SeeBeefGenetics: Evaluation of Optimized Feedback in a Beef Cattle Breeding Simulation

MARIA HAAG, JUSTIN LE TOURNEAU, ROSE MARRA, AND WILLIAM LAMBERSON

Introduction

- Feedback helps students interpret their results leading to cognitive change or learning.
  - Critical for novice students (Clark et al., 2009; Kirschner et al. 2006).
- Not all feedback is effective.
  - Feedback on easy tasks inhibits learning (Bangert-Drowns et al., 1991)
  - Feedback shown before decision making does not initiate change (Shute, 2008)
  - Feedback that is too detailed overwhelms students (Roll et al., 2014; Van Dijk et al., 2016).

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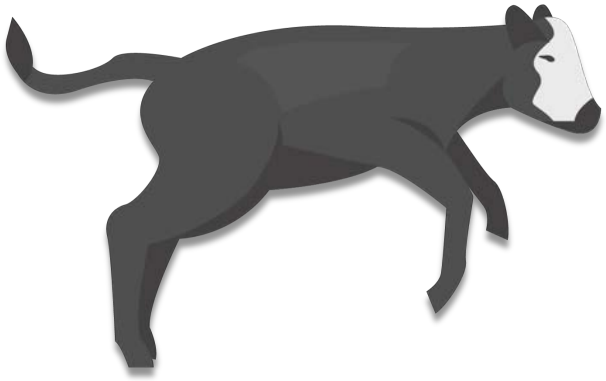
Problem



- Recommendations for feedback design are conflicting (Shute 2008; Wong et al. 2019)
- Researchers suggest more work focused on:
  - Feedback Timing (Kulik & Kulik, 1988; Johnson, et al., 2016)
  - Feedback Content (Timmers & Veldkamp, 2011; Attali & van der Kleij, 2017)
  - Learner Characteristics (Kulyuga et al., 2007)
  - Interaction of Design Types (Wang et al., 2019)

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Objective

Determine the effectiveness of optimized feedback in a beef cattle breeding simulation using an iterative approach.

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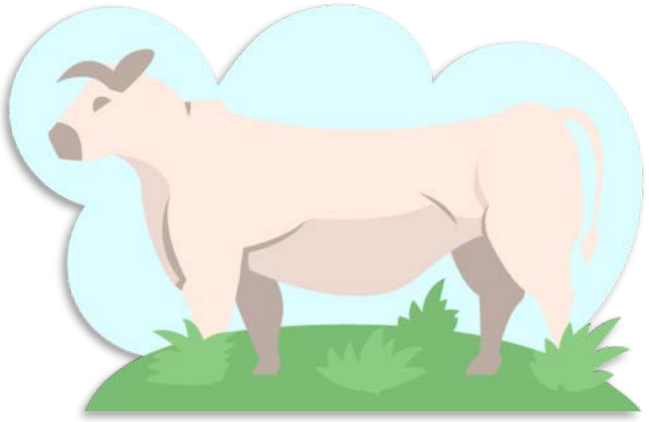
The Simulation

- SeeBeefGenetics™ is an online, beef cattle breeding simulation.
- Illustrates long-term cattle breeding concepts including:
  - Stochastic Genetic Principles
  - EPD-based Selection
  - Relevant Production Traits
- Features objective-based modules on topics including:
  - Mendelian Genetics
  - Quantitative Genetics
  - Correlated Response
  - Selection Methods
  - Sire Selection
  - Crossbreeding



