



ONLINE COURSE DESIGN, QUALITY MATTERS TRAINING, and Student Outcomes: Where Are We Now?

Promoting Continuous Improvement in an
Online Biology Course via Quality Research

RACHEAL BROOKS, PH.D.

Director

Office of e-Learning

North Carolina Central University

GAIL HOLLOWELL, PH.D.

Associate Professor

Biological and Biomedical Sciences

North Carolina Central University



NC Central
UNIVERSITY

Office of E-Learning

A Title III Activity

OBJECTIVES

1

Examine 2017 research on online course design, Quality Matters training, and student outcomes.

2

Identify subsequent updates made to the course, discipline, and departmental and institutional strategic goals.

3

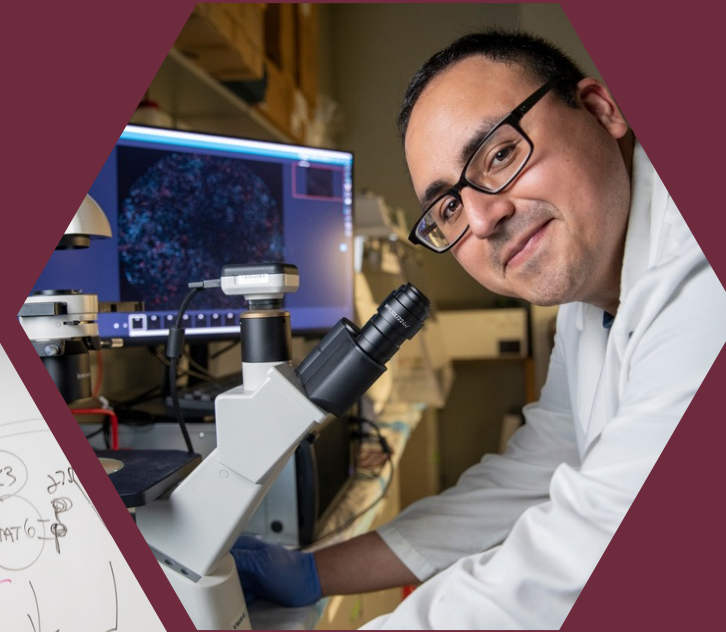
Discuss the impact of transitions across the Fifth, Sixth, and Seventh Editions of the Quality Matters Higher Education Rubric on training and course design.

4

Collaboratively explore potential considerations for future research.

- U.S. Secretary of Education Arne Duncan
Changing the HBCU Narrative: From
Corrective Action to Creative Investment

“[S]tudent populations with high dropout rates, especially minority students, will have to exponentially increase their college graduation rates...[Therefore,] HBCUs will—and must—play a critical leadership role in meeting this challenge.”



CONSIDERATIONS REGARDING ONLINE STEM EDUCATION



- Major deficit in number of online STEM courses versus the humanities
- Higher attrition rates due to transactional distance and technology problems due to:
 - Students' inability to "catch up"
 - Lack of meaningful and frequent learner-instructor interactions
- Proper use of technology plays an important role in successful online experiences
- Professional preparation of faculty to design and deliver online courses is paramount

ONLINE STEM EDUCATION AT NCCU

- Increased course enrollment despite limited space
- 60% increase in online course offerings from 2011 to 2016
 - STEM course offerings account for 7% of this amount
- NCCU General Education Curriculum (GEC) requirements:
 - 1 mathematics course
 - 2 science courses
- 3 out of 5 mathematics GEC courses offered online
- 10 out of 17 science GEC courses offered online

NCCU STEM FACULTY Quality Matters Training

- Beginning in 2014, NCCU participated in the Preparing Critical Future Faculty program
 - Funded by the National Science Foundation's Historically Black Colleges and Universities-Undergraduate Program (HBCU-UP)
- Led by 2 STEM faculty and in partnership with Division of Extended Studies
- 10-faculty member cohort participated in a professional development workshop series
 - Biology, Chemistry, Environmental Science, Mathematics, and Physics
 - Faculty completed the Applying the Quality Matters Rubric (APPQMR) workshop
 - Utilized lessons learned to revise online courses

