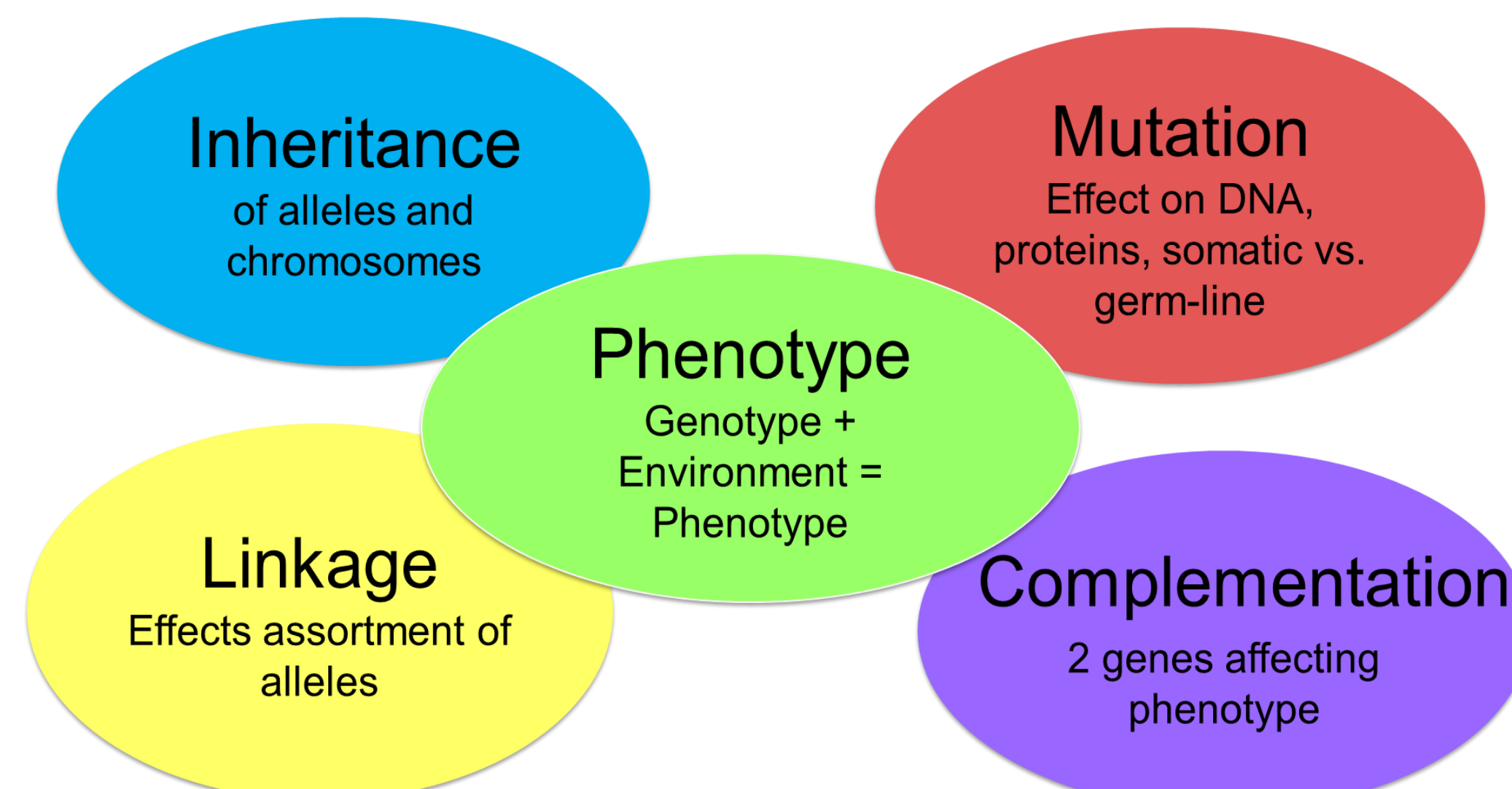


### Goal

Measure **retention** of **conceptual understanding** versus **problem solving ability** 2.5 months after students completed the required second year genetics course.