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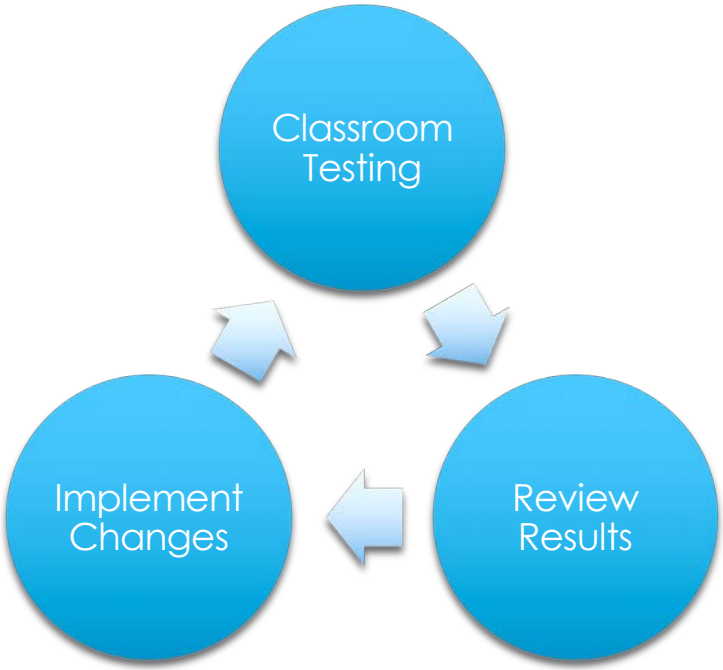
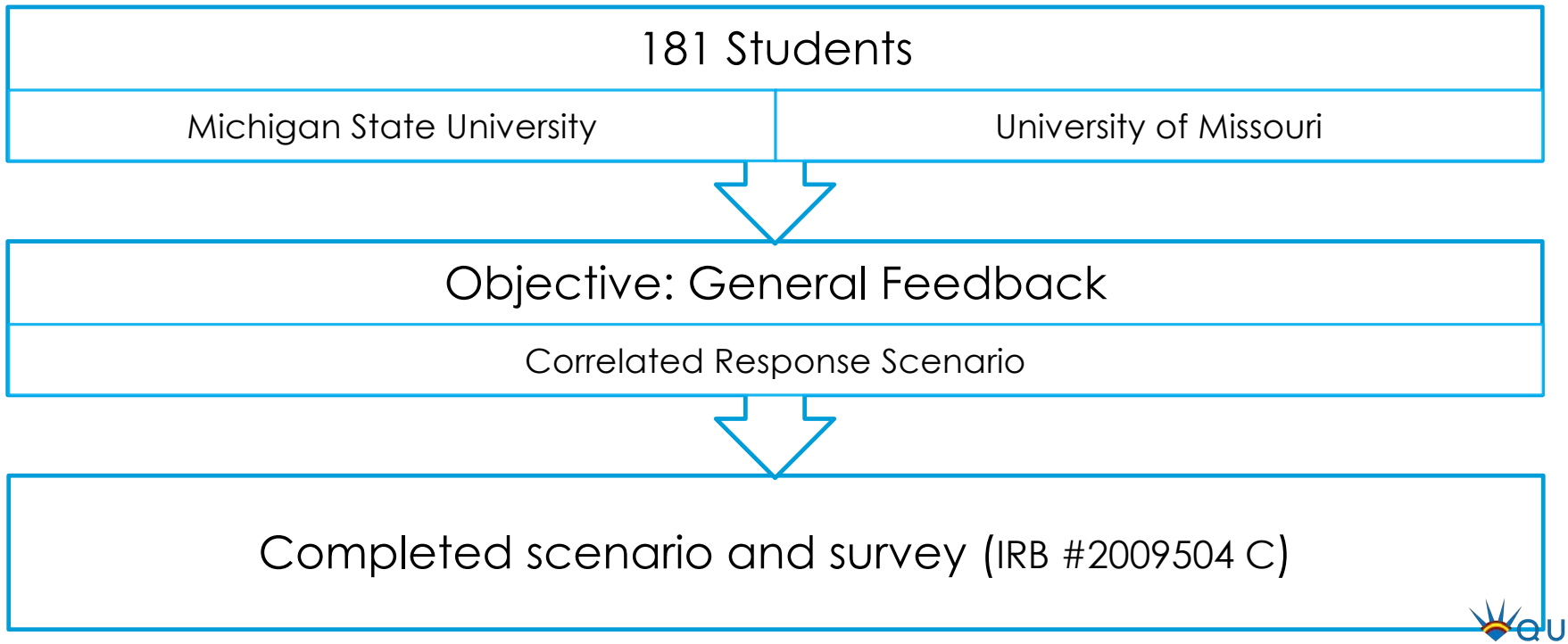
Iterative Testing



