

# Pedagogical Best Practices: The Power of Quizzing

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The National Center for Academic Transformation

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# REDESIGN OF INTRODUCTORY PSYCHOLOGY

**Intro Psych 105 is the largest of UNM's 20 "killer" courses for lower division undergraduate students.**

**Before the redesign, the drop, withdrawal, failure rate was 42%.**

# REDESIGN OF INTRODUCTORY PSYCHOLOGY Problem

While maintaining or exceeding standards ...

- Improve grades (but without grade inflation)
- Use merit system (no curving)
- Comprehensive coverage (all of textbook)
- Achieve consistency across sections
- Increase student time on task

# REDESIGN OF INTRODUCTORY PSYCHOLOGY

## Solution: Lots of WebCT Quizzes

Quizzes Required

3,000 Question Pool

3 Quizzes per week

20 Questions per quiz

Each Quiz different

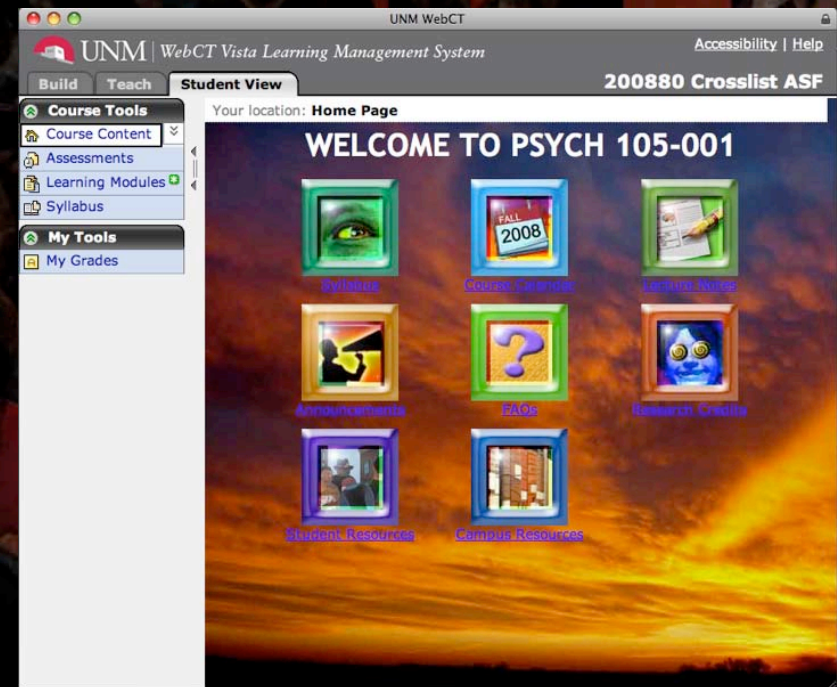
Timed & Deadlines

Unlimited repeats

Highest score counts

1 Point per question

1 Exam per week



# REDESIGN OF INTRODUCTORY PSYCHOLOGY

## Instructions to Students

Quizzes are **not** just a way to review or to test yourself.

Quizzes are an important way to **learn** the material in the first place.

UNM WebCT  
UNM | WebCT Vista Learning Management System  
Accessibility | Help  
200880 Crosslist ASF  
Student View  
Your location: Home Page  
WELCOME TO PSYCH 105-001  
Syllabus  
Course Calendar  
Lecture Notes  
Announcements  
FAQs  
Research Credits  
Student Resources  
Campus Resources

# Quiz Resistance

*"It's weird to use a quiz to study."*

*"You don't take a quiz to study, you study first and then you take a quiz!"*

*Traditionally, what does it mean to study?*

*Traditionally, what does it mean to study?*

- Attend Lectures
  - Read Textbook
  - Review Notes
- But . . .***

- How do you know what's important?
- How do you know you'll remember it?

*What should it mean to study?*

Active  
Learning  
+  
Practice



# REDESIGN OF INTRODUCTORY PSYCHOLOGY

## Results

# Do Quizzes Matter?

Students who do well on exams typically:

- Take quizzes many times (5-15x)
- Get perfect or near perfect scores
- Complete later quizzes in a set in under 5 min

# Do Quizzes Matter?

Fall 2005: Correlations

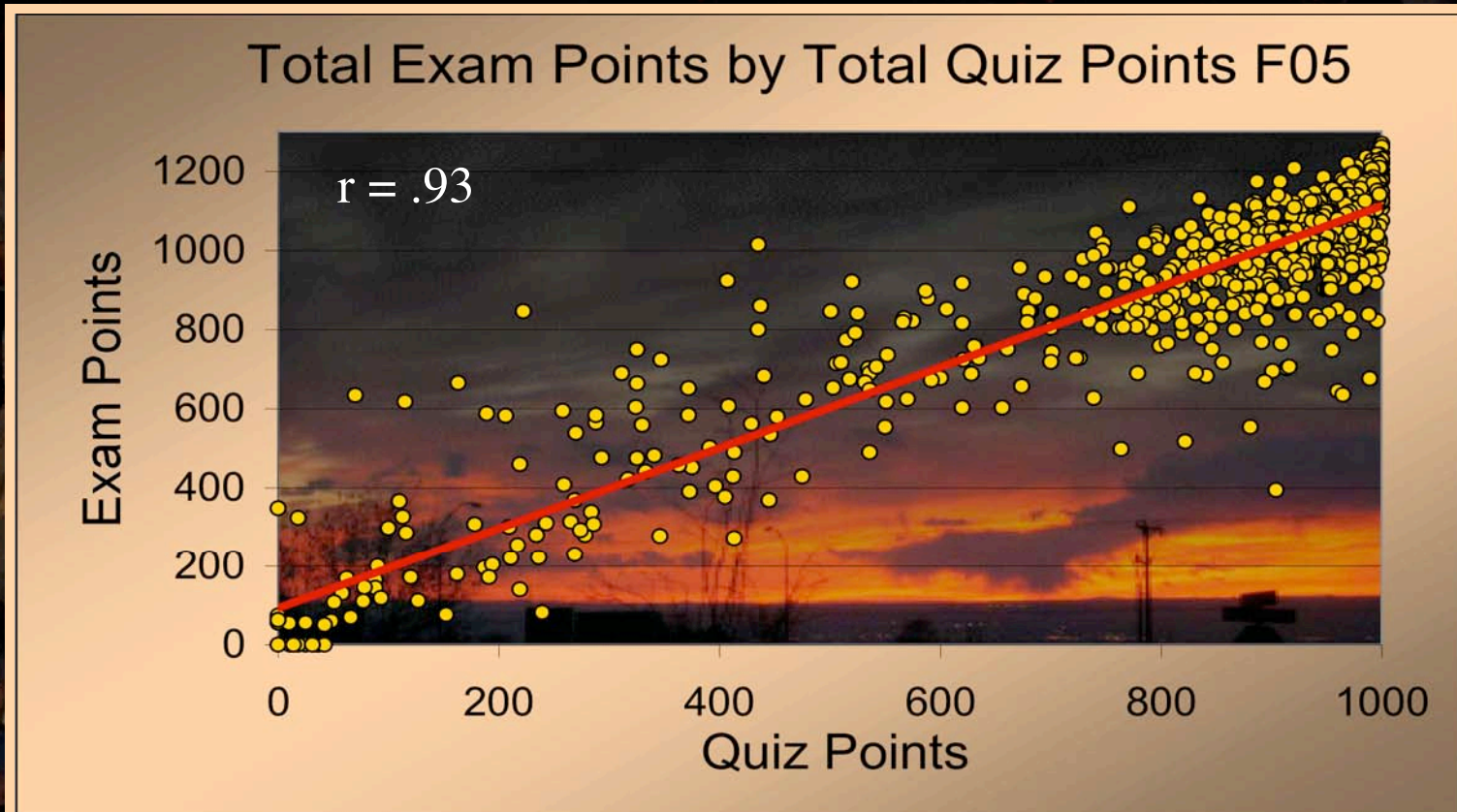


Figure 1. High quiz scores predicted high exam scores (n = 847 students).

# Do Quizzes Matter?

## Fall 2005: Pretest vs. Posttest

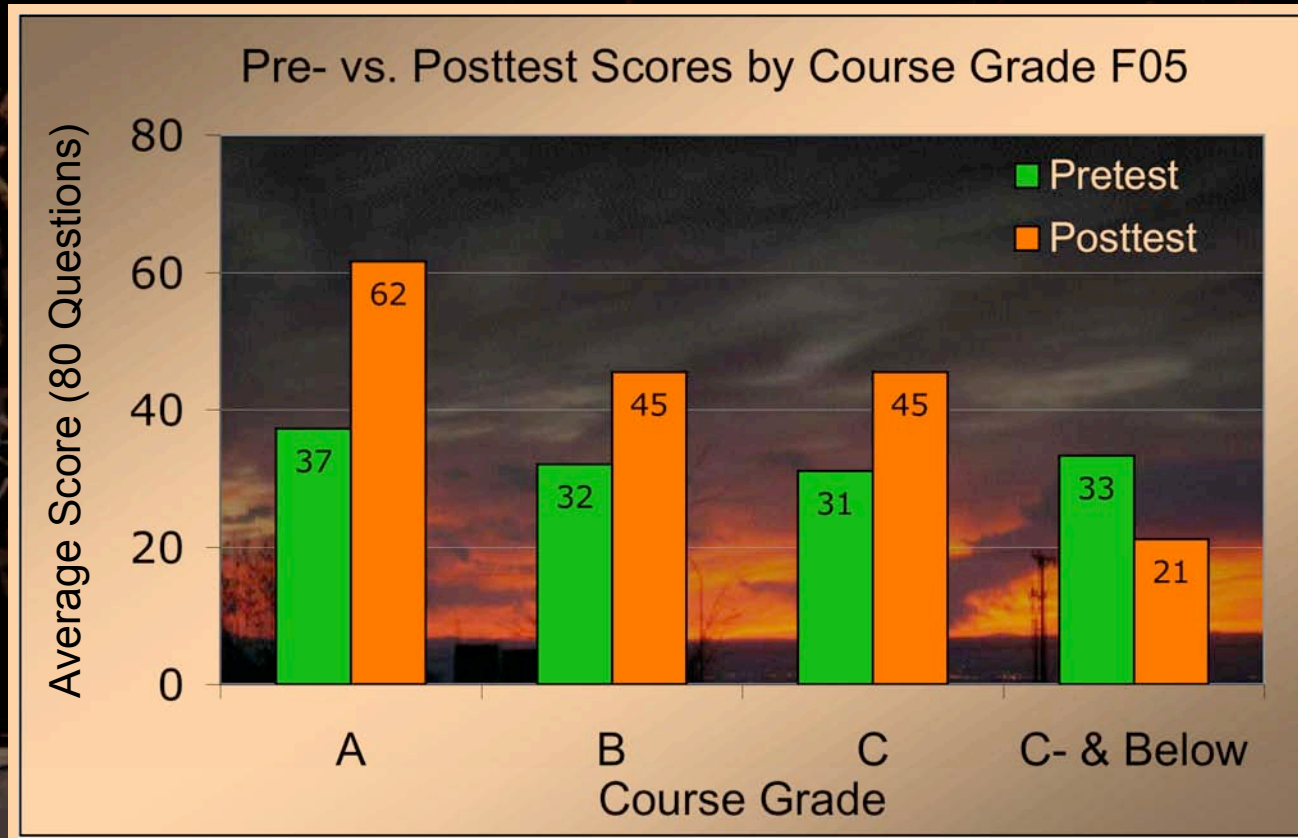


Figure 2. Students took an 80-question Pretest during the first week of the semester and the same test as the Final Exam. Students who performed well in the course performed better on the Posttest Final than students who performed less well.

