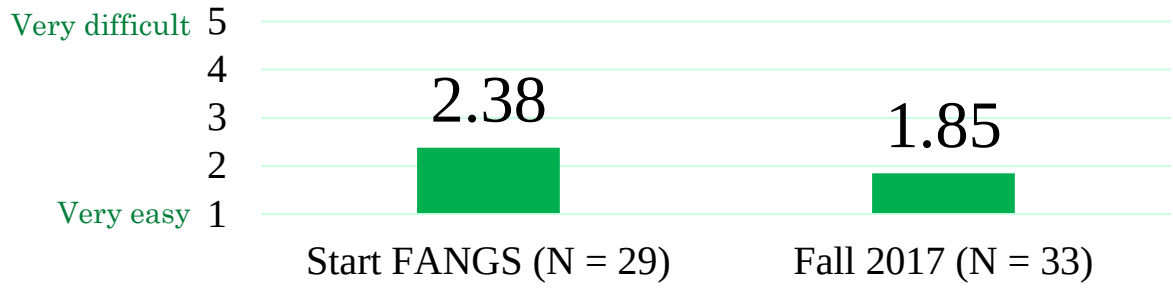
Critical Thinking (Item Scores)

2nd Year (Biology Majors): **Start of FANGS v End of Fall 2017**

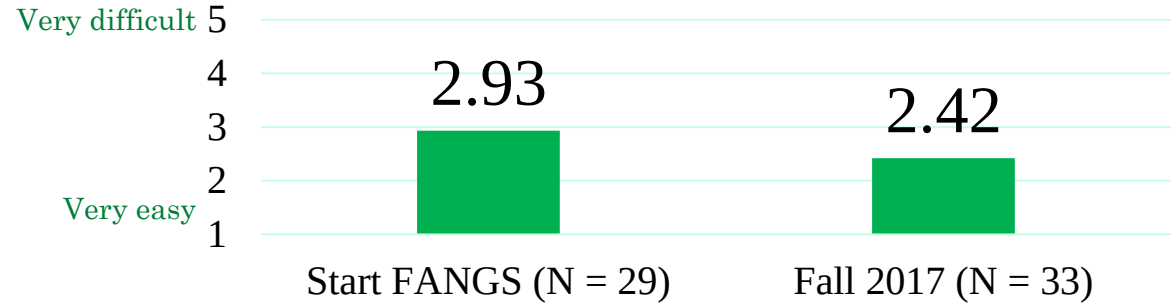
- Identifying both stated and unstated assumptions in an argument (- 0.58 on average)



- Determining if conclusions are consistent with and supported by the data (- 0.53 on average)



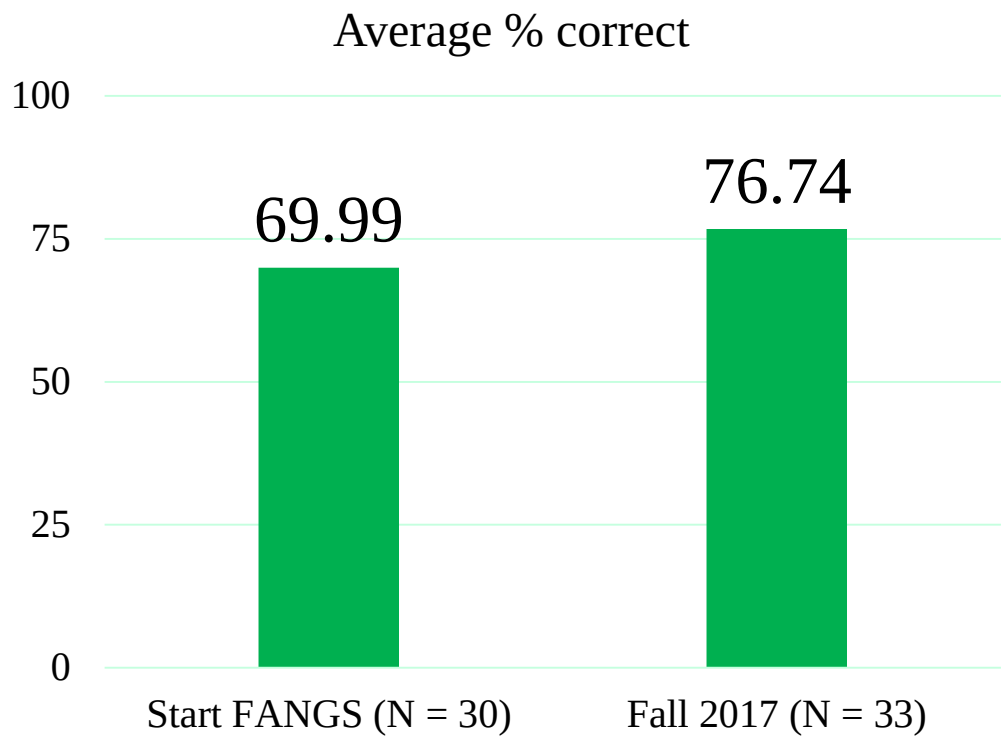
- Searching for examples to test an argument or explanation (- 0.51 on average)