Iteration 1



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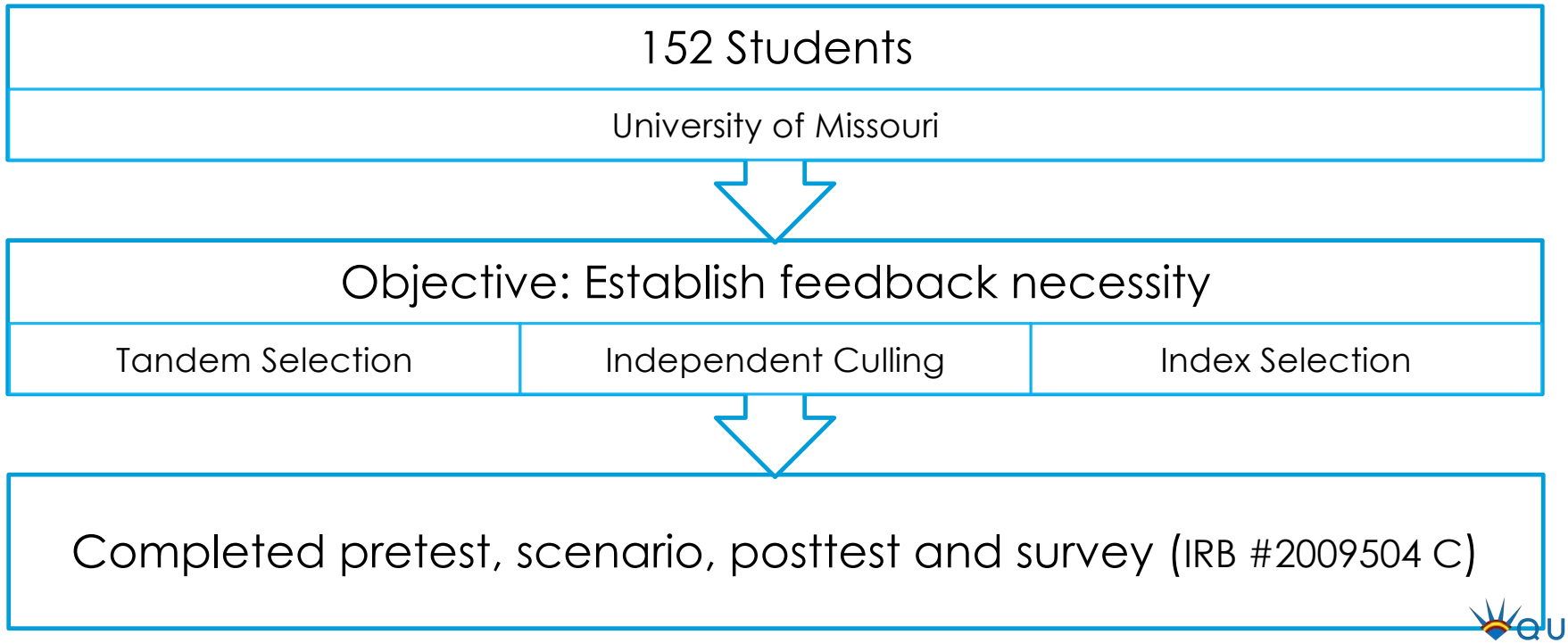
Iteration 2



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Iteration 2 Results

- No difference in pretest and posttest score.
- Qualitative responses:
  - "It was hard to understand what my data meant for my herd."
  - "I didn't know if my herd was improving or not."