# Do Quizzes Matter?

## Fall 2008: Pretest vs. Posttest

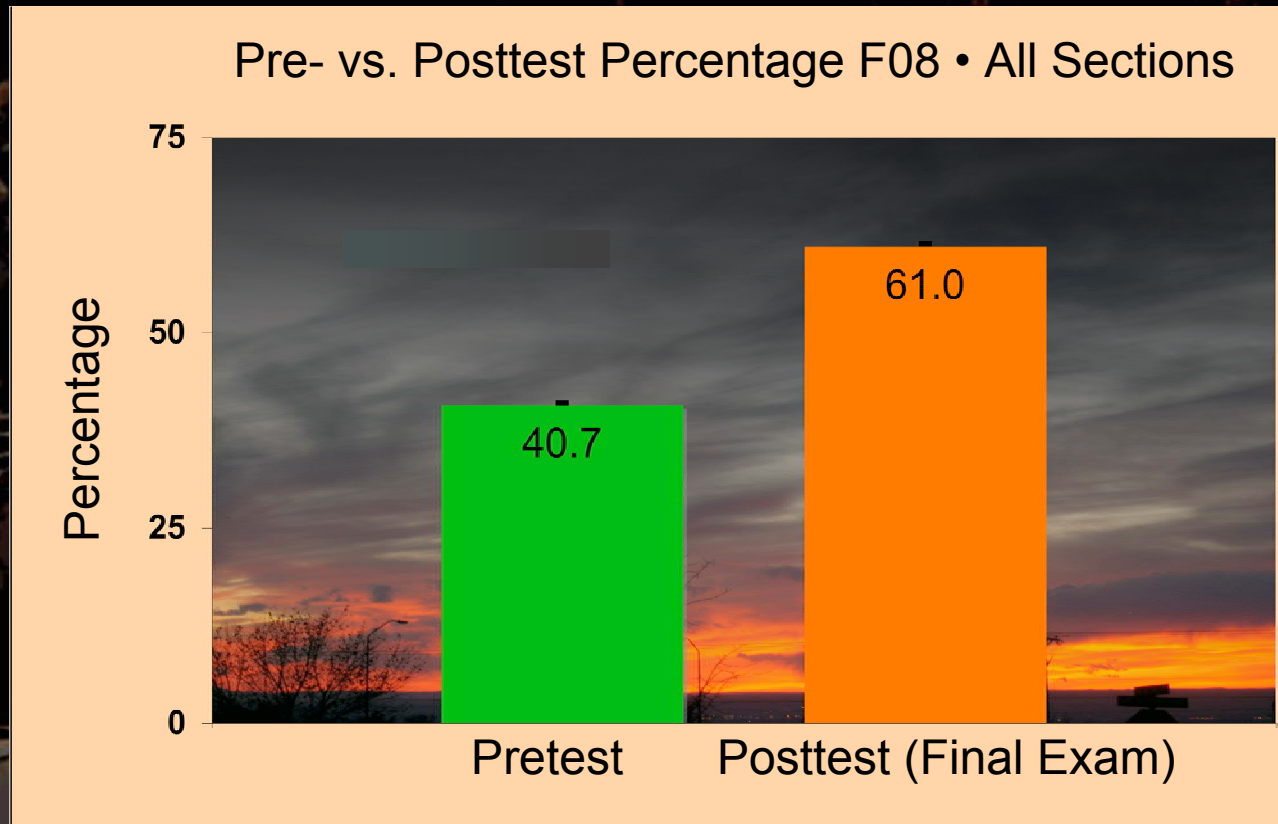


Figure 3. Students took an 80-question Pretest during the first week of the semester and the same test as the Final Exam.

# Do Quizzes Matter?

Fall 2005: Ethnicity

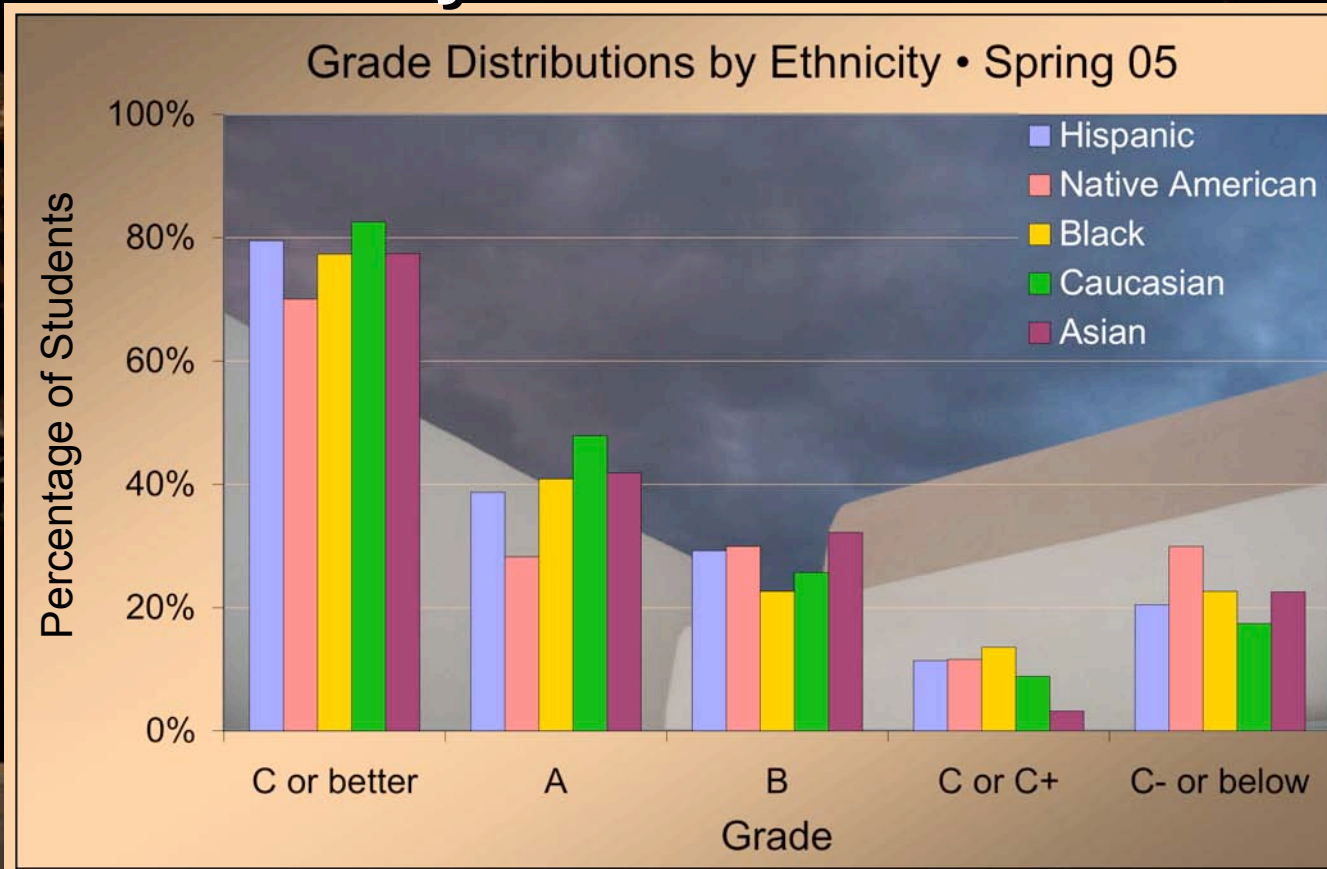
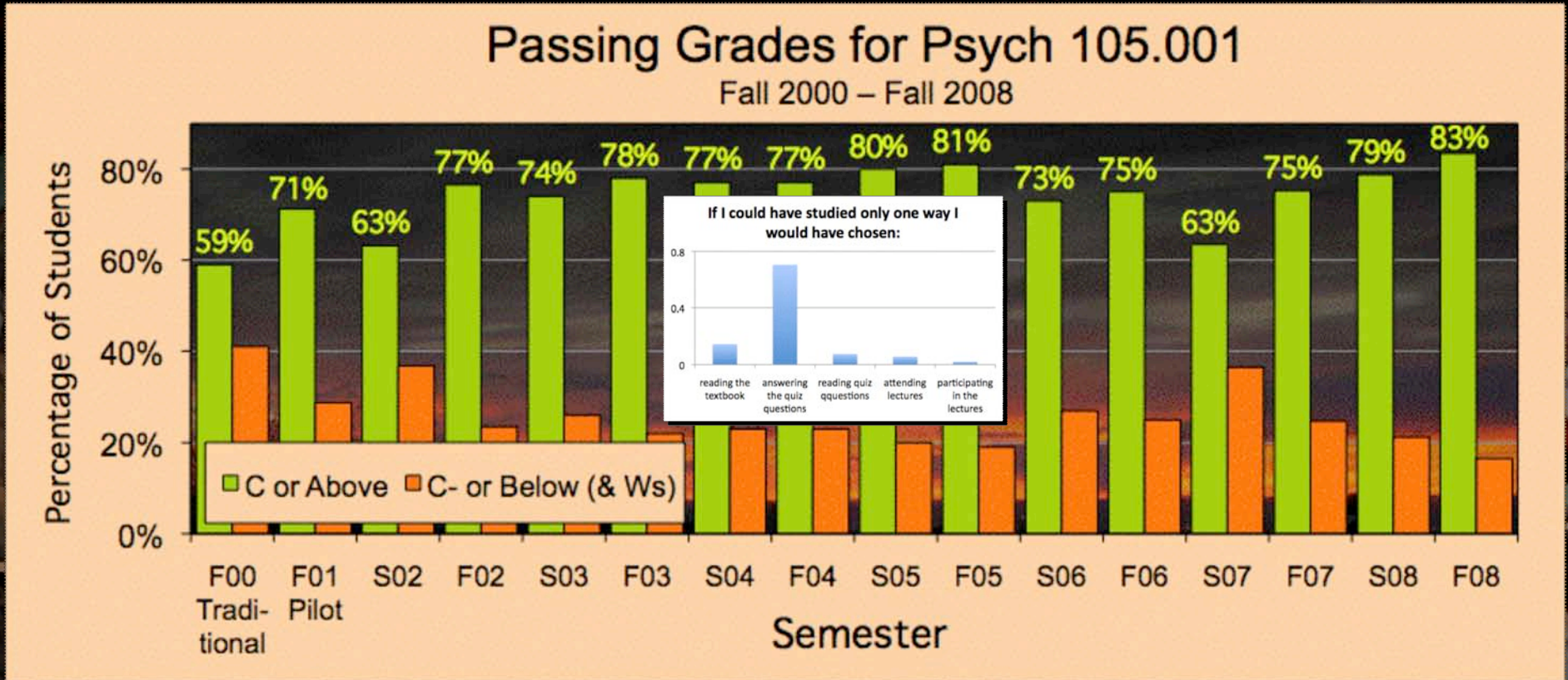


Figure 4. Students of different ethnic backgrounds performed comparably.

