

Increased class structure  
improves  
short and long term  
learning

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*(with one caveat)*

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UC STEM LEC Meeting-*Part deux*  
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# The Caveat

Data NOT normalized for GPA/SAT

Don't *think* it matters (class size, averages, etc.)

# Background

“Active learning” - **good**

High “structure” - **good**

- Pre-lecture reading
- Online quizzes
- Online homework
- Multiple exams
- In-class activities (not just lecture)

Longitudinal effects?

# Biochemistry & Molecular biology at UCI

Traditional lecture course, low “structure”

Large enrollment

Three sections run once a year

Each section taught by 2-3 faculty, little coordination

One mid-term, one final (not cumulative)

Course “works”

# The challenge

“Improve” the courses

“Standardize” the courses

# “Improve” the course

Increase learning

Increase retention of concepts

Increase engagement

Increase retention of students

Use active learning, and high structure

# “Improve” the course - Changes

## Low structure sections

Mostly lecture, 2-3 instructors

No pre-reading

No homework

DS - Worksheets

DS – TA lecture

1 midterm, 1 Final (nc)

“Knowledge” questions

## High structure sections

Class activities, 1 instructor

Pre-reading, quizzes

Weekly homework

DS - Problems

DS – Groupwork

3 midterms, 1 Final (c)