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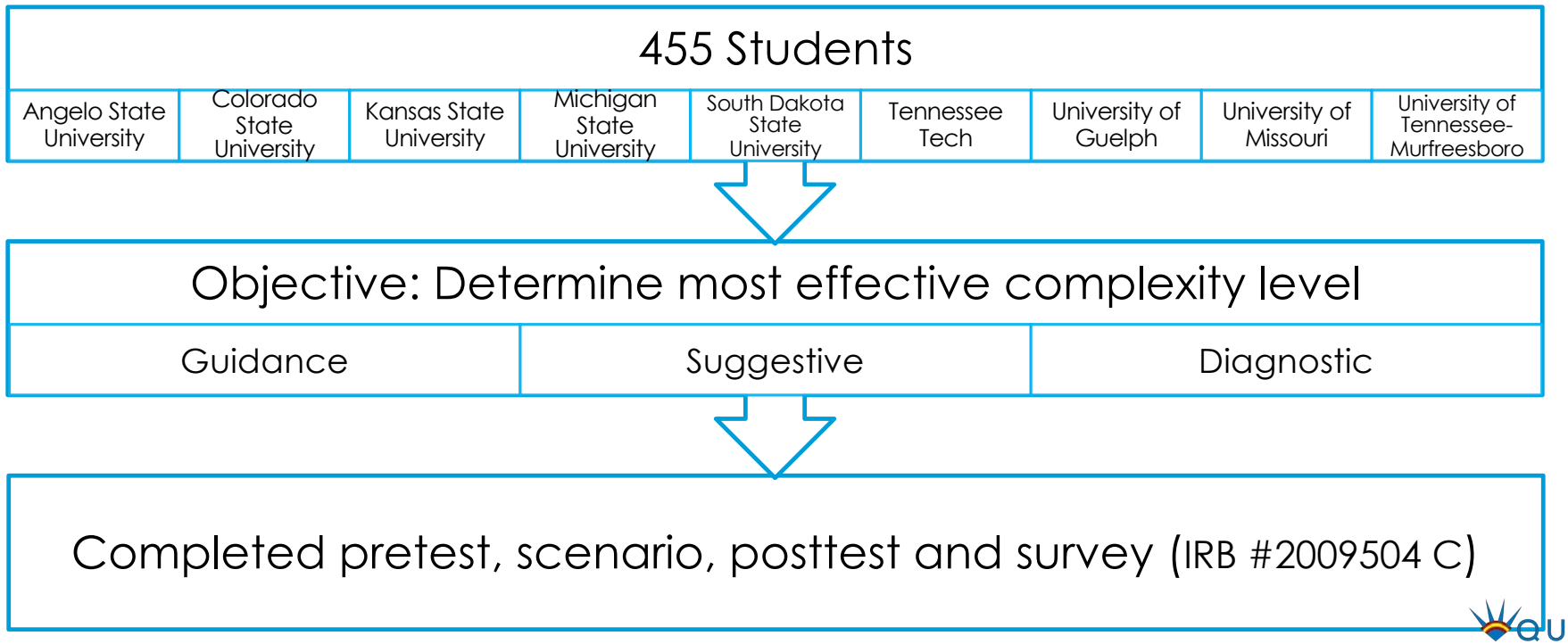
Iteration 3