QUALITY MATTERS RUBRIC UTILIZED FOR THE STUDY

- At the time the research was conducted, the Quality Matters Program employed the QM Higher Education Fifth Edition Rubric
 - 8 General Standards
 - 43 Specific Review Standards
 - 99 Points
- Applying the QM Rubric Workshop and additional Office of e-Learning support were based on the Fifth Edition of the QM Higher Education Rubric



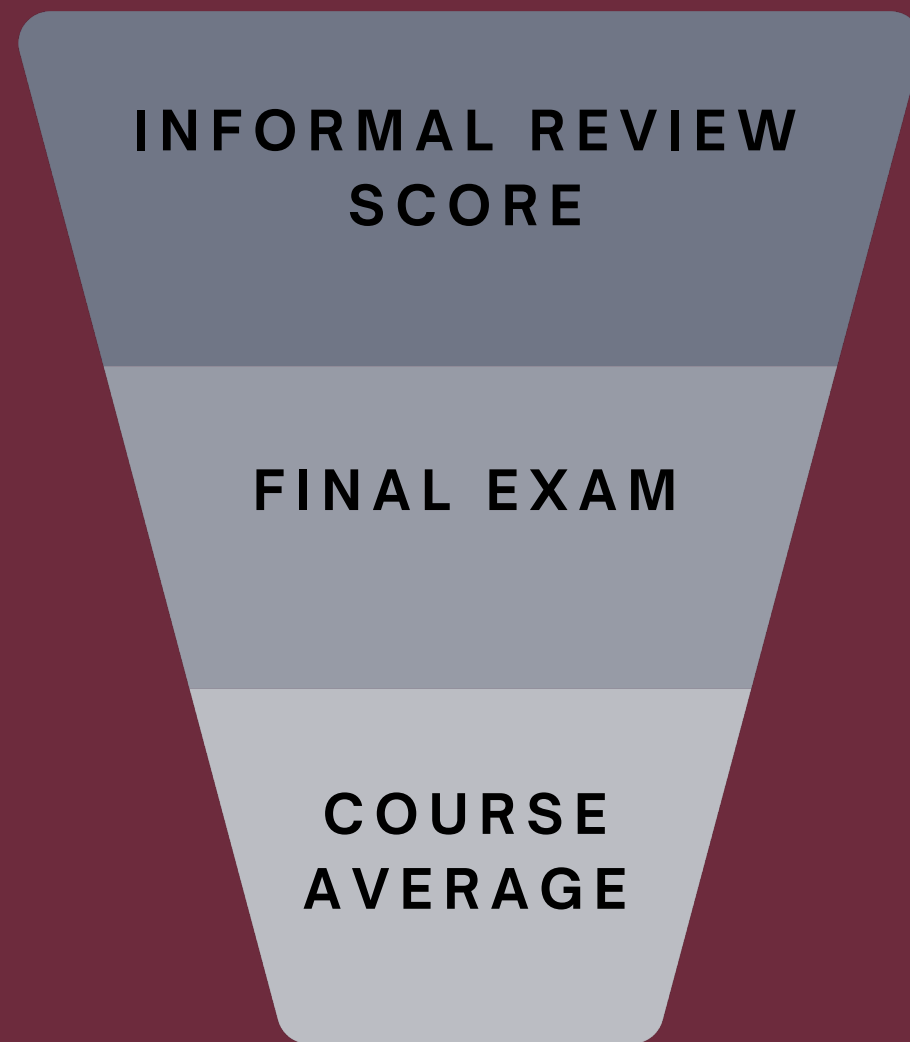
For more information visit www.qualitymatters.org or email info@qualitymatters.org

Quality Matters™ Rubric Standards
Fifth Edition, 2014, with Assigned Point Values