“Understanding” questions

# Winter and Spring 2013 – First implementation

First implementation – few hiccups, some errors

Designed course specific assessment

Multiple choice, Scantron questions

Administered in Discussion section, week 10

No prep, insignificant points for completion



# A note about the data

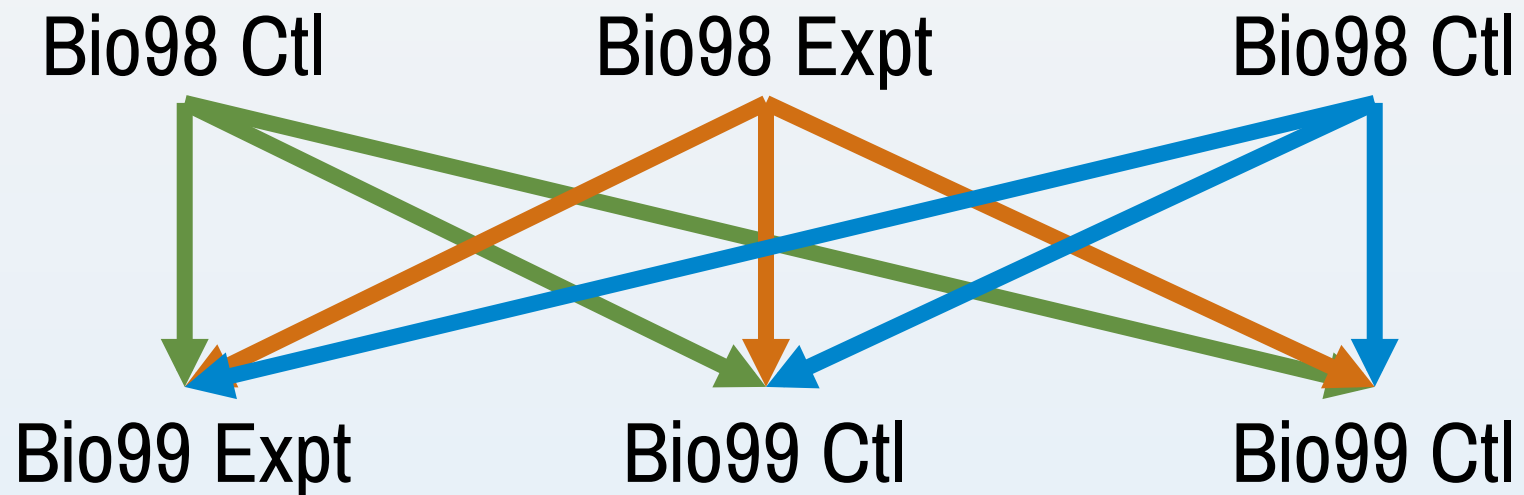
Bio98 = Biochemistry

Bio99 = Molecular biology

Bio98/Biochem in Winter

Bio99/Mol bio in Spring

# A note about longitudinal study

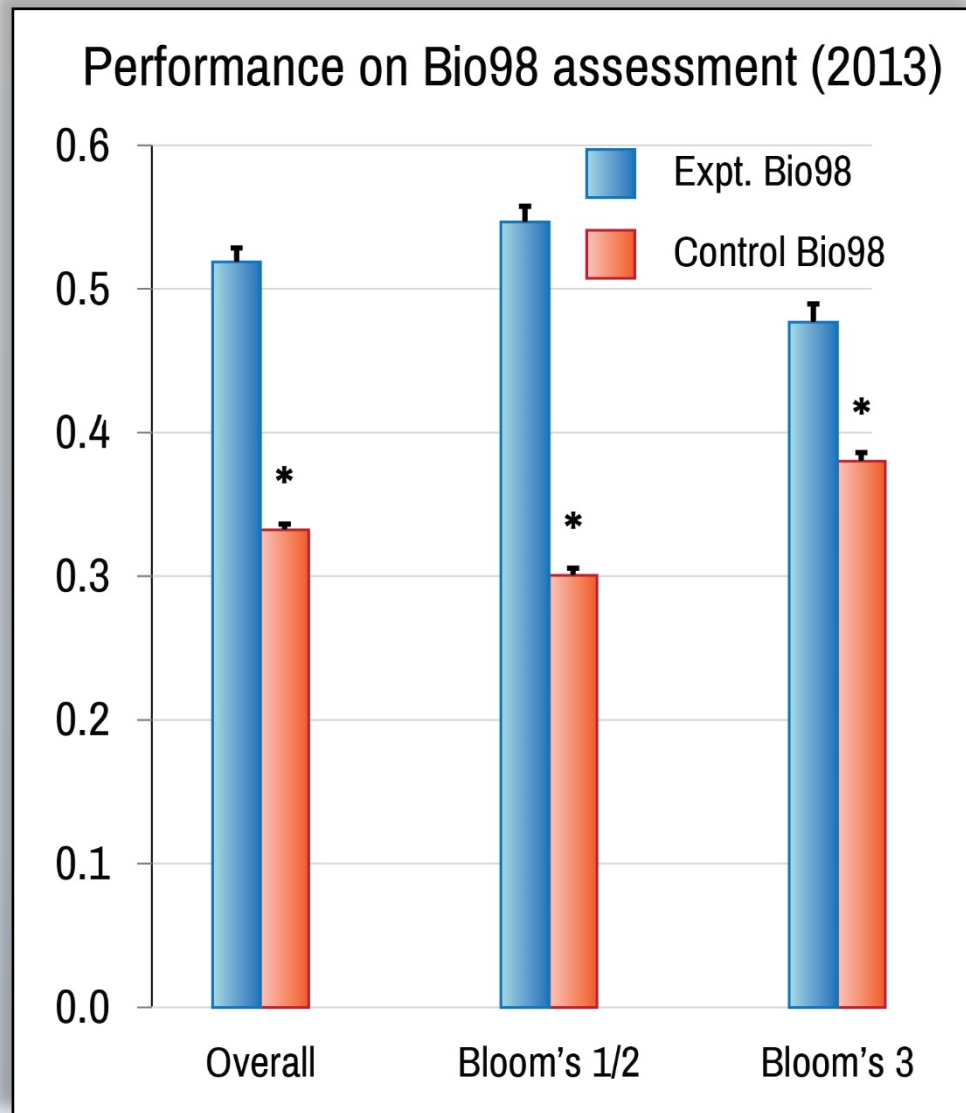


Expt Bio98 students in Bio99?