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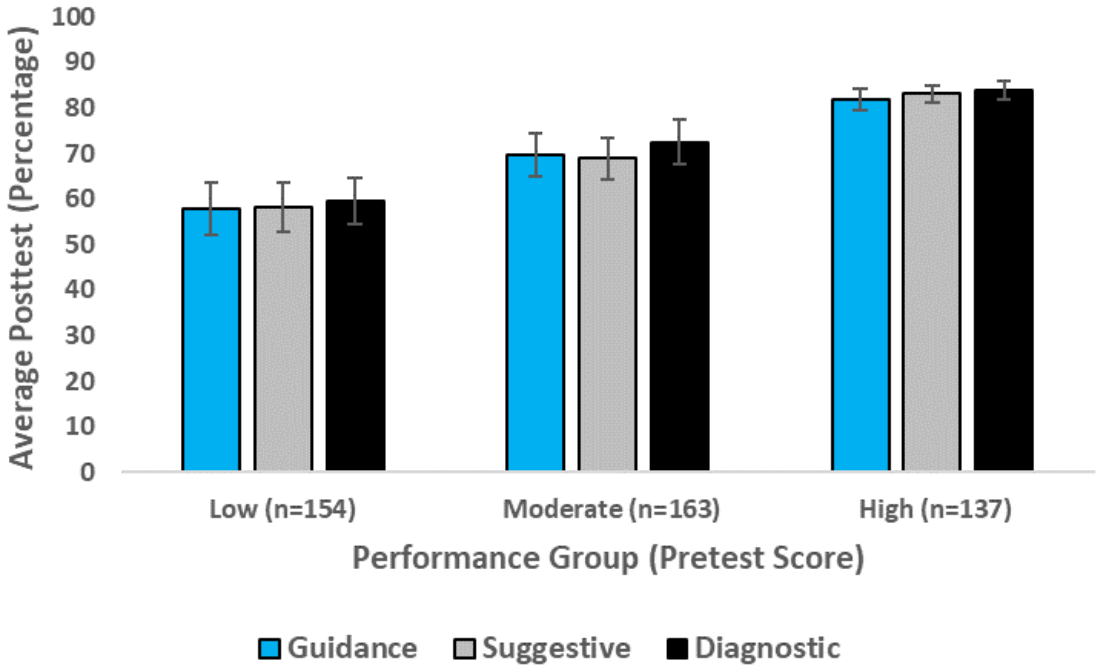
Average Posttest (Percentage)
100
90
80
70
60
50
40
30
20
10
0
Low (n=154)
Moderate (n=163)
High (n=137)
Performance Group (Pretest Score)
Guidance
Suggestive
Diagnostic

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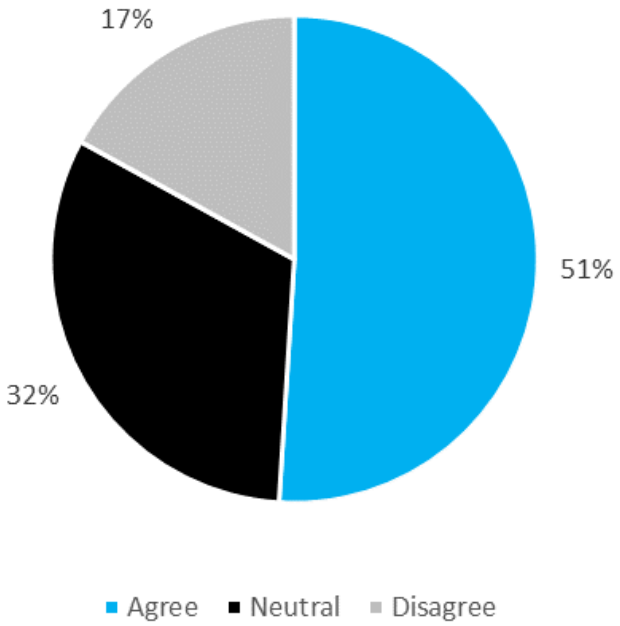
17%
51%
32%
Agree
Neutral
Disagree

"Vince sometimes contradicted what my goals for my breeding operation were."

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"I did not read Vince's suggestions."

"I didn't really use Vince."