Standards	Points
Course Overview and Introduction	
1.1 Instructions make clear how to get started and where to find various course components.	3
1.2 Learners are introduced to the purpose and structure of the course.	3
1.3 Etiquette expectations (sometimes called "netiquette") for online discussions, email, and other forms of communication are clearly stated.	2
1.4 Course and/or institutional policies with which the learner is expected to comply are clearly stated, or a link to current policies is provided.	2
1.5 Minimum technology requirements are clearly stated and instructions for use provided.	2
1.6 Prerequisite knowledge in the discipline and/or any required competencies are clearly stated.	1
1.7 Minimum technical skills expected of the learner are clearly stated.	1
1.8 The self-introduction by the instructor is appropriate and is available online.	1
1.9 Learners are asked to introduce themselves to the class.	1
Learning Objectives (Competencies)	
2.1 The course learning objectives, or course/program competencies, describe outcomes that are measurable.	3
2.2 The module/unit learning objectives or competencies describe outcomes that are measurable and consistent with the course-level objectives or competencies.	3
2.3 All learning objectives or competencies are stated clearly and written from the learner's perspective.	3
2.4 The relationship between learning objectives or competencies and course activities is clearly stated.	3
2.5 The learning objectives or competencies are suited to the level of the course.	3
Assessment and Measurement	
3.1 The assessments measure the stated learning objectives or competencies.	3
3.2 The course grading policy is stated clearly.	3
3.3 Specific and descriptive criteria are provided for the evaluation of learners' work and are tied to the course grading policy.	3
3.4 The assessment instruments selected are sequenced, varied, and suited to the learner work being assessed.	2
3.5 The course provides learners with multiple opportunities to track their learning progress.	2
Instructional Materials	
4.1 The instructional materials contribute to the achievement of the stated course and module/unit learning objectives or competencies.	3
4.2 Both the purpose of instructional materials and how the materials are to be used for learning activities are clearly explained.	3
4.3 All instructional materials used in the course are appropriately cited.	2
4.4 The instructional materials are current.	2
4.5 A variety of instructional materials is used in the course.	2
4.6 The distinction between required and optional materials is clearly explained.	1
Learner Activities and Learner Interaction	
5.1 The learning activities promote the achievement of the stated learning objectives or competencies.	3
5.2 Learning activities provide opportunities for interaction that support active learning.	3
5.3 The instructor's plan for classroom response time and feedback on assignments is clearly stated.	3
5.4 The requirements for learner interaction are clearly stated.	2
Course Technology	
6.1 The tools used in the course support the learning objectives and competencies.	3
6.2 Course tools promote learner engagement and active learning.	3
6.3 Technologies required in the course are readily obtainable.	2
6.4 The course technologies are current.	1
6.5 Links are provided to privacy policies for all external tools required in the course.	1
Learner Support	
7.1 The course instructions articulate or link to a clear description of the technical support offered and how to obtain it.	3
7.2 Course instructions articulate or link to the institution's accessibility policies and services.	3
7.3 Course instructions articulate or link to an explanation of how the institution's academic support services and resources can help learners succeed in the course and how learners can obtain them.	2
7.4 Course instructions articulate or link to an explanation of how the institution's student services and resources can help learners succeed and how learners can obtain them.	1
Accessibility and Usability	
8.1 Course navigation facilitates ease of use.	3
8.2 Information is provided about the accessibility of all technologies required in the course.	3
8.3 The course provides alternative means of access to course materials in formats that meet the needs of diverse learners.	2
8.4 The course design facilitates readability.	2
8.5 Course multimedia facilitate ease of use.	2