### Key Course Concepts



### Do students understand & retain the concepts?

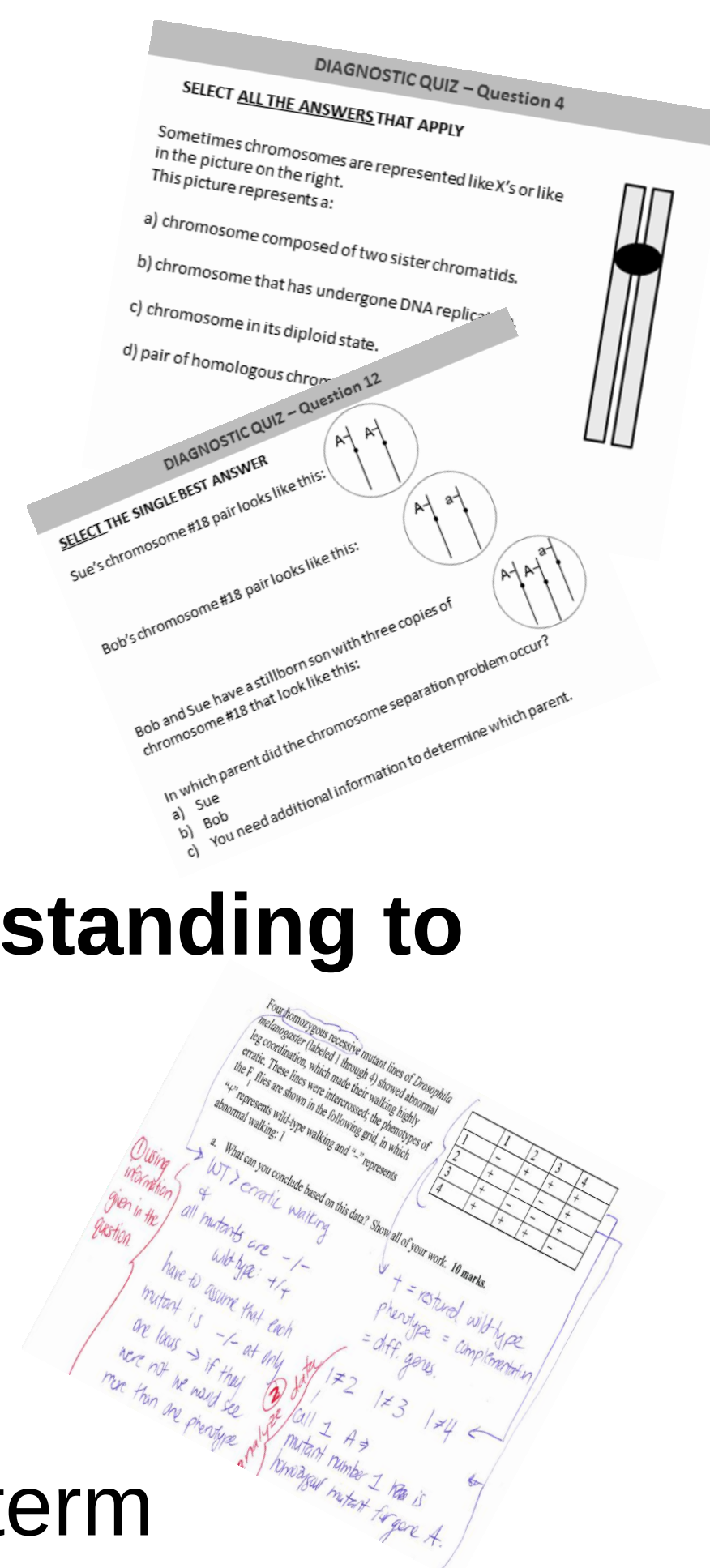
**CI Test:** 14 multiple-choice questions from validated conceptual inventory tests<sup>1,2</sup>