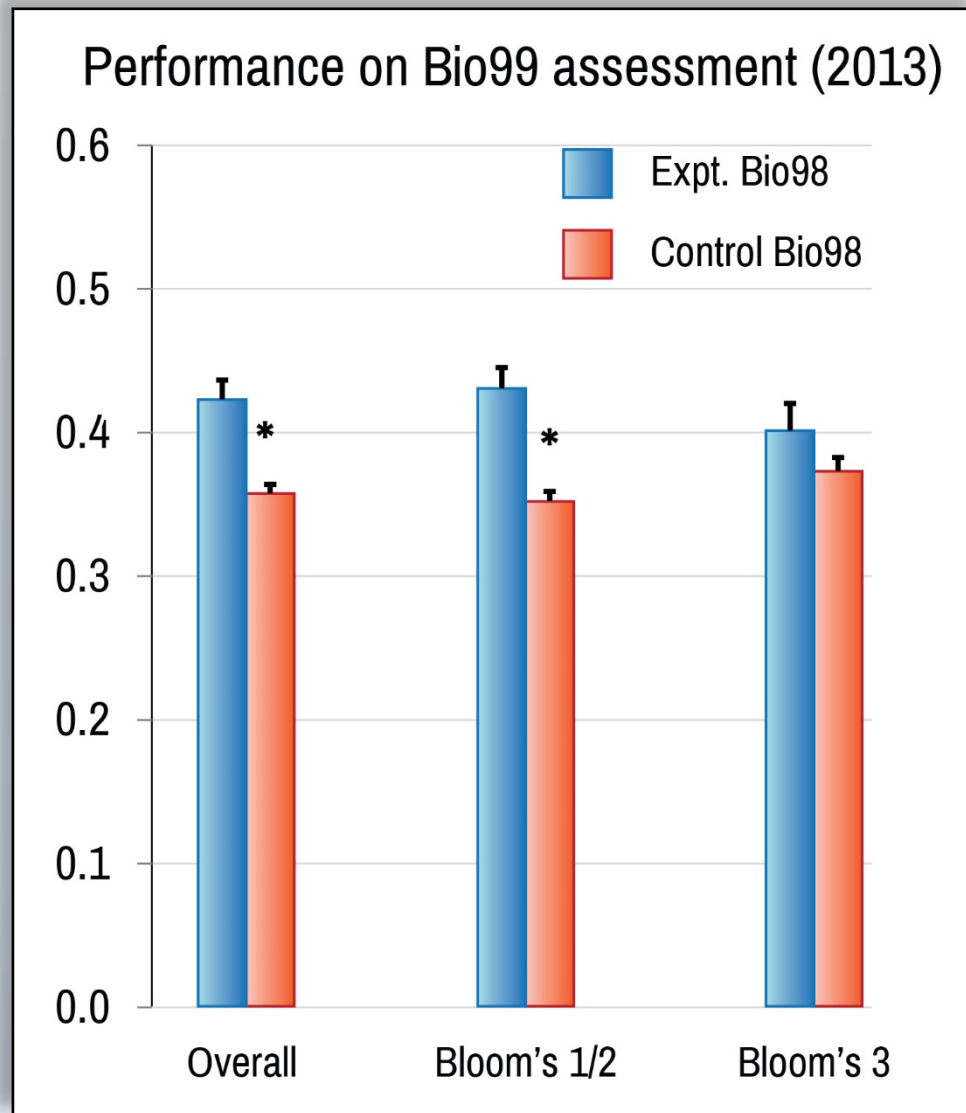
Expt Bio99?

**Does it work?**

