2021 Virtual HBCU-UP/CREST PI-PD Meeting

Investigating the Integration of Mathematics into Biology by Reciprocal Course Content Exchange: Comparisons on Primary Outcomes

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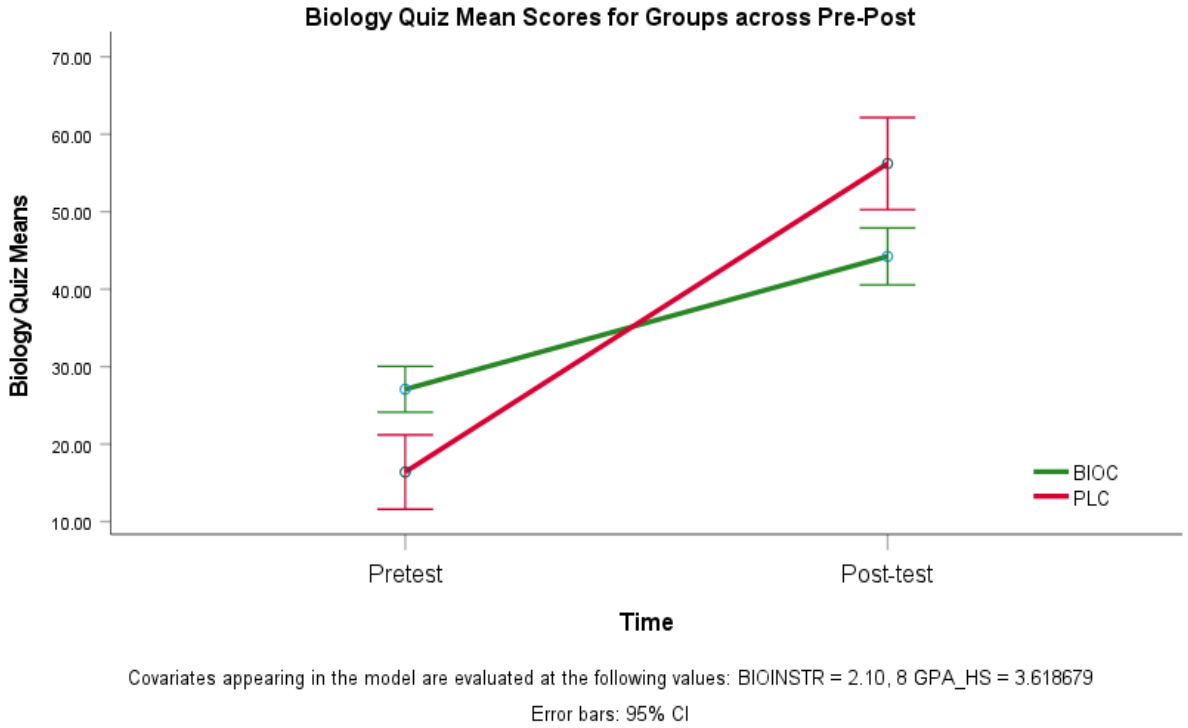
Project Overview

- Fisk University had a 76% attrition rate for biology majors
  - 38% struggles with mathematics
  - 47% failure to connect biology and mathematics concepts.
- Learning Communities (LC) based on Performance Pyramid
  - Peer Leaders
  - Projects that integrated General Biology I and College Algebra
  - Monitoring and support
- Pre-post Quasi-experimental design
  - Separate cumulative Biology and Mathematics quizzes
  - LC vs. Biology Control
  - LC vs. Mathematics Control