METHODOLOGY

Online Introductory Biology Course



Post-QM training data produced higher values
for these variables

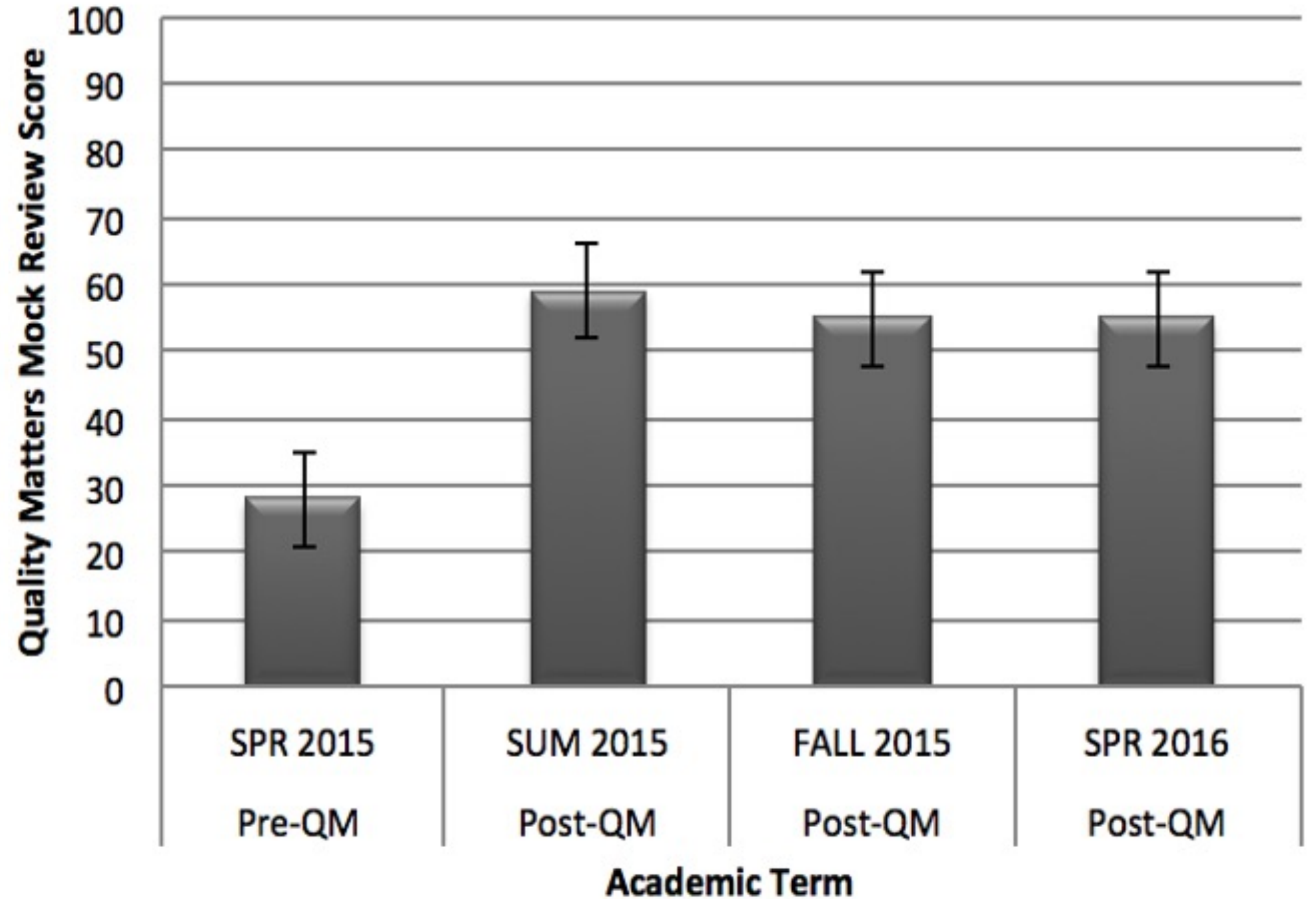
Quality Matters Training Highlights

- Online biology course taught by single instructor
- Completion of Applying the QM Rubric workshop in Spring 2015
- Informal QM Review of six sections taught before and after training
 - Spring 2015 – 1 section
 - Summer 2015 – 3 sections
 - Fall 2015 – 1 section
 - Spring 2016 – 1 section
- Set of 101 cases