Content Assessment (attempted at least 1 item of 11)

2nd Year (Biology Majors): Start of FANGS v End of FALL 2017

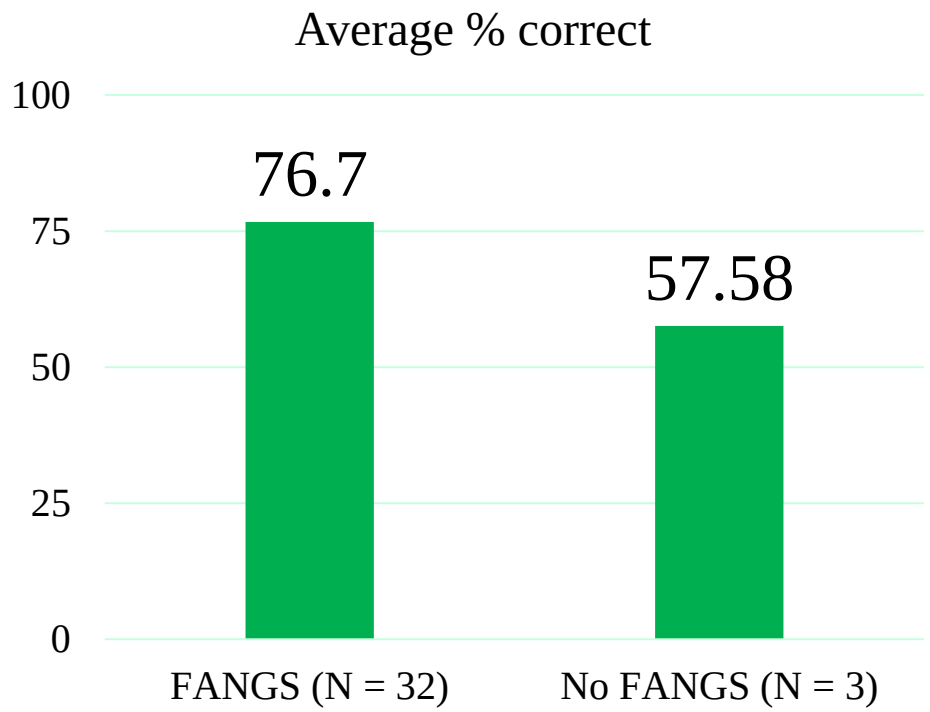
- Fall 2017: attempted more items
  - Start = 6.83 vs Fall = 8.39
- Fall 2017: more correct responses
  - Start = 9.80 vs Fall = 10.94
- Fall 2017: higher percent correct



Content Assessment (attempted all 11 items)

2nd Year (Biology Majors): FANGS v No FANGS (Fall 2017)