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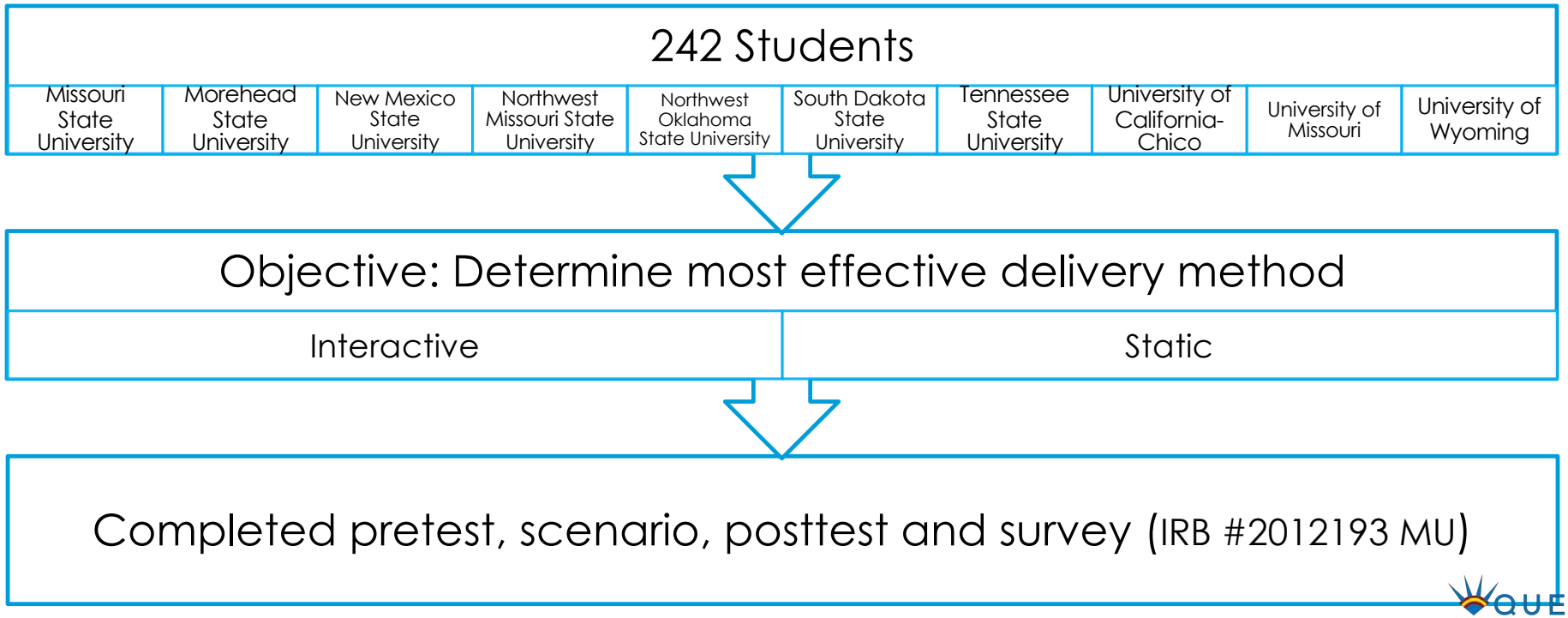
Iteration 4