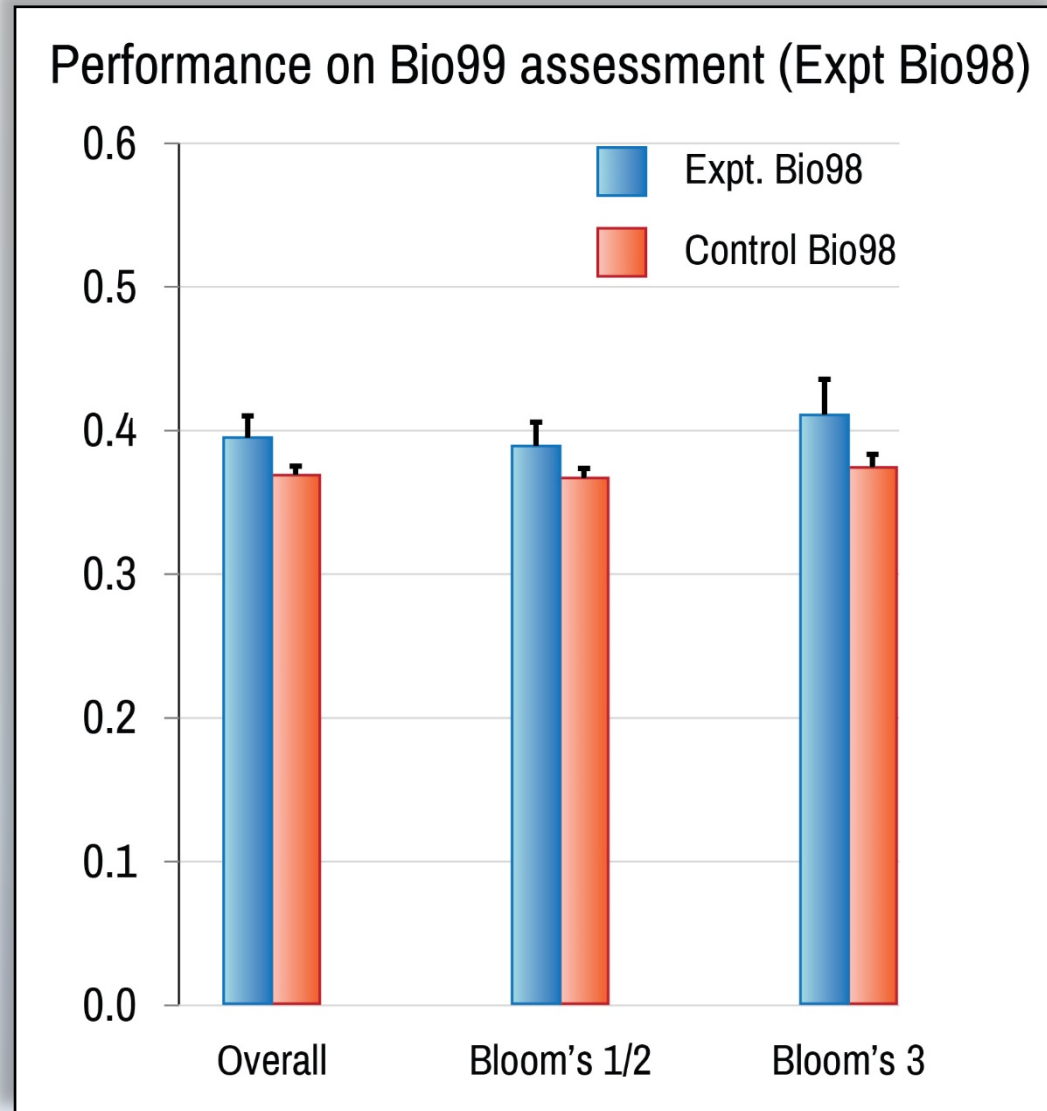
# Winter and Spring 2013 – First implementation