Average end of term score (n=441) : **70%**

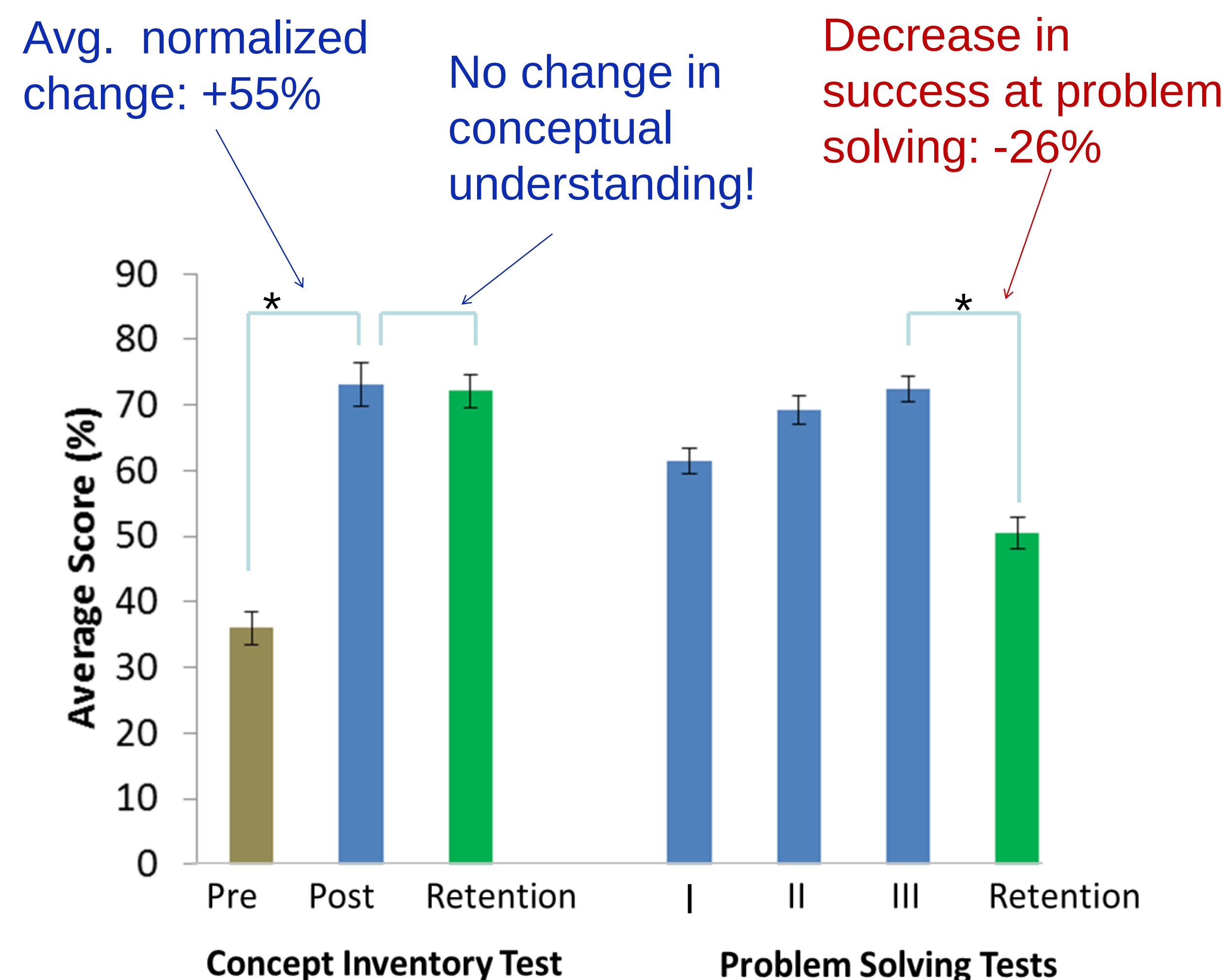