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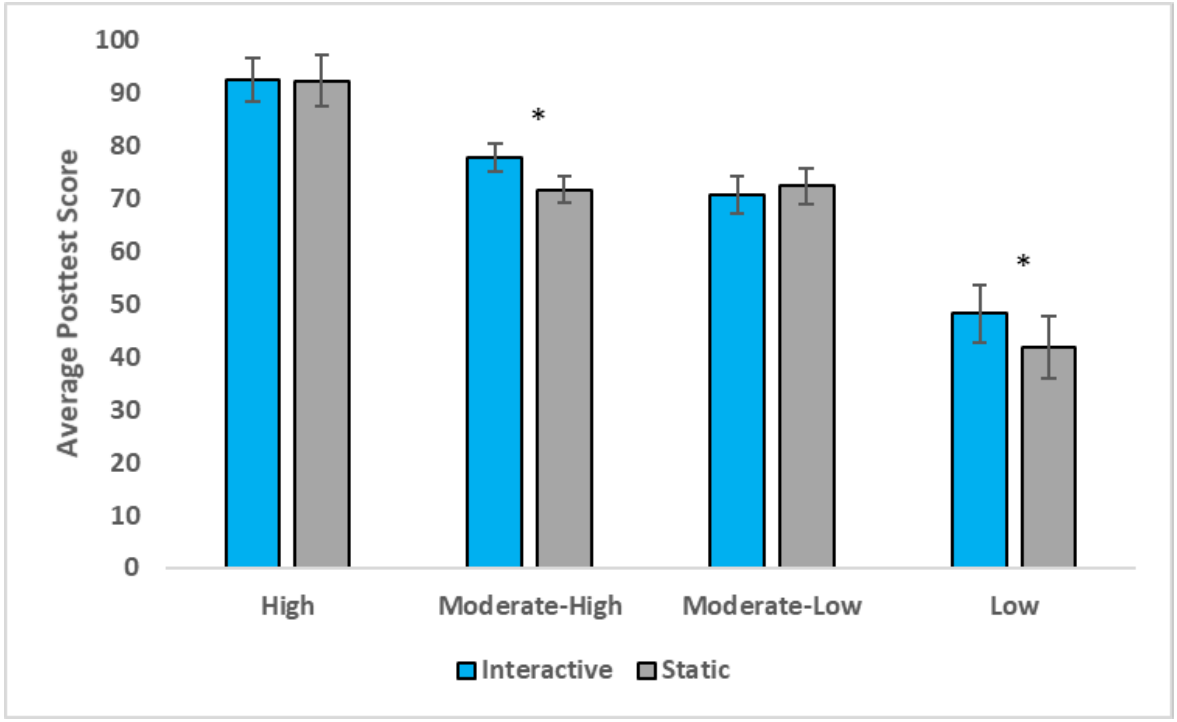
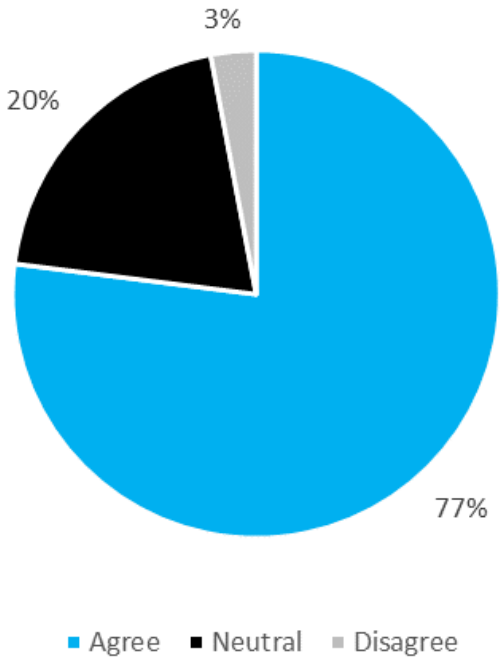

Average Posttest Score
100
90
80
70
60
50
40
30
20
10
0
*
*
High
Moderate-High
Moderate-Low
Low
Interactive
Static


3%
20%
77%
Agree
Neutral
Disagree

"Personally, I liked when he asked me questions as I went along. It really helped me to understand the entire scope of the scenario."

"He pointed out some important things to me that I otherwise may have overlooked."

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"It did help but I probably could have had a little more."

"He needed to have a tad more detail."

"Sometimes I needed more."