Best Practices/Successes

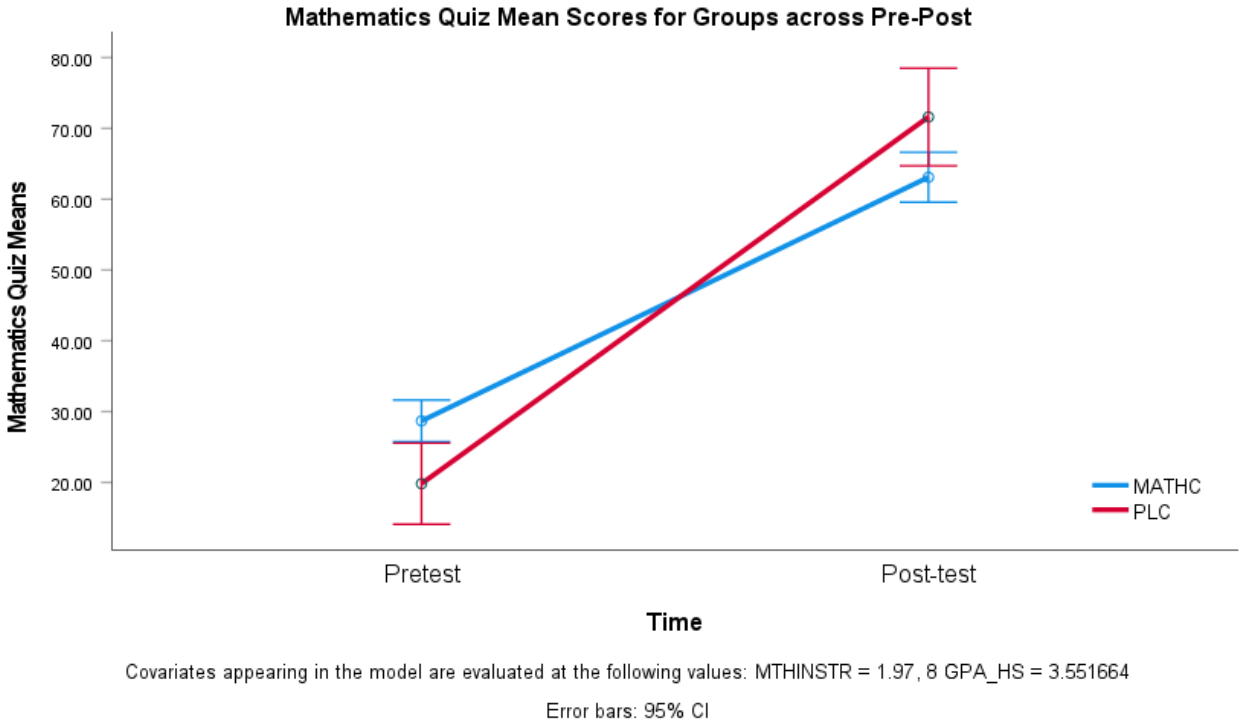
LC vs. Biology Control

- Mixed ANCOVA Controlling for Instructor and H.S. GPA
- $F(1, 131) = 28.38$, $p < .001$, $\eta_p^2 = .18$



LC vs. Mathematics Control

- Mixed ANCOVA Controlling for Instructor and H.S. GPA
- $F(1, 143) = 17.95$, $p < .001$, $\eta_p^2 = .11$



Implications

- LC participants
  - Higher biology post-test scores
  - Greater growth in biology and mathematics
- Theory-based Approach
  - Alignment of curriculum
  - Extracurricular projects + Supports

Learning Community Activities and Corresponding Performance Pyramid Elements.

Procedure	Performance Pyramid Element
Project Week 1	
Check use of Course Performance Logs	Performance Capability/Expectations and Feedback
Team building exercise	Performance Capability
Review places to study/complete work	Performance Capability
Review Biology/Mathematics Key Concepts	Knowledge and Skills
Connect Biology/Mathematics Key Concepts	Knowledge and Skills
Expectations/Syllabus Review & Goal setting for up-coming course requirements	Expectations and Feedback
Project Week 2	
Check use of Course Performance Logs	Performance Capability/Expectations and Feedback
Applied Biology Group Project	Knowledge and Skills
Academic/Social/Cognitive Skill Topic	Knowledge and Skills
Expectations/Syllabus Review & Goal setting for up-coming course requirements	Expectations and Feedback
Check-in questionnaire	Motivation, Values and Self-efficacy
Adjunct Activities	
Weekly Project Evaluation	Rewards, Recognition and Incentives
Attendance Tracking	Rewards, Recognition and Incentives
Informational Resources	Tools, Environment and Processes
Meeting Room	Tools, Environment and Processes
PPL leader-Faculty meeting	Tools, Environment and Processes

Limitations and Future Directions

Limitations

- Two corresponding courses
- One university
- Assessment of student needs

Future Directions

- LC throughout program
- Multisite coordination
- Adjust to student needs