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# Winter and Spring 2013 – First implementation

Lessons learned

If you don't grade it, they won't do it

Discussion sections – TA training

More practice at higher order problems (homework)

## Winter and Spring 2014 – Second implementation

Didn't measure performance in Bio98

Other sections implemented *some* aspects

Final assessment in Molecular Biology class

Final assessment = Biochem + Molecular biology

Final assessment Mol bio questions = common

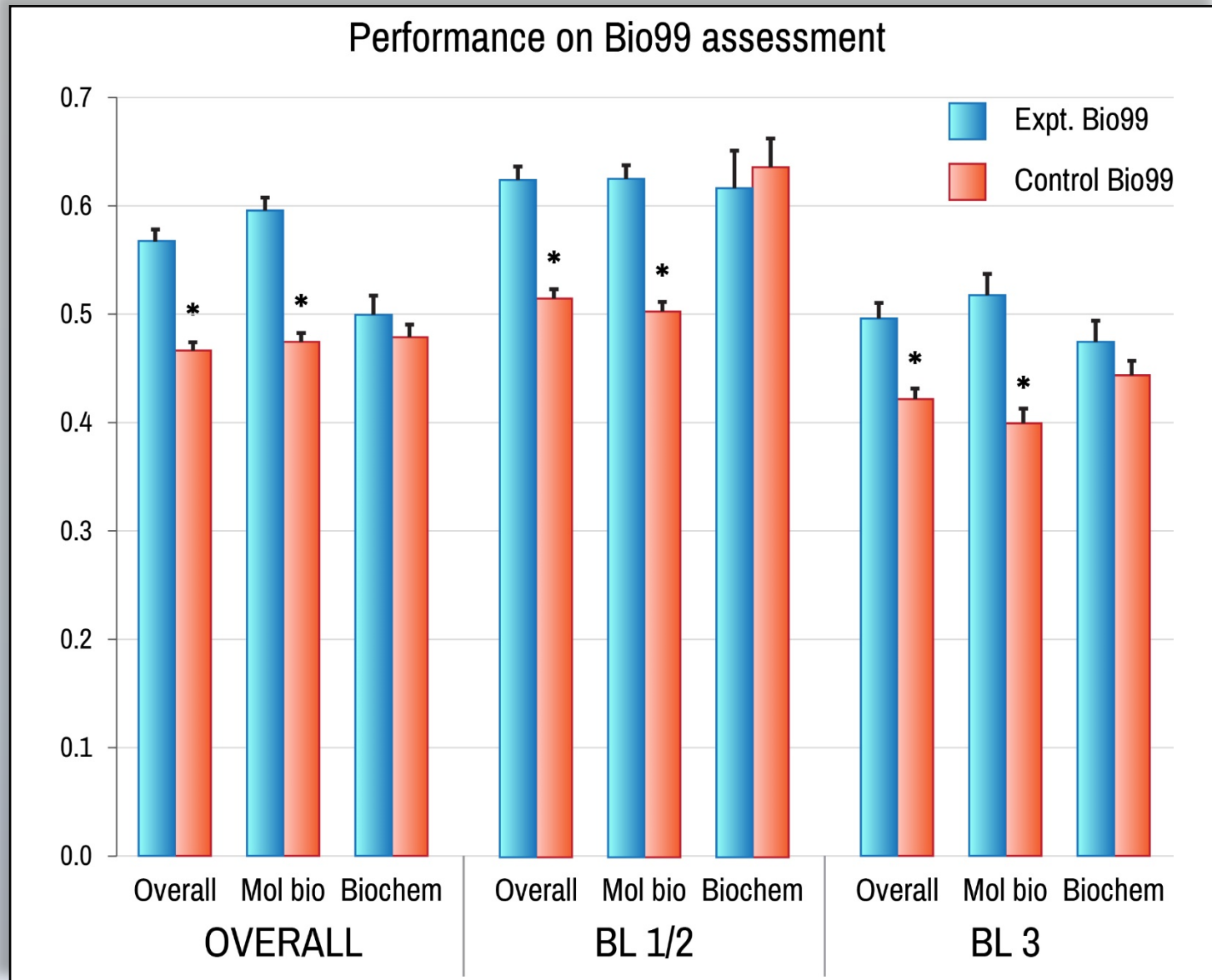