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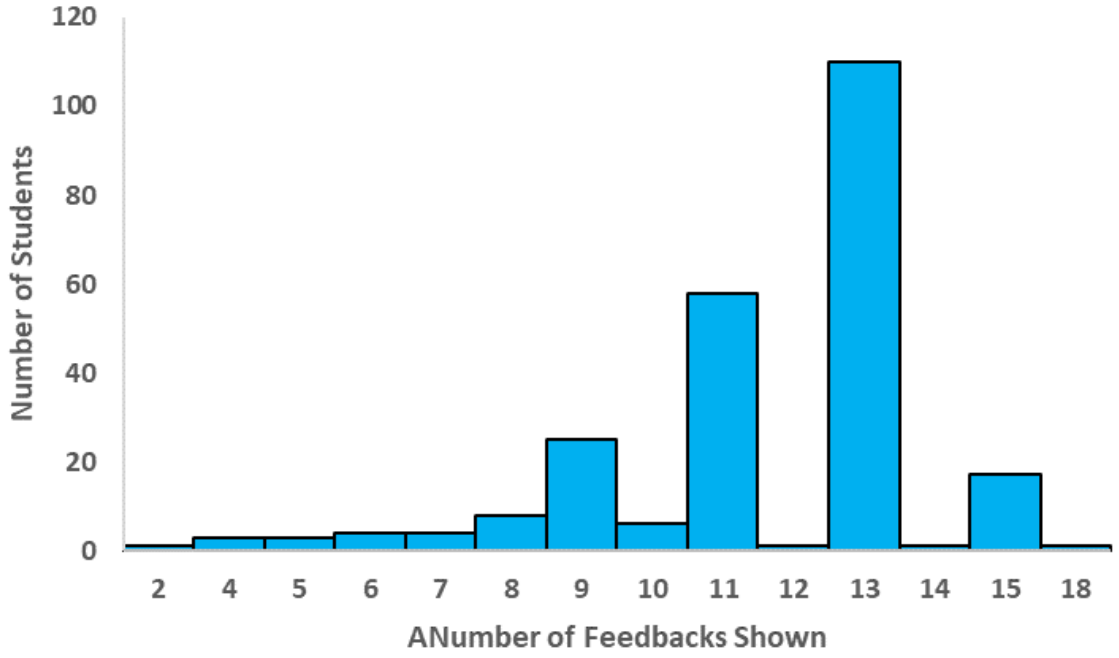
120
100
80
60
40
20
0
Number of Students
2
4
5
6
7
8
9
10
11
12
13
14
15
18
ANumber of Feedbacks Shown

"He would give advice I already knew"

"I didn't really need his help"

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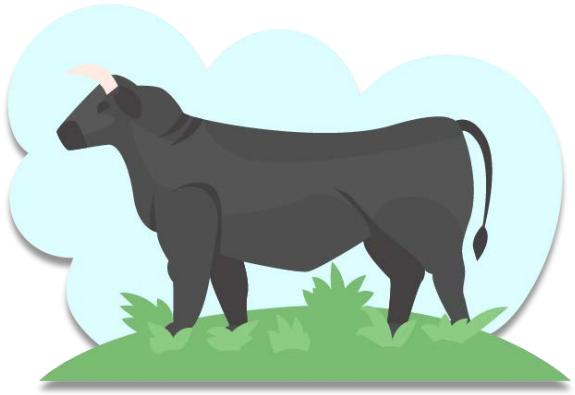
Conclusions



- Feedback is not one-size-fits-all.
- Must consider:
  - Learner characteristics such as prior knowledge
  - Student engagement with feedback
  - Content
  - Timing

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Future Work

- Determine effects of complexity level using interactive feedback
- Students will be randomly assigned to one feedback group:
  - Interactive, Conformational Feedback
  - Interactive, Knowledge of Correct Answer
  - Interactive, Elaborated Feedback
- Will take students ~1 hour to complete study.

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Acknowledgments

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Questions or Comments

- Information about SeeBeefGenetics™ is available at www.seegenetics.com
- Contact me at maria.haag@quetza.org if you would like more information.

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