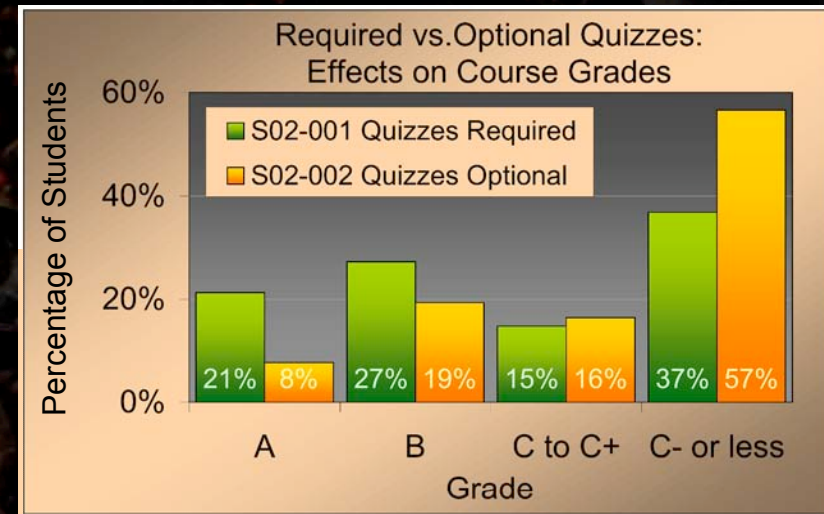
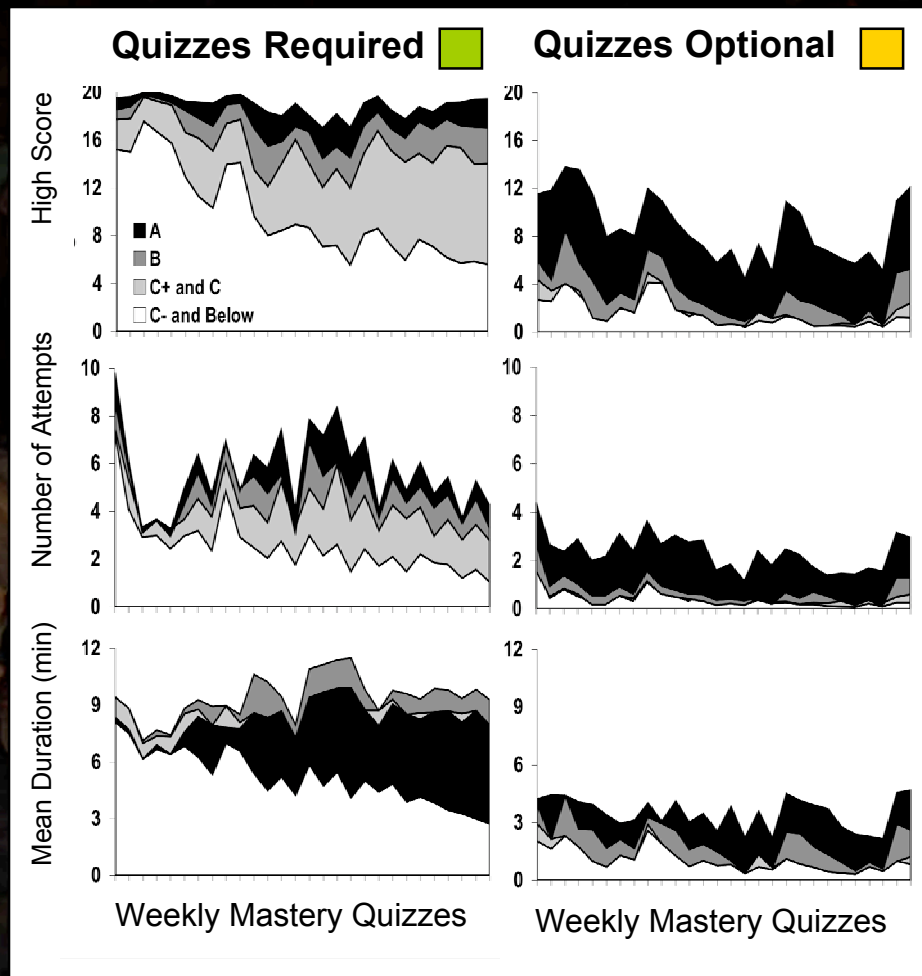
# Do Quizzes Matter?

Fall 2000 – Fall 2008: 16 Semesters



# Do *Required* Quizzes Matter?

## Spring 2002: Two Sections/Same Instructor



(Figure 5)

Figure 6. Patterns of Quiz Taking (left). When quizzes were **required**, students scored higher, took them more times, and for longer durations than when quizzes were **optional**.



# Do *Required* Quizzes Matter?

## Spring 2005: Two Sections/*Different* Instructors

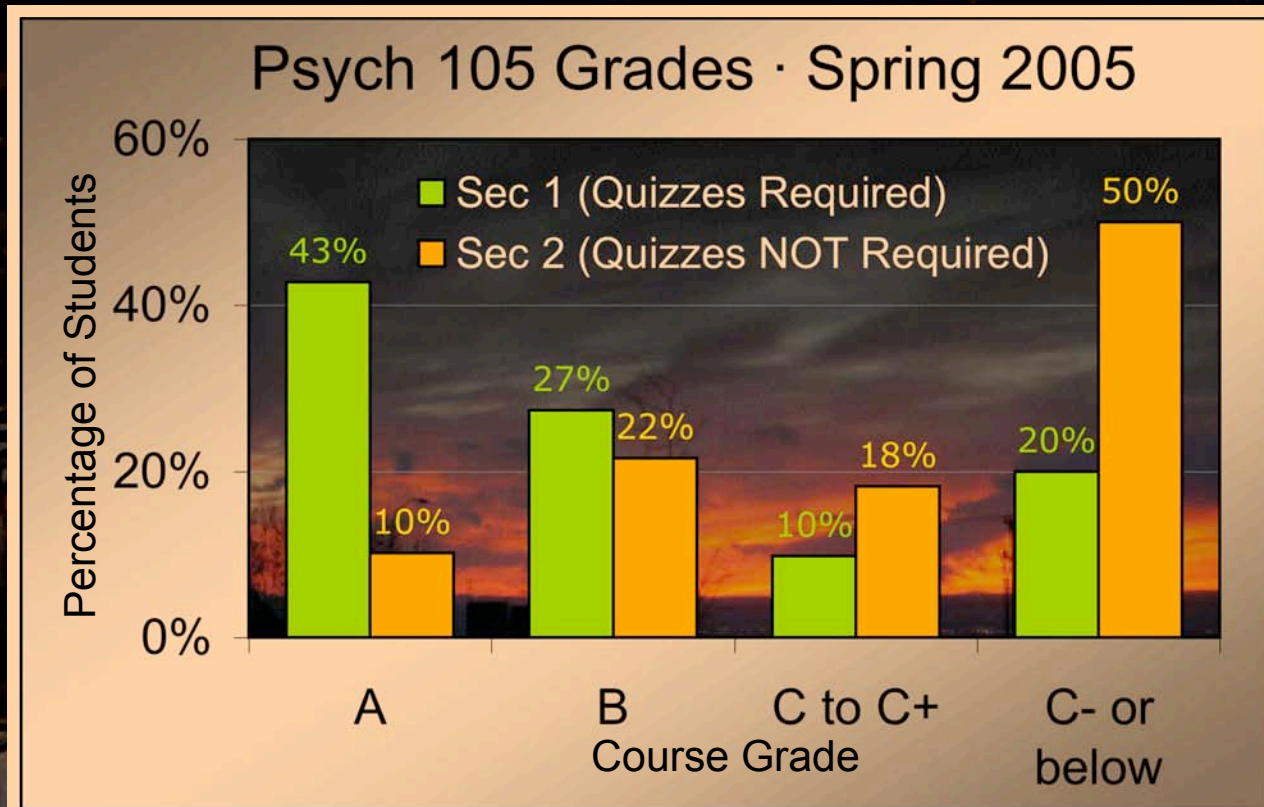


Figure 7. In spring 2005, to determine whether quizzes need to be required in order for students to perform well in the class, two sections were taught by *different* instructors. In Sec 001, quizzes were required; in Sec 002, quizzes were available but optional (i.e., students were encouraged to take them, but they received no points for doing so). Students performed better when quizzes were required (Sec 001) than when quizzes were optional (Sec 002).

# Do *Required* Quizzes Matter?

## Spring 2007: Alternating Weeks—Rqd vs Opt Qzs

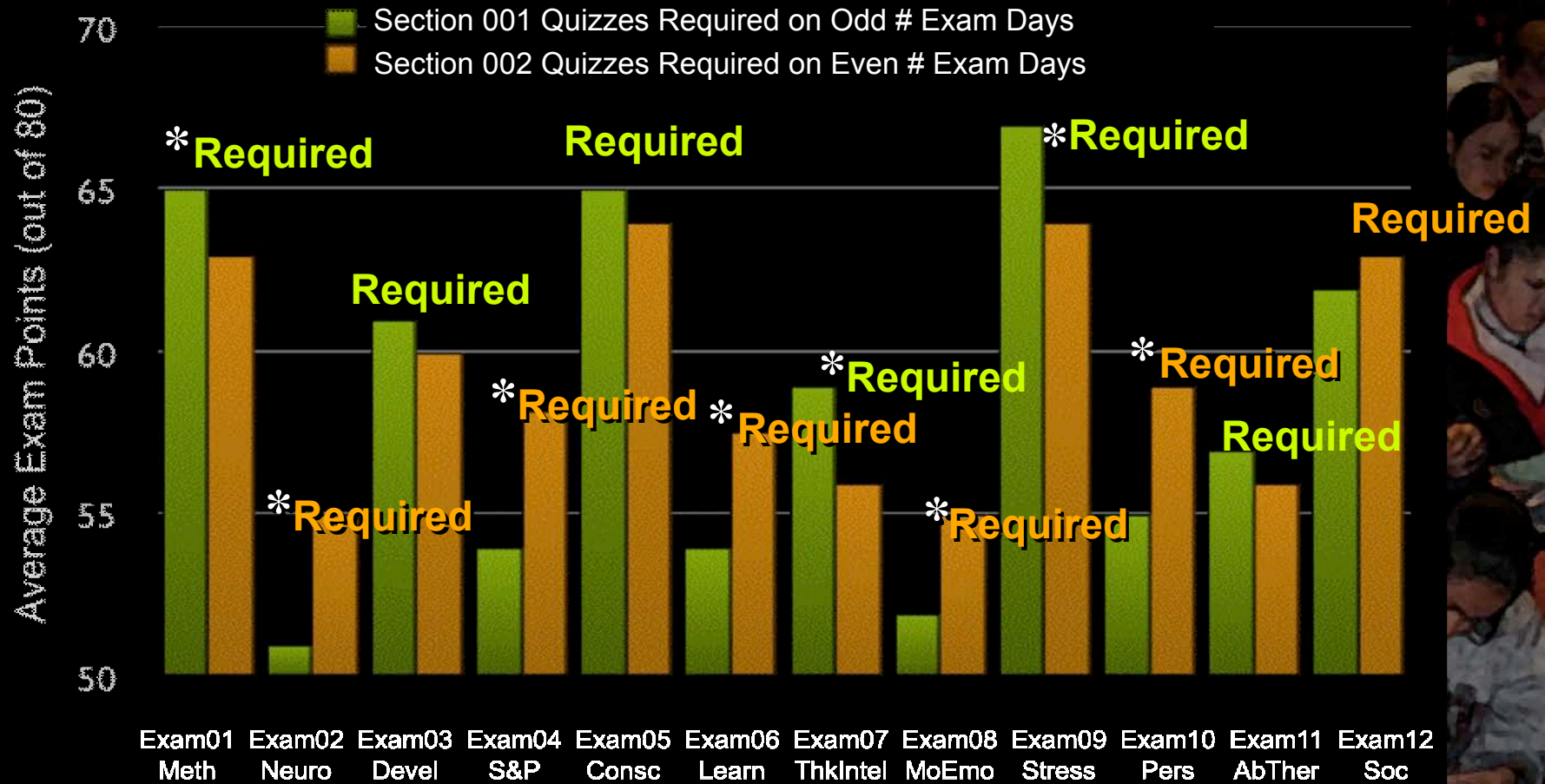


Figure 8. In weeks when quizzes were required, students performed better across sections than when quizzes were optional. \* $p < .05$  or better

# Do Quiz Questions Matter?

*Are students just memorizing the questions?*



# Do Quiz *Questions* Matter?

## What students see

QUIZ STEM — In elementary school and high school, Charlie got away with copying his test answers from classmates. Because the college has test proctors who are very observant, Charlie spends as many hours devising new ways to cheat as it would take him to study and perform well in an honest fashion. Charlie's strategy for passing tests illustrates the consequences of:

- functional fixedness.
- **a mental set.**
- confirmation bias.
- the availability heuristic.