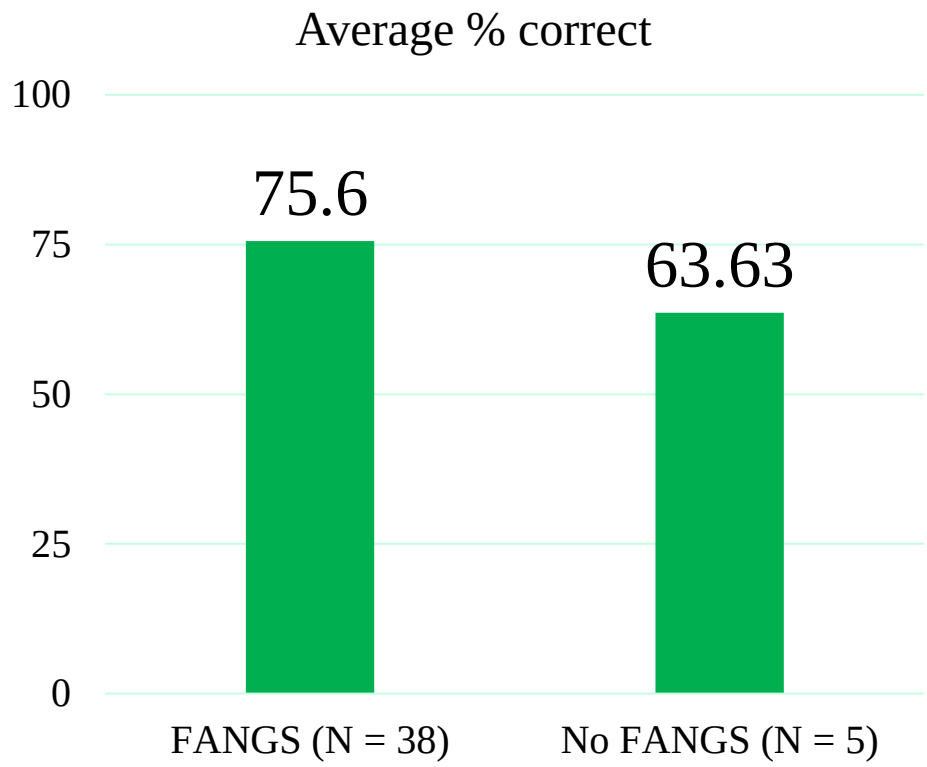
- FANGS: more correct responses
  - FANGS = 8.44 vs no FANGS = 6.33
- FANGS: higher percent correct
  - Sample size problem



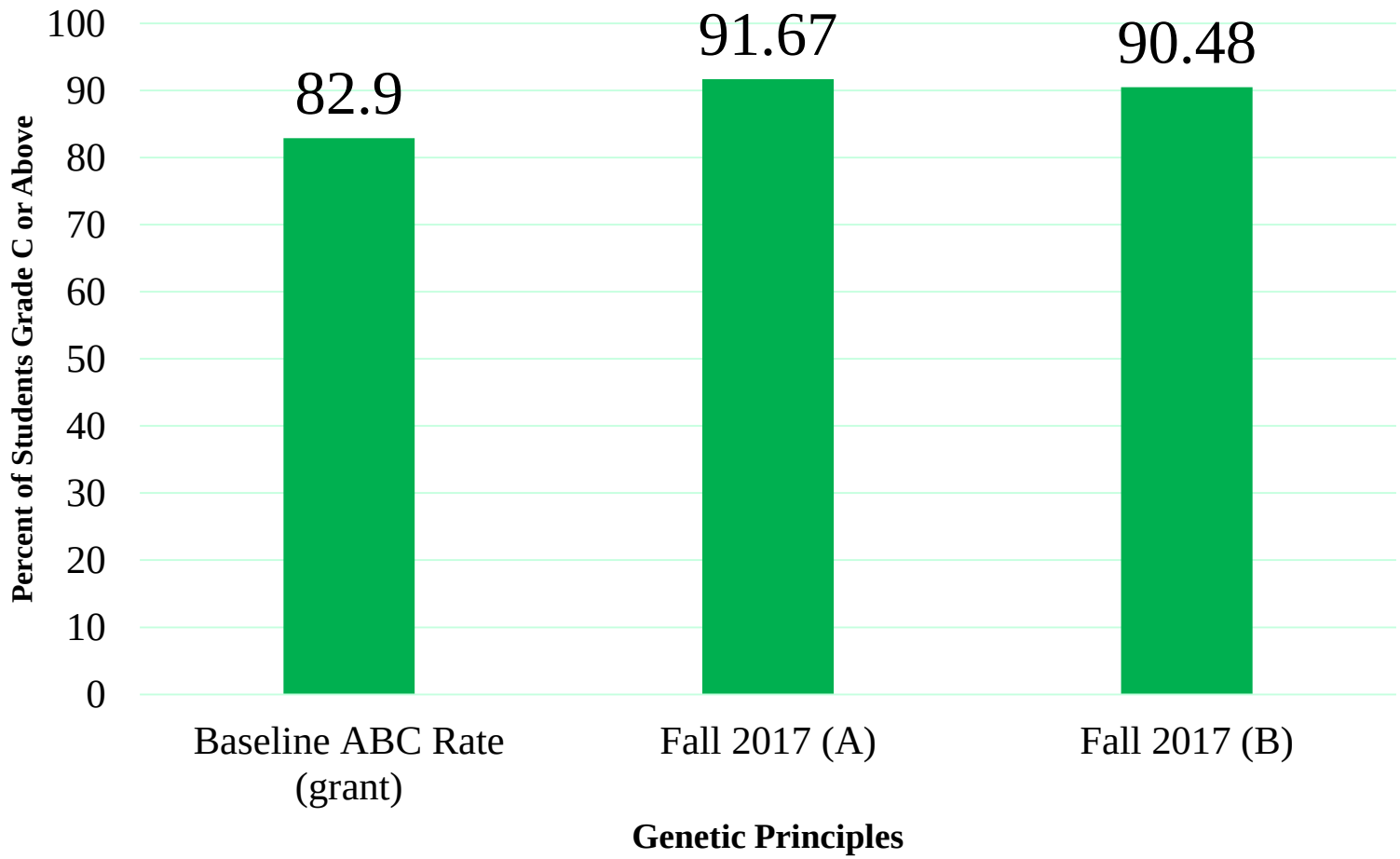
Content Assessment (attempted all 11 items)