METHODOLOGY

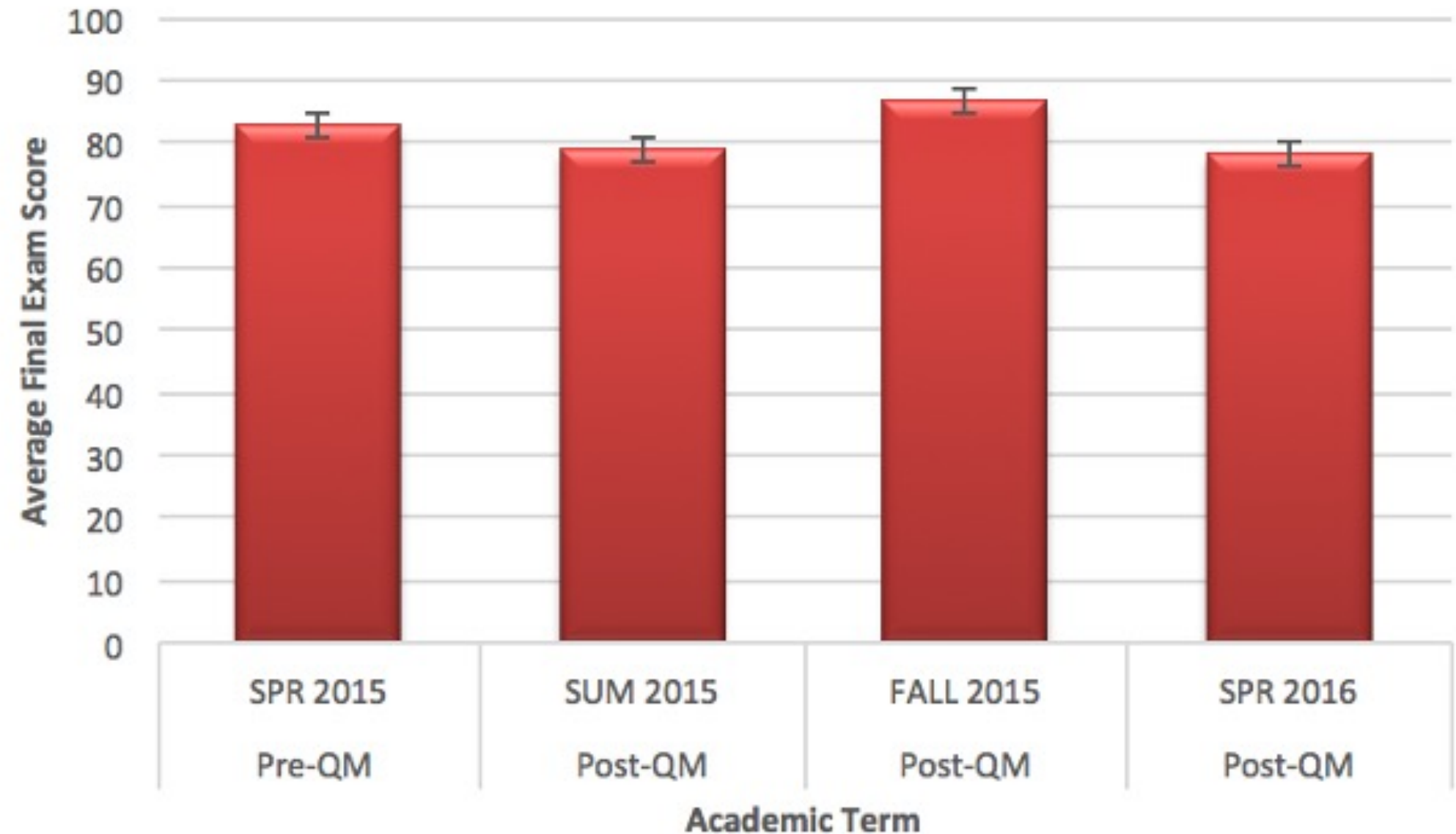
- Instructor was 1 of 10 members of faculty learning community
- Made revisions during term immediately following training
- Revisions related to:
 - Blackboard content
 - Course shell
 - Overall course layout
 - Student learning styles
- Course not initially designed or modified for an official Quality Matter Peer Review
- Instructor applied lessons learned from APPQMR to enhance learning experience
- Quality Matters informal review scores were **significantly correlated** with final exam performance and overall course averages