**Better structure/design**

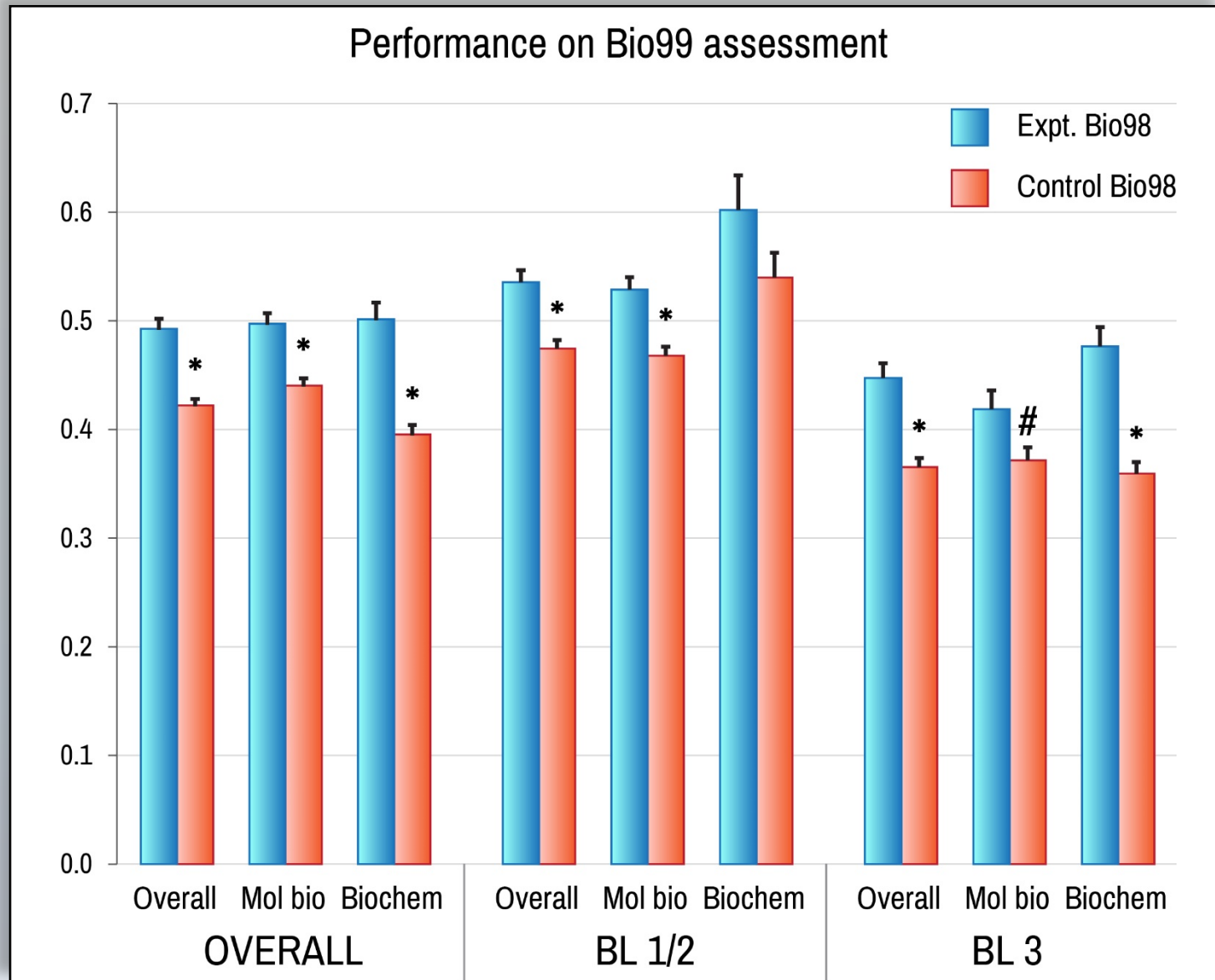
**=**

**Better outcomes?**

# Winter and Spring 2014 – Second implementation

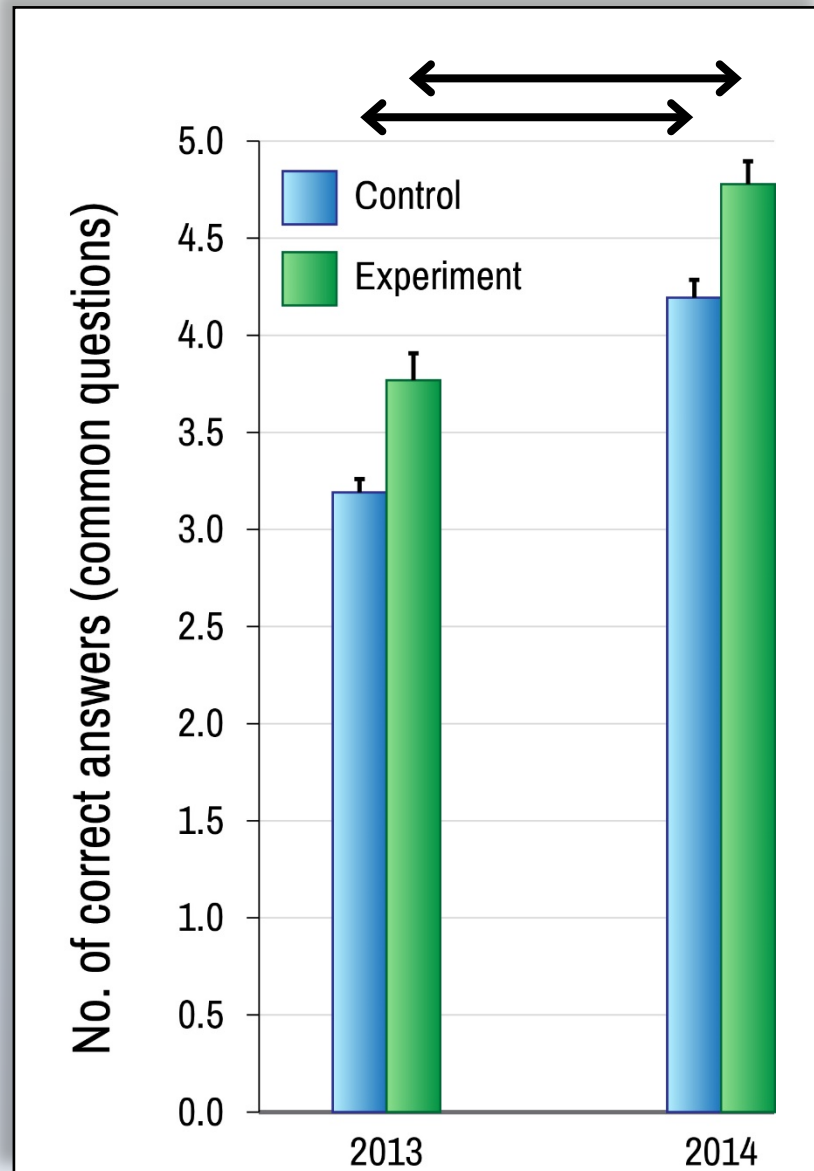


# Winter and Spring 2014 – Second implementation



**Was it just me**  
**(*not* structure)?**

# First VS Second implementation



# Summary

Increased structure -> Increased learning

Increased structure -> Longitudinal gains

Increased structure requires **more** work!

More work -> Barrier to implementation

Improve course? Increase adoption?