# Do Quiz *Questions* Matter?

## What students remember?

QUIZ STEM — In elementary school and high school, **Charlie** got away with copying his test answers from classmates. Because the college has test proctors who are very observant, **Charlie** spends as many hours devising new ways to cheat as it would take him to study and perform well in an honest fashion. **Charlie's** strategy for passing tests illustrates the consequences of:

- functional fixedness.
- **a mental set.**
- confirmation bias.
- the availability heuristic.

**Charlie = mental set**

# Do Quiz *Questions* Matter?

## Use different Exam questions

**QUIZ STEM** — In elementary school and high school, Charlie got away with copying his test answers from classmates. Because the college has test proctors who are very observant, Charlie spends as many hours devising new ways to cheat as it would take him to study and perform well in an honest fashion. Charlie's strategy for passing tests illustrates the consequences of:

- functional fixedness.
- a mental set.
- confirmation bias.
- the availability heuristic.

**TEST STEM** — A mental set is a:

- methodical step-by-step procedure for solving problems.
- mental grouping of similar objects, events, or people.
- tendency to approach a problem in a way that has been successful in the past.
- group of conclusions derived from certain assumptions or general principles.

# Do *Required* Quizzes Matter?

## Spring 2007: Alternating Weeks—Rqd vs Opt Qzs

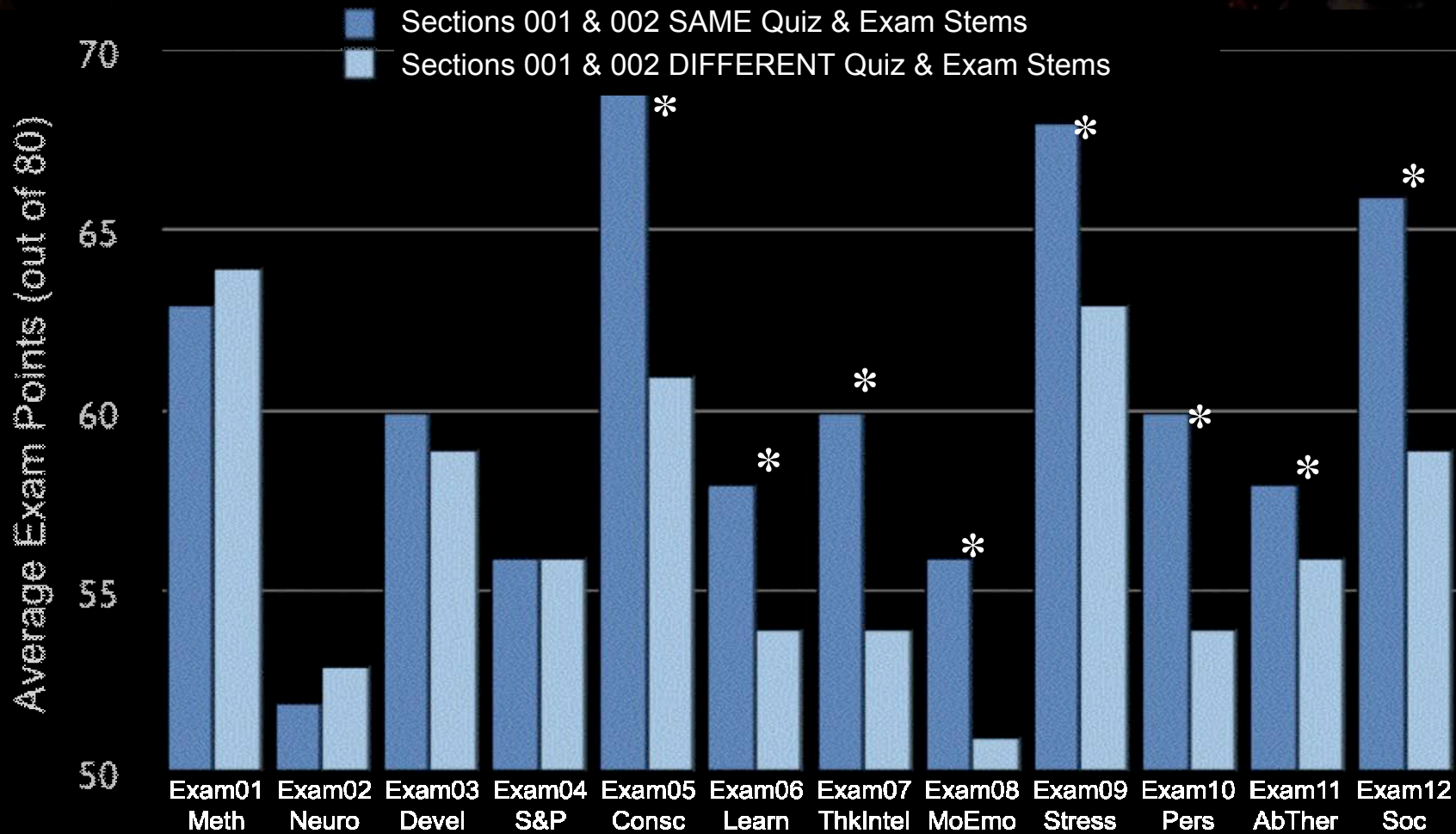


Figure 9. Difference in performance between same- or different-stem questions. Performance was different when quiz and exam stems were very different from each other.  $*p < .05$

# Do Quiz Questions Matter?

To determine whether studying by taking quizzes versus going to lectures and reading the textbook differentially affects exam performance, students were divided into two groups (Group 1 and Group 2).

All students were required to complete quizzes, to attend lectures, and to read the textbook.

All exam questions were based on quiz-question content but were not the same questions. Students in both Groups saw a common pool of quiz questions from which 30 exam questions were based. In addition, students in Group 1 saw quiz questions from which 10 exam questions were based; but only Group-1 students saw the corresponding quiz questions. Group-2 students saw their own set of quiz questions from which 10 exam questions were based; but only they saw these corresponding quiz questions.

Exams were comprised of 50 questions; 30 common questions, 10 Group-1 Questions, and 10 Group-2 Questions.

The hypothesis was that all students would perform comparably on the Common Questions but that Group-1 Students would perform better on exam questions they had prepared for by taking quizzes and Group-2 Students would perform better on exams question they had prepared for by taking quizzes.



# Do Quiz Questions Matter?

Effects of Studying Different Quiz Questions on Exam01 Performance Spring 2008

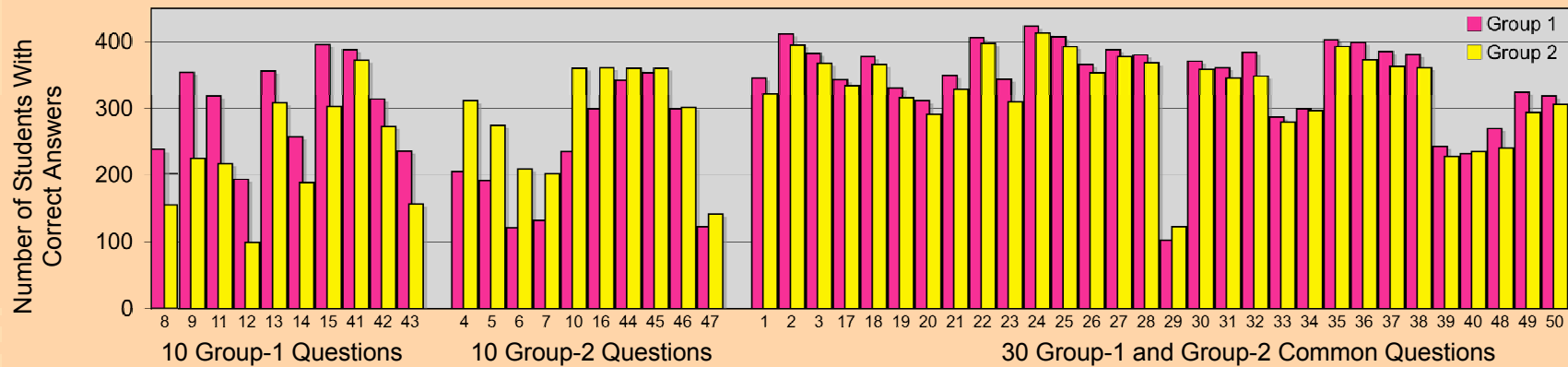


Figure 10. Students studied for the exam by taking quizzes, attending lectures, and reading the textbook. Students in both groups performed comparably on exam questions they had studied by taking quizzes. Students in Group 1, however, performed better on exam questions based on items only they had studied on quizzes. Group-2 students, correspondingly, did better on exam questions based on quiz items they had studied.

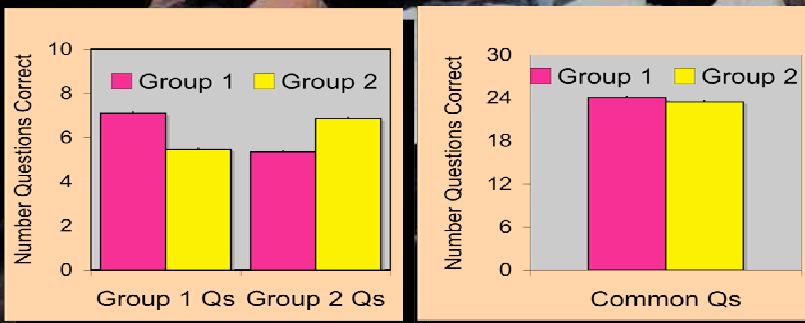
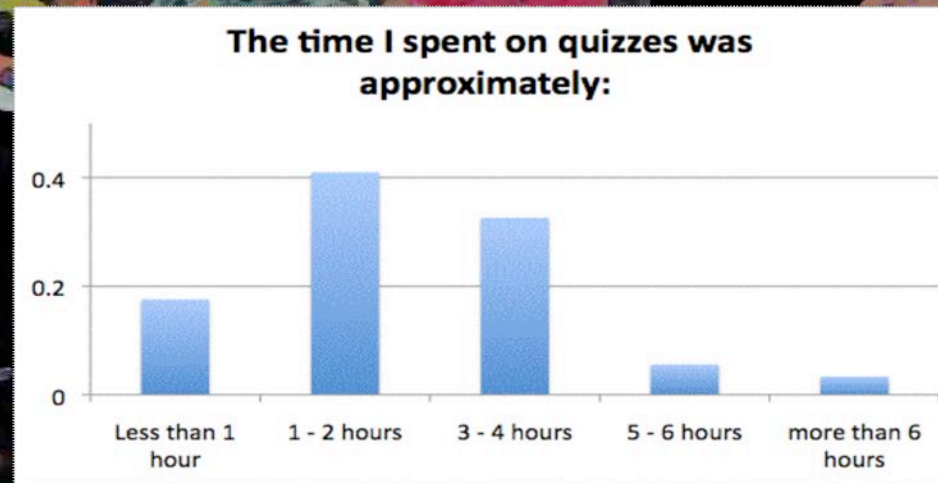
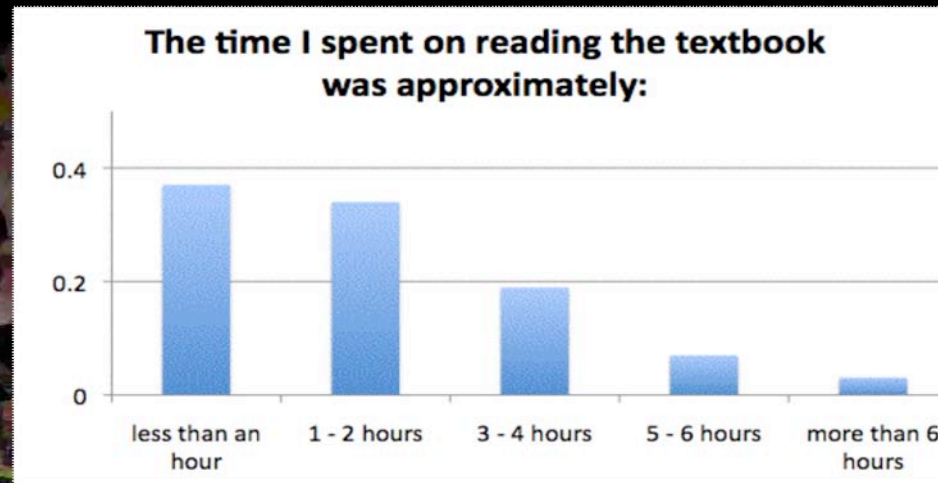