QUALITY MATTERS INFORMAL REVIEW SCORES BY TERM



BIOLOGY FINAL EXAM PERFORMANCE BY TERM: PRE AND POST QM TRAINING

Hypothesis: Students would earn higher scores on final exam post QM training

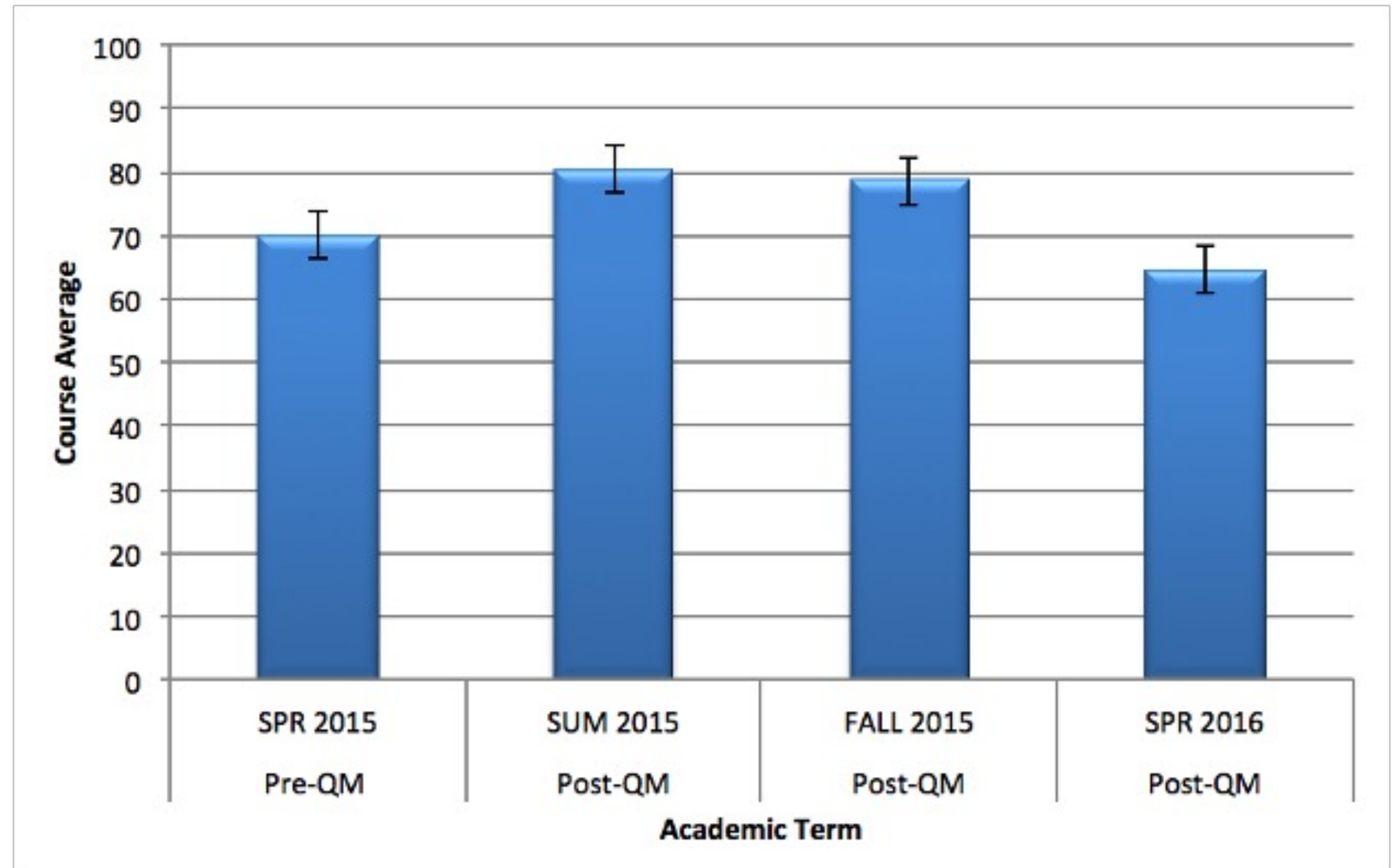


Pre QM Training final exam scores ($M = 82.65$, $SD = 6.95$) increased in semesters post QM Training ($M = 86.24$, $SD = 7.86$), $t(99) = 0.124$, $p = .015$, two-tailed.