Biology Majors (Across Years): **FANGS v No FANGS (Fall 2017)**

- FANGS: more correct responses
  - FANGS = 8.32 vs No FANGS = 7.00
- FANGS: higher percent correct
  - Sample size problem



ABC Rates


100
90
80
70
60
50
40
30
20
10
0
Percent of Students Grade C or Above
82.9
91.67
90.48
Baseline ABC Rate (grant)
Fall 2017 (A)
Fall 2017 (B)
Genetic Principles

ABC Rates

Fall 2017

- Organic Chemistry (Section A) = **76.19%**
- Organic Chemistry (Section B) = **77.27%**
- Organic Chemistry (Section C) = **64.29%**
- Organic Chemistry (Section D) = **73.68%**

- Cell & Molecular (Section A) = **100%**
- Cell & Molecular (Section A) = **95%**

- Cell Biology (Section A) = **100%**
- Cell Biology (Section B) = **70.83%**

***Will be evaluated after FANGS 2.0

Student Comments

“Presentation on grit was amazing! Very informative and somewhat inspiring. Being ok with failure, but one must learn from the failure.”

“Have a student panel with students who have taken these courses so we can ask them how they got through the classes!”

“I do not believe snake knowledge is important or meaningful to our studies!”

“Maybe prioritize concepts (biological/chemistry) in lessons, then snake activities.”

“Snake cake was the bomb.com!”

Moving Forward

- Work closer with faculty to emphasize that the keep the objectives in mind when designing their curriculum including assessment
- Be more deliberate about obtaining data from a comparison group of students that do not participate in the program
- Include a student panel to discuss studying skills for the targeted courses
- Include new Biology faculty to the planning committee to contribute additional ideas
- Reduce emphasis on snake theme and continue offering cake

Thank you

ST. MARY'S UNIVERSITY

Contact Information

- Lisa Oakes loakes@stmarytx.edu
- Paulina Cano pcano1@stmarytx.edu

References

References for scales used to assess academic skills:

GRIT

- Duckworth, A.L., Peterson, C., Matthews, M.D., & Kelly, D.R. (2007). Grit: Perseverance and passion for long-term goals. *Journal of Personality and Social Psychology, 9*, 1087-1101.

METACOGNITION

- Tuncer, M., & Kaysi, F. (2013). The development of the metacognitive thinking skills scale. *International Journal of Learning & Development, 3*(2).
  DOI: 10.5296/ijld.v3i2.3449
  URL: http://dx.doi.org/10.5296/ijld.v3i2.3449