Figure 11. Collapsed percentages of correct questions. Common questions were comparable between groups. Group 1 performed better on their questions; Group 2 performed better on their questions.

# Do Quiz Questions Matter?

## Time spent reading vs. taking quizzes



# Do Quiz Questions Matter?

Are students simply  
*reading* the quizzes?

**QUIZ ITEM** Plato's assumption that certain ideas are inborn is most directly relevant to the controversy regarding:

- A) conscious versus unconscious.
- B) observation versus introspection.
- C) nature versus nurture.
- D) correlation versus causation.

**STUDYBIT** Plato's assumption that certain ideas are inborn is most directly relevant to the controversy regarding nature versus nurture.

- I'll read it later.
- I've read it.
- I'm learning it.
- I know it.

# Do Quiz Questions Matter?

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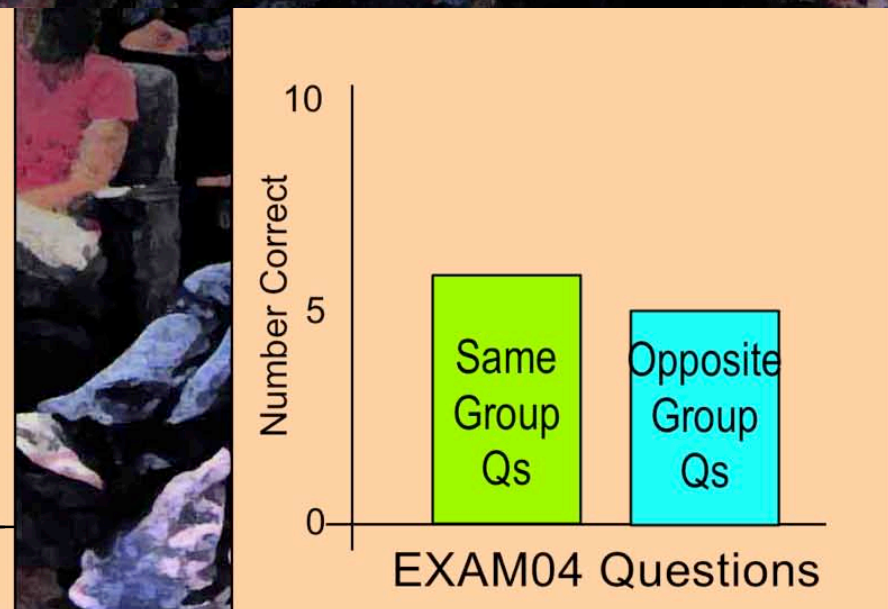
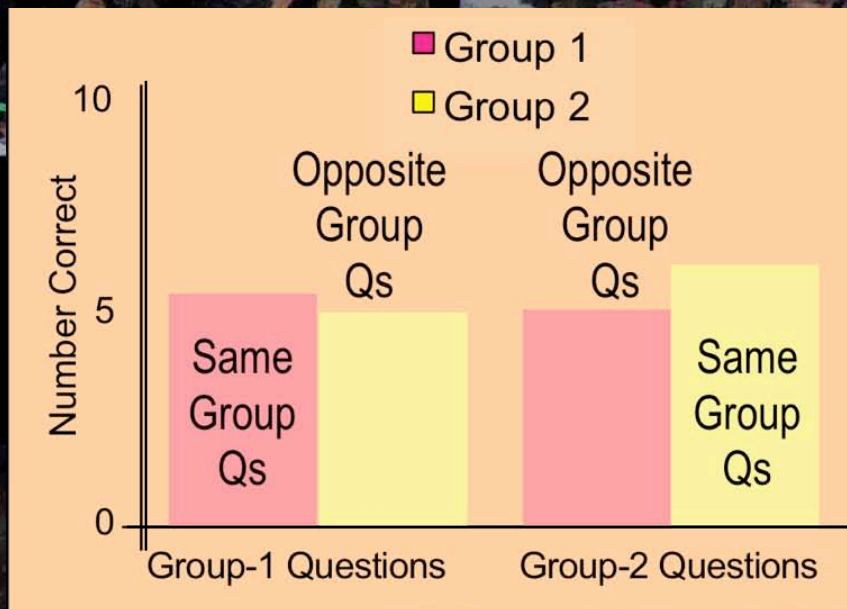
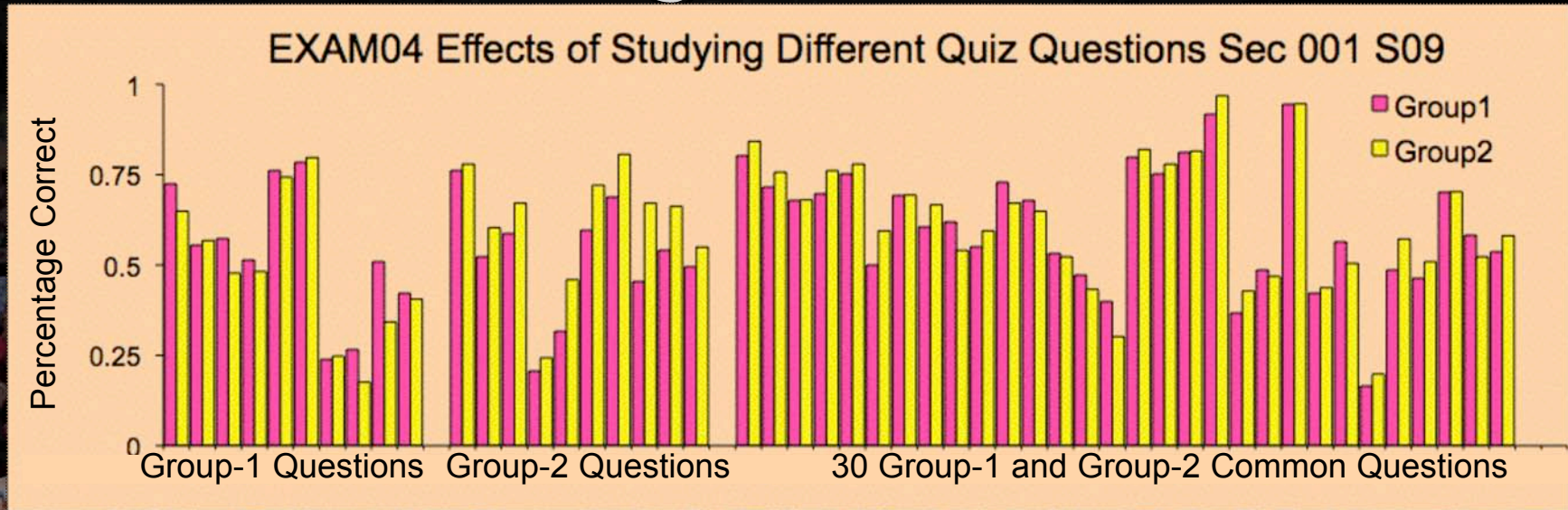
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10:43:03 PM

Question Number from MASTER:

Question Number from MASTER	1	2	3	4	5
	processing rotors to how our knowledge and expectations influence perception. (Multiple Choice)	processing rotors to how the physical characteristics of stimuli influence their interpretation. (Multiple Choice)	Berdine has developed cataracts in both eyes, preventing her from being able to identify even her mother's face. Berdine most clearly suffers a deficiency in: (Multiple Choice)	Bottom-up processing involves analysis that begins with the: (Multiple Choice)	Complete sensation in the absence of complete perception is to: (Multiple Choice)
Attempt	Score				
1	16 --	--	--	--	3. absolute
2	15.2 2. Bottom-up	--	1. the optic ne --	--	--
3	16.4 --	--	3. bottom-up E --	--	2. sensation
4	20 --	--	3. bottom-up E --	--	--
1	16 --	--	1. the optic ne	4. feature dete	2. hyperalgesi --
2	0 --	--	--	--	not answered not answered --
3	16 1. Top-down	2. Bottom-up	--	--	--
4	19.2 --	2. Bottom-up	--	4. feature dete	2. hyperalgesi --
5	20.8 1. Top-down	--	--	--	2. sensation
6	21.6 --	--	--	--	--
7	21.6 --	--	--	--	2. sensation
8	23.2 --	2. Bottom-up	3. bottom-up p	2. sensory rec	--
9	21.6 --	--	--	--	--
10	21.6 --	2. Bottom-up	--	2. sensory rec	--
11	20.8 1. Top-down	2. Bottom-up	--	2. sensory rec	--
12	24 --	--	3. bottom-up E	--	--
1	21.6 1. Top-down	--	--	2. sensory rec	--
2	21.6 1. Top-down	--	--	2. sensory rec	2. sensation
3	21.6 --	--	--	2. sensory rec	2. sensation

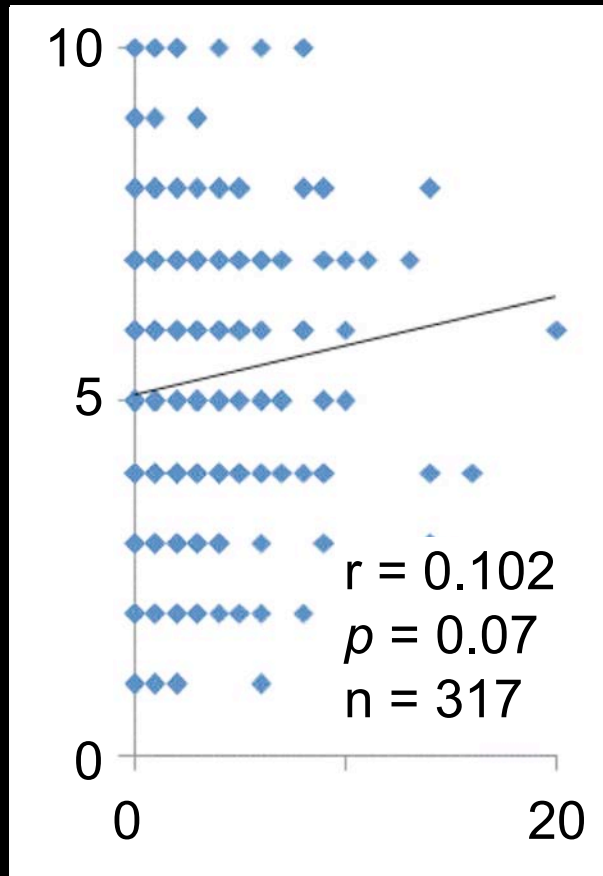
# Do Quiz Questions Matter?



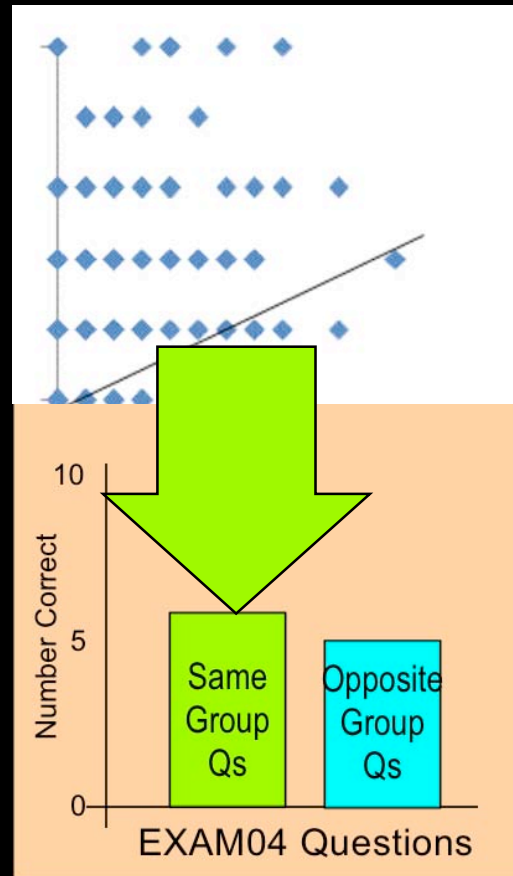
# EXAM 04 Personality Sec 001 Groups 1&2 Spring 09

## Same-Group Exam Questions vs. Same-Group Quiz Questions

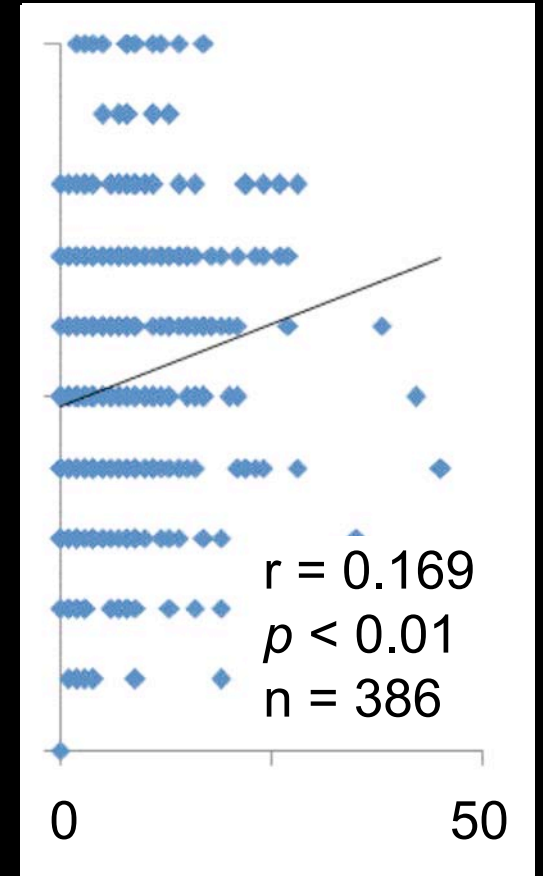
Same-Group Exam Qs Correct



MasteryQz A



MasteryQz B



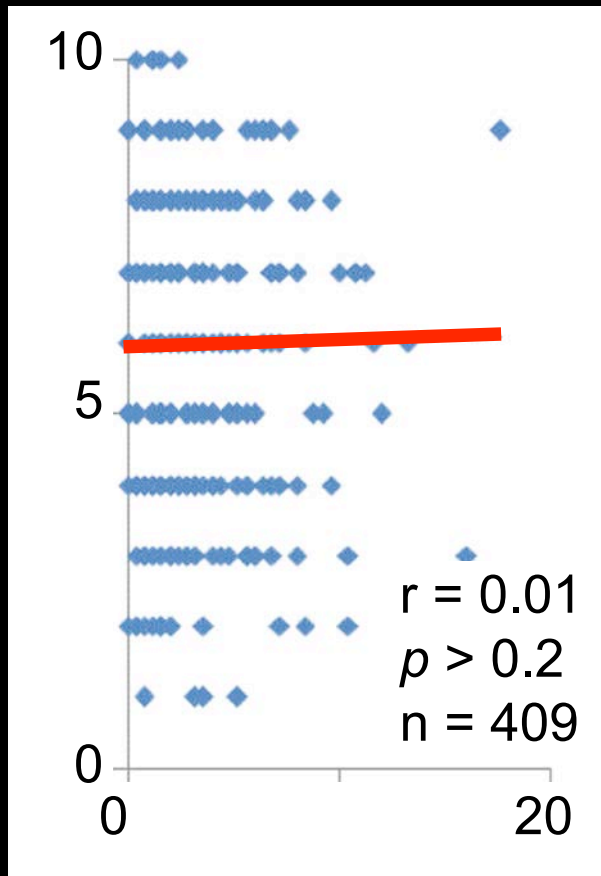
LectureQz

Number of Correct Quiz Responses

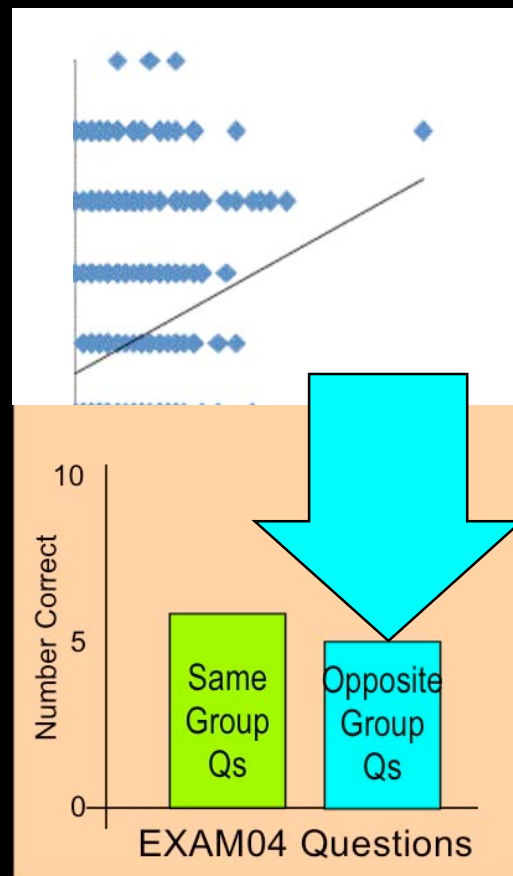
# EXAM 04 Personality Sec 001 Groups 1&2 Spring 09

## Opposite-Group Exam Questions vs. StudyBit Responses

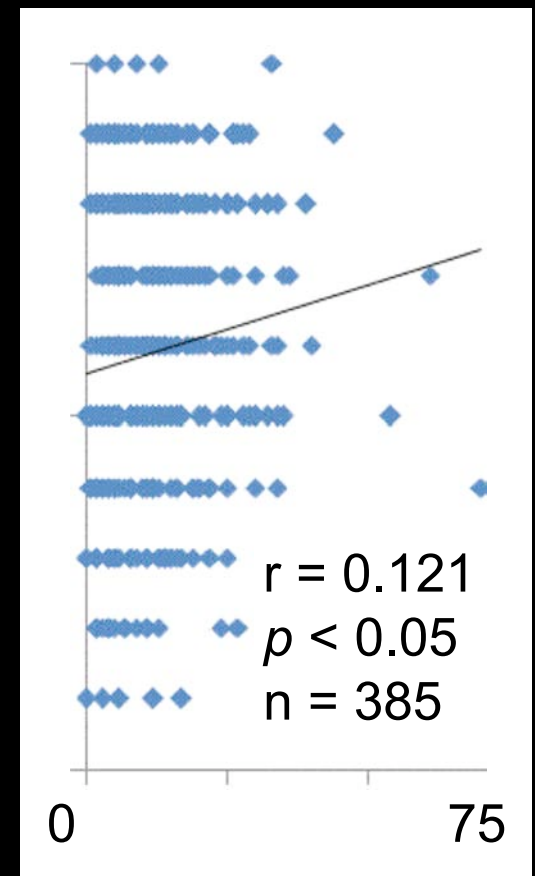
Oppo-Group Exam Qs Correct



MasteryQz A



MasteryQz B



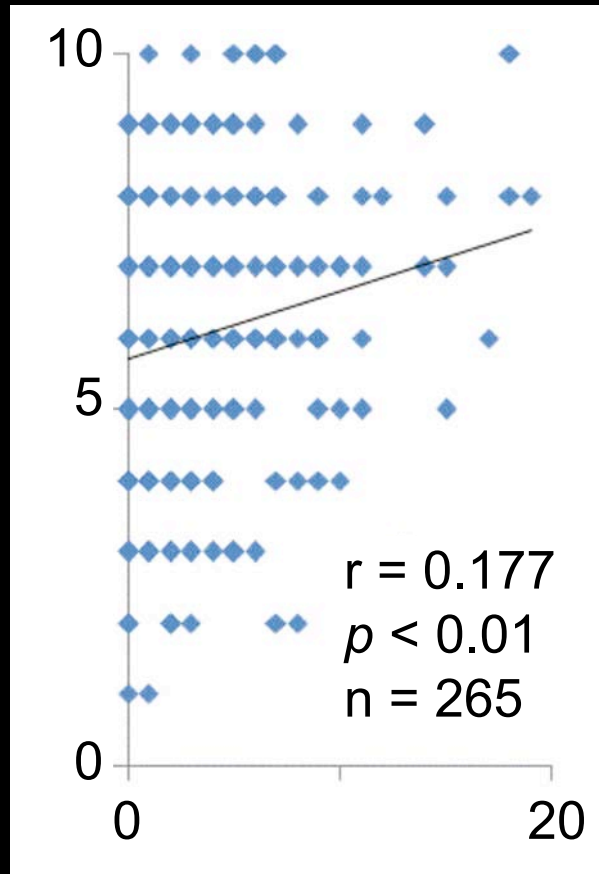
LectureQz

Number of StudyBit Responses

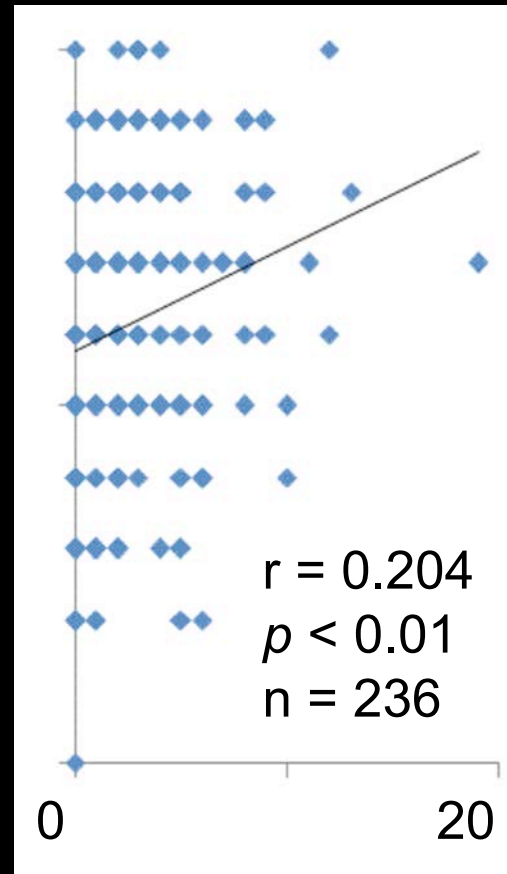
# EXAM 04 Personality Sec 002 Groups 1&2 Spring 09

## Same-Group Exam Questions vs. Same-Group Quiz Questions

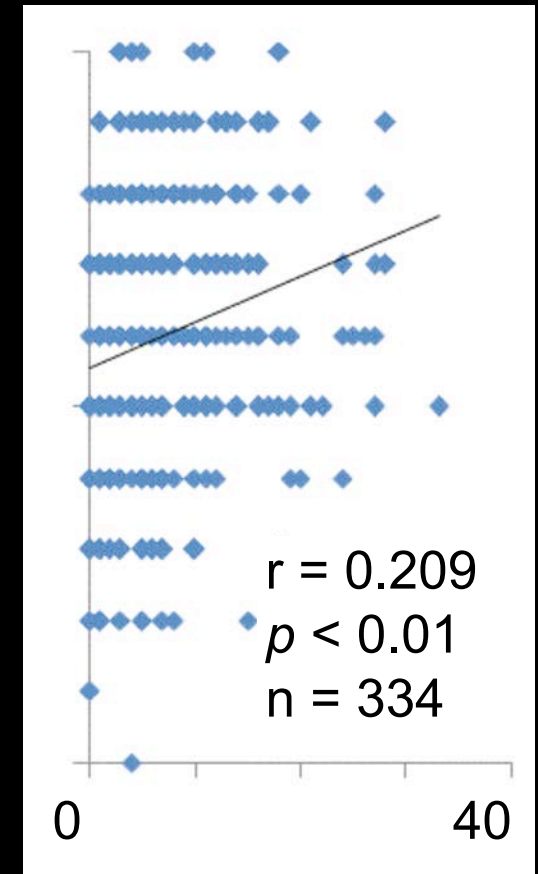
Same-Group Exam Qs Correct



MasteryQz A



MasteryQz B



LectureQz

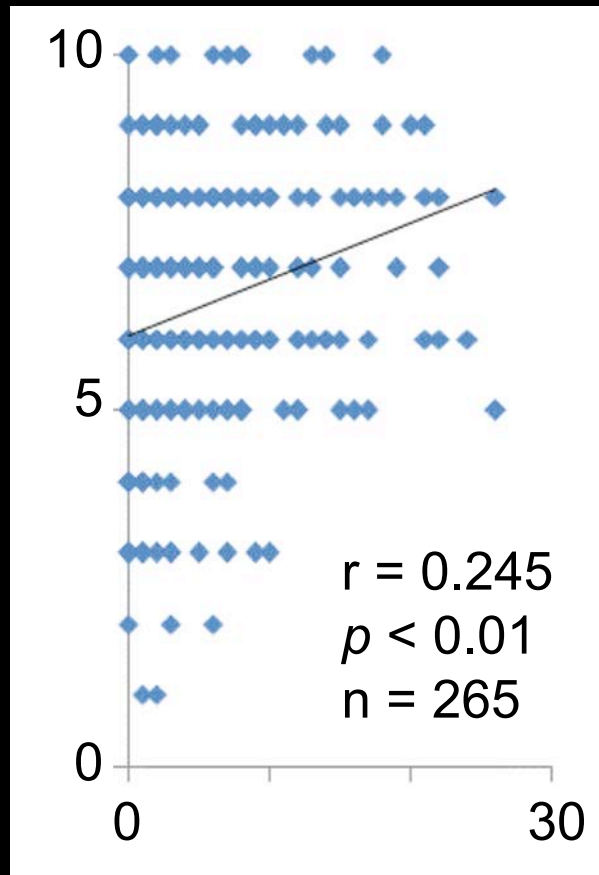
Number of Correct Quiz Responses



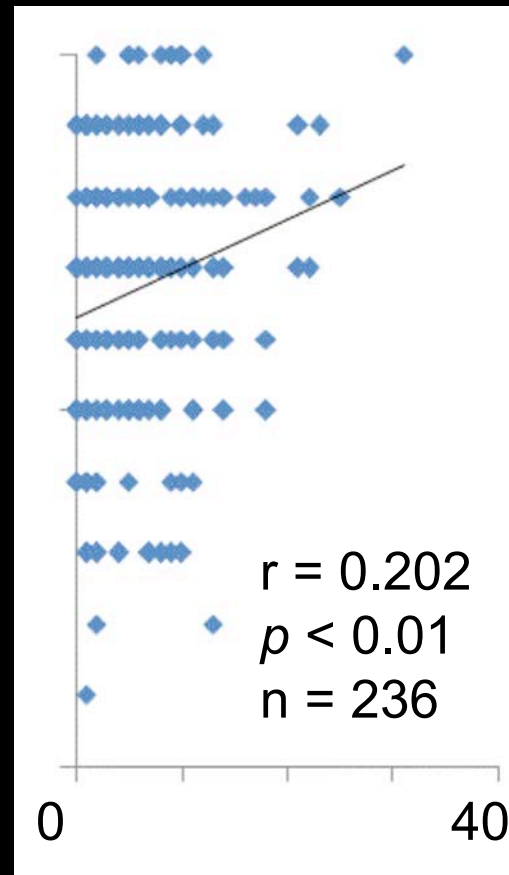
# EXAM 04 Personality Sec 002 Groups 1&2 Spring 09

## Opposite-Group Exam Questions vs. Opposite-Group Qz Question

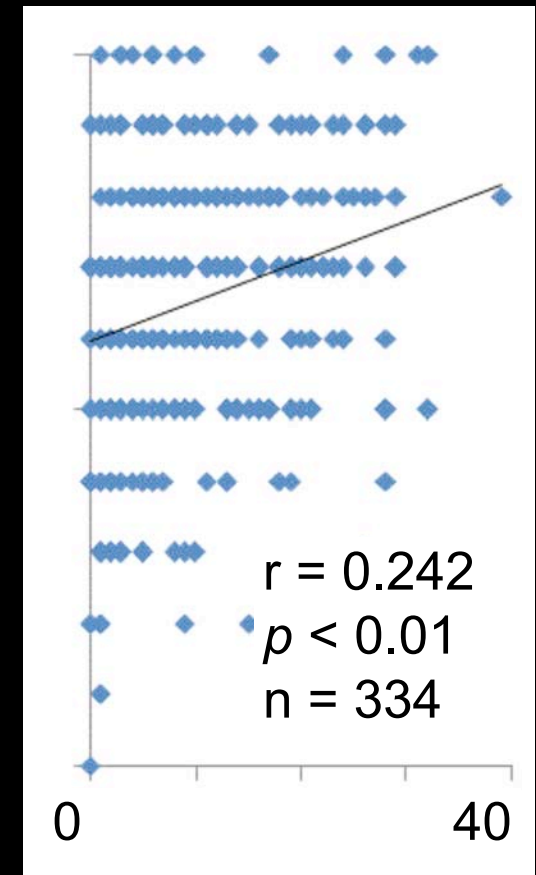
Oppo-Group Exam Qs Correct



MasteryQz A



MasteryQz B



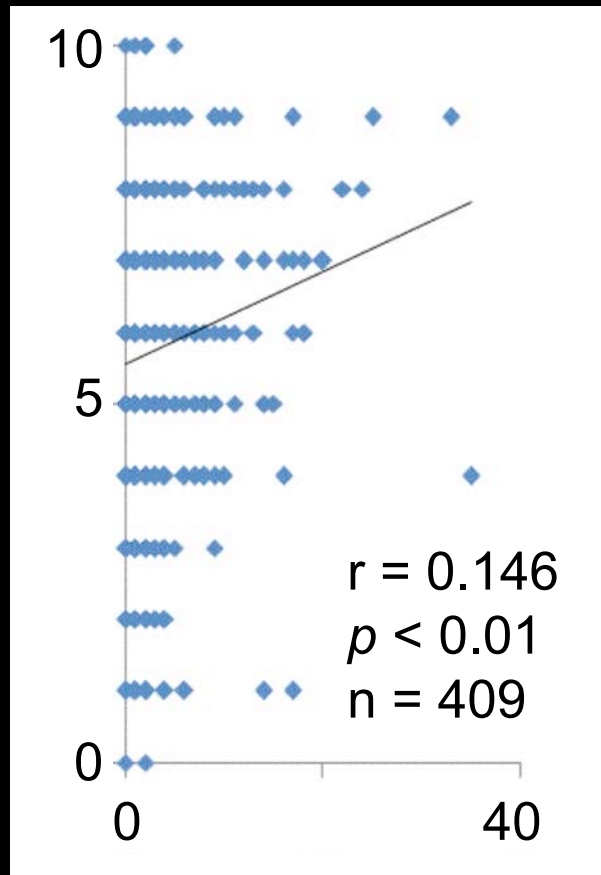
LectureQz

Number of Correct Quiz Responses

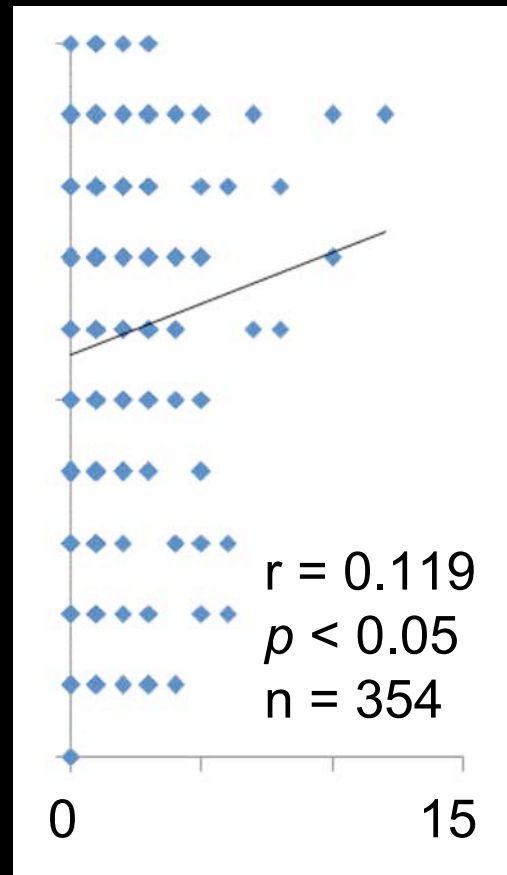
# EXAM 09 Personality Sec 001 Groups 1&2 Fall 08

## Same-Group Exam Questions vs. Same-Group Quiz Questions

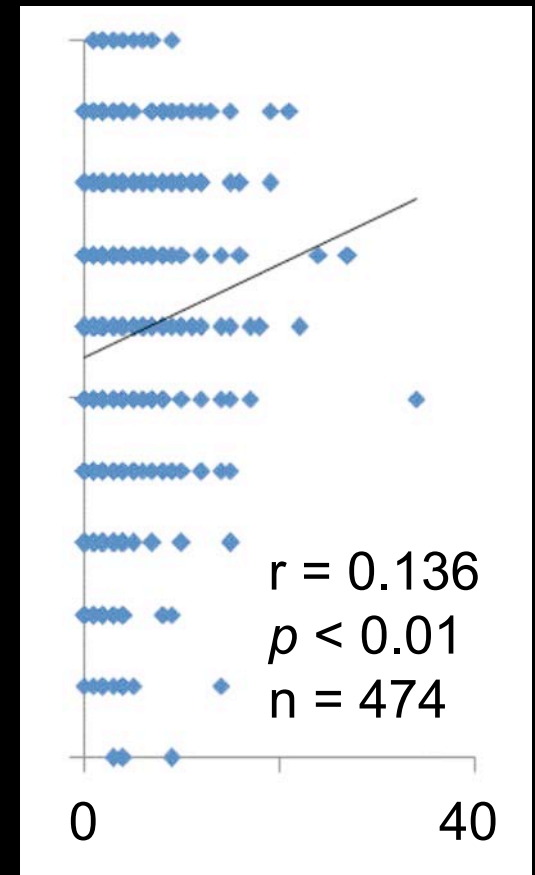
Same-Group Exam Qs Correct



MasteryQz A



MasteryQz B



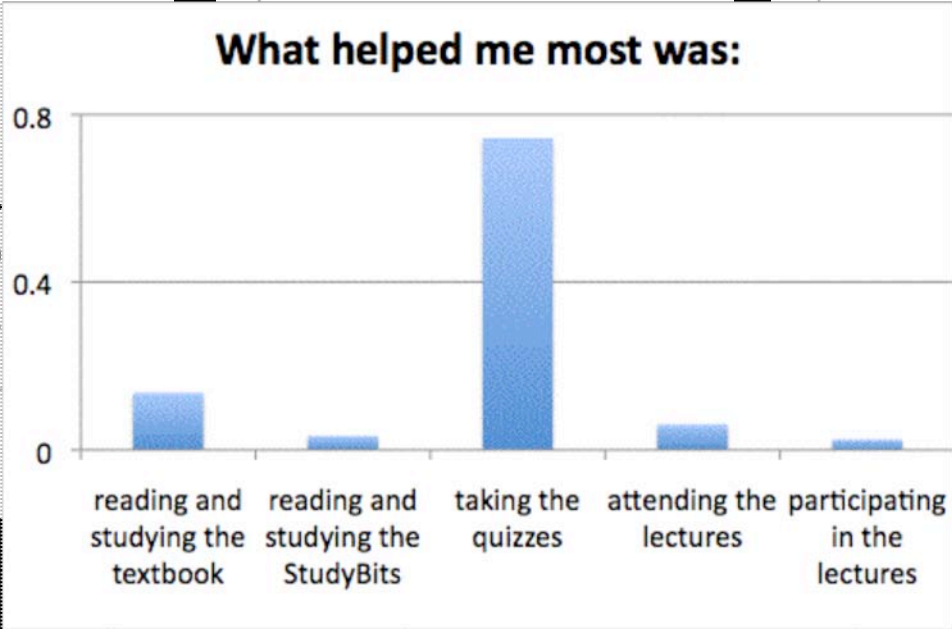
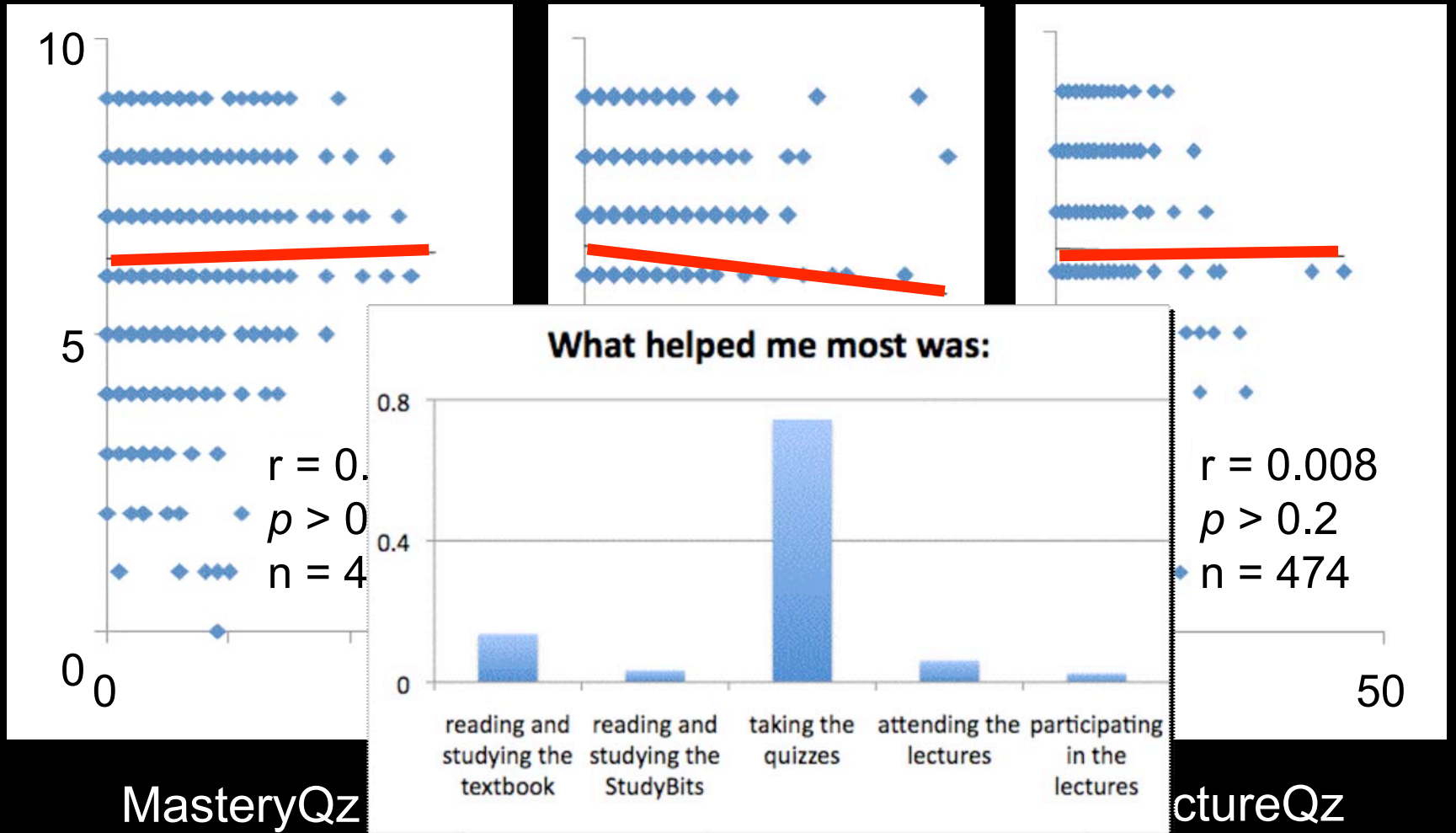
LectureQz

Number of Correct Quiz Responses

# EXAM 09 Personality Sec 001 Groups 1&2 Fall 08

## Opposite-Group Exam Questions vs. Opposite-Group Qz Questions

Oppo-Group Exam Qs Correct

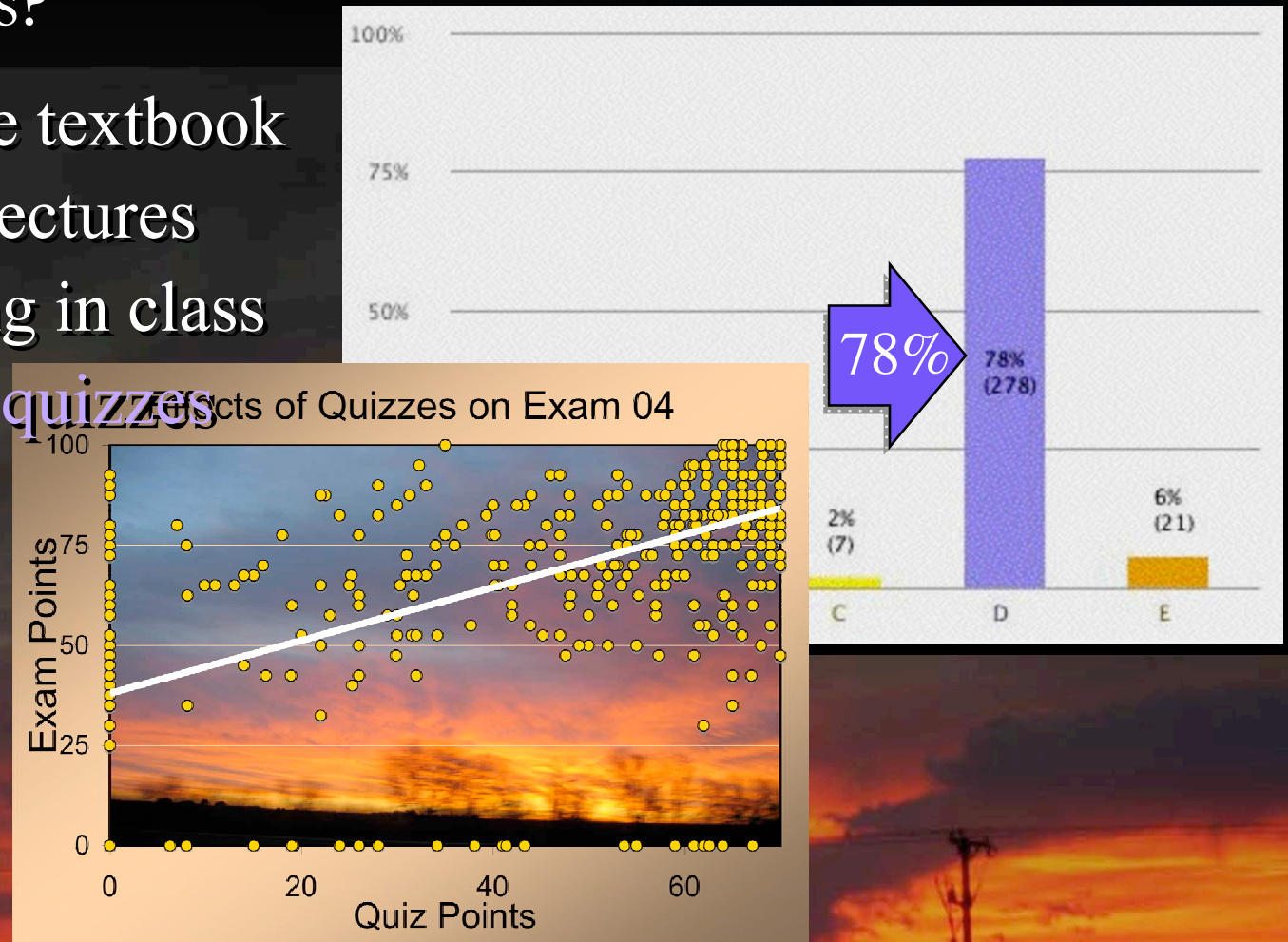


Number of StudyBit Responses

# Do Quizzes Matter to *Students*?

So far, what's been of *greatest* use to you for studying for the exams?

- A. Reading the textbook
- B. Attending lectures
- C. Participating in class
- D. Taking the quizzes
- E. Other



# What *else* matters to *Students*?

So far, what's been of *greatest* use to you for studying for the exams?

- A. Reading the textbook
- B. Attending lectures
- C. **Participating in class**
- D. Taking notes
- E. Other