OVERALL COURSE AVERAGES BY TERM: PRE AND POST QM TRAINING

Hypothesis: Students would earn higher course averages post QM training



Pre QM Training course averages ($M = 77.75$, $SD = 10.14$) increased in semesters post QM Training ($M = 82.71$, $SD = 9.16$), $t(99) = 0.175$, $p = .008$, two-tailed.



STUDENT RATING OF INSTRUCTION

Average ratings **increased** immediately following training in the following areas:

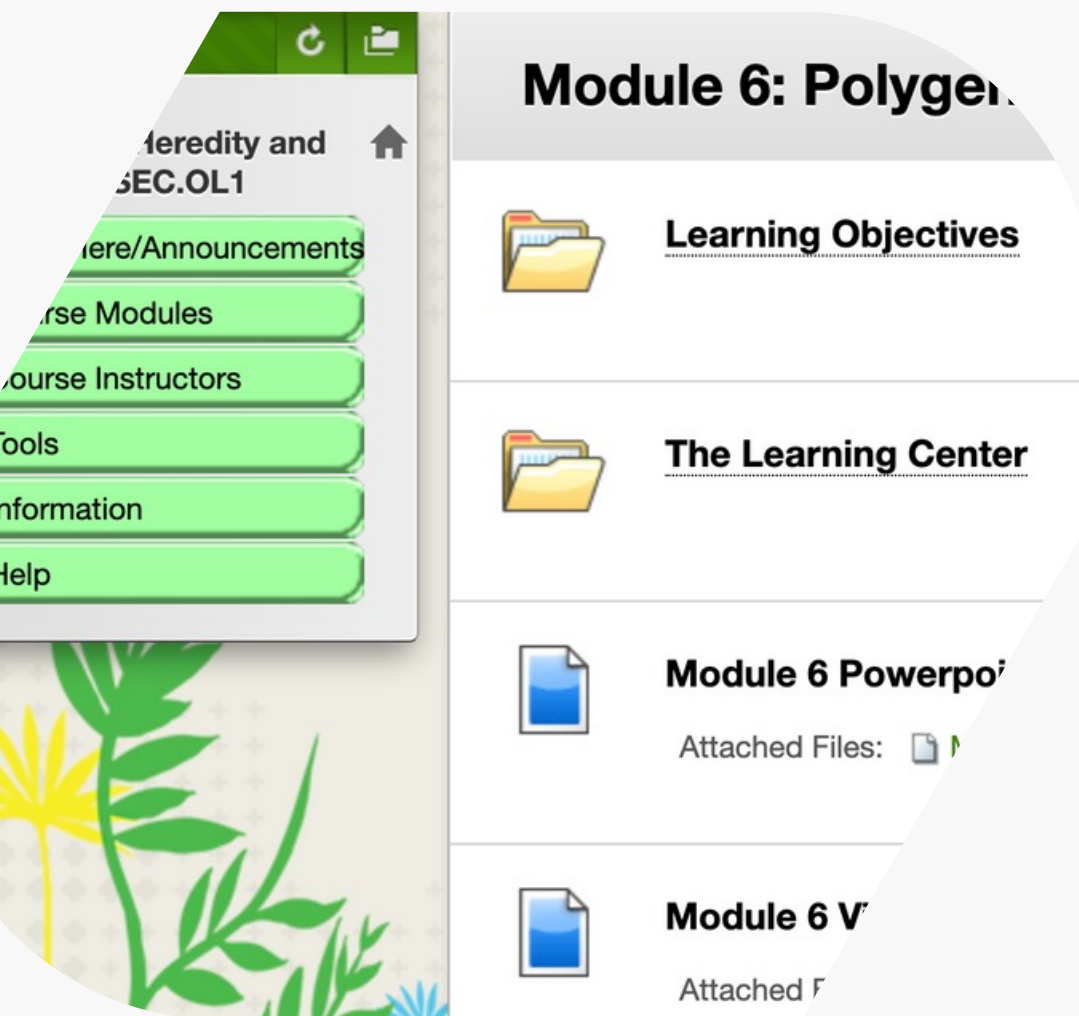
SRI Category	Related QM Fifth Edition Standards
Alignment of course goals and objectives with instruction	<ul style="list-style-type: none">• Course purpose and structure (1.2)• Alignment of assessments (3.1) instructional materials (4.1) learning activities (5.1), and course technologies (6.1)
Presentation of subject matter	<ul style="list-style-type: none">• Purpose of instructional materials (4.2)• Requirements for learner interaction (5.4)• Alternative means of access (8.3)
Organization of subject matter	<ul style="list-style-type: none">• Facility of course navigation and design (8.1)
Enhancement of ability to think, criticize, and create	<ul style="list-style-type: none">• Link between objectives and learning activities (2.4)• Appropriate objectives for course level (2.5)