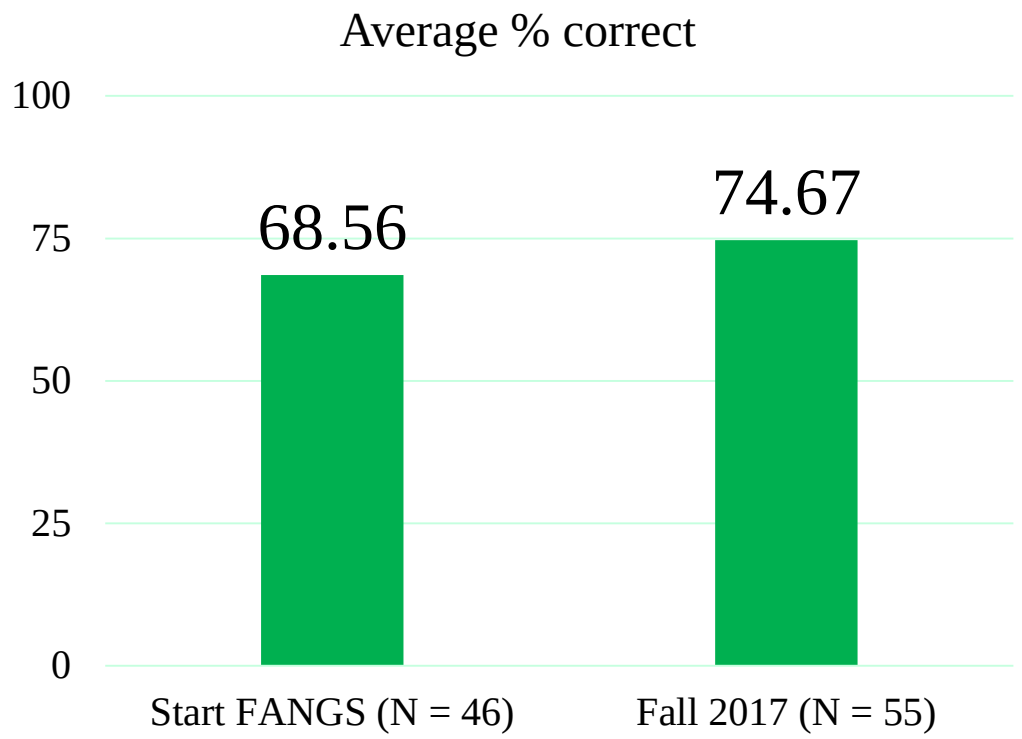
CRITICAL THINKING

- Powers, D. E. (October, 2002). Self-assessment of reasoning skills. *ETS Research Report.*

Content Assessment (attempted at least 1 item of 11)

2nd Year (Across Majors): Start of FANGS v End of FALL 2017

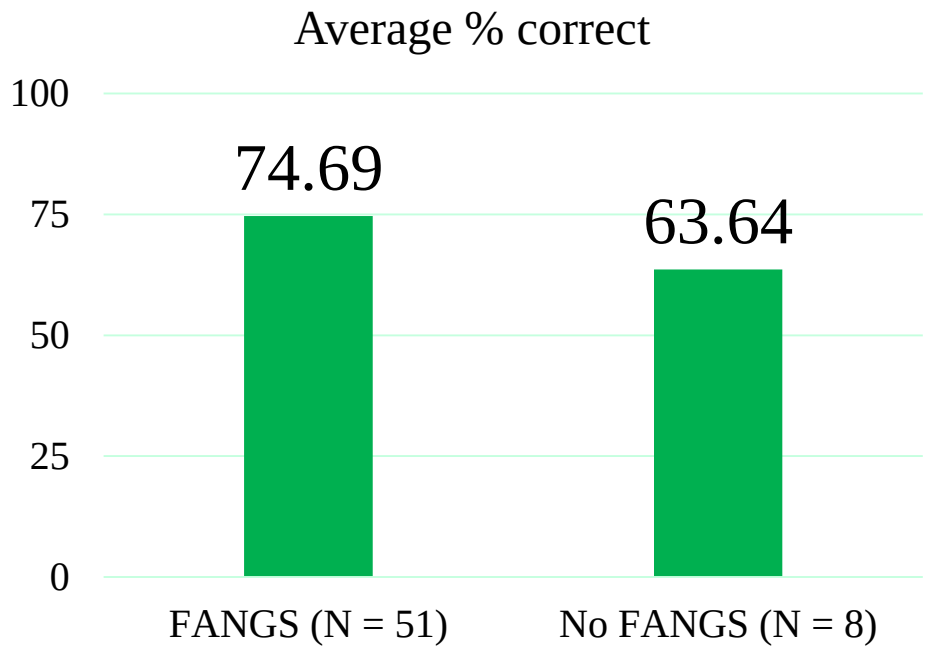
- Fall 2017: attempted more items
  - Start = 6.78 vs Fall = 8.15
- Fall 2017: more correct responses out of those attempted
  - Start = 9.85 vs Fall = 10.91
- Fall 2017: higher percent correct



Content Assessment (attempted all 11 items)

2nd Year (Across Majors): **FANGS v No FANGS (Fall 2017)**

- FANGS: more correct responses
  - FANGS = 8.22 vs no FANGS = 7.00
- FANGS: higher percent correct
  - Sample size problem



Content Assessment (attempted all 11 items)

Across Majors (Across Years):

Start of FANGS v End of Fall 2017

- No statistically significant differences

FANGS v No FANGS (Fall 2017)

- No statistically significant differences
  - Items correct:
    - F = 8.03
    - NF = 7.81
  - Percent Correct:
    - F = 73.02
    - NF = 71.02

Biology Majors (Across Years):

Start of FANGS v End of Fall 2017

- No statistically significant differences