STUDENT RATING OF INSTRUCTION

Average ratings **also increased** immediately following training in the following areas:

SRI Category	Related QM Fifth Edition Standards
Assignment of helpful tests and course readings	<ul style="list-style-type: none">• Alignment of assessments (3.1) and instructional materials (4.1) with learning objectives
Use of instructional approaches that effectively enhance learning	<ul style="list-style-type: none">• Use of various instructional materials (4.5)• Opportunities that support active learning (5.2)• Tools promote learner engagement and active learning (6.2)
Use of instructional approaches that effectively enhance learning	<ul style="list-style-type: none">• Alignment of assessments with learning objectives (3.1)
Provision of assessments that are provided frequently enough to help evaluate student progress	<ul style="list-style-type: none">• Multiple opportunities for learners to track progress (3.5)

FALL 2015 REVERSION



The Informal QM Review score lowered slightly, and the following trends were also observed:

- Course no longer "Met" 4 Specific Review Standards:
 - **Omission** of required technical skills (SRS 1.7)
 - **No denotation** of **required** or **optional** instructional materials (SRS 4.6)
 - **No identified alignment** between at least 85% of instructional materials and learning objectives (4.1)
 - **No identified alignment** between at least 85% of learning activities and stated learning objectives (5.1)

CHARTING A NEW LANDSCAPE FOR STUDENT-CENTERED SUCCESS

Updates to course and online offerings in BIO since 2017	What does this mean for the department and students?
<ul style="list-style-type: none">• Same instructor continue to teachings• Course template is being used as the model for BIO other courses• Introductory courses for non-majors (i.e., other sections of BIOL 1000, BIOL 1100)	<ul style="list-style-type: none">• More flexibility with course offerings• Broader reach to student population



NEXT STEPS FOR OUR RESEARCH

General observations that contribute to plans for future research

- The Quality Matters Higher Education Rubric and associated professional development has changed
 - This research was based on the Fifth Edition of the HE Rubric
 - The Sixth Edition was released in 2018
 - The Seventh Edition will be released in July 2023

University is migrating LMSs

- Update IRB
- Download course content prior to June 30, 2023 to have access to data for course review



FUTURE DIRECTIONS

We invite you to contribute to this work!

How might we do this differently?

What are other areas of focus to consider?



FUNDING SUPPORT

This project was generously supported by the National Science Foundation HBCU-UP Program (NSF ID 1235727).

Any opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

CONTACT US FOR ADDITIONAL INFORMATION

Dr. Racheal Brooks

Director, Office of e-Learning
rmbrooks@nccu.edu

Dr. Gail P. Hollowell

Associate Professor, Biological and Biomedical Sciences
ghollowell@nccu.edu

Dr. Yolanda B. Anderson

Office of the Provost and Associate Vice Chancellor for
Faculty Development and Resources
yandersn@nccu.edu

THANK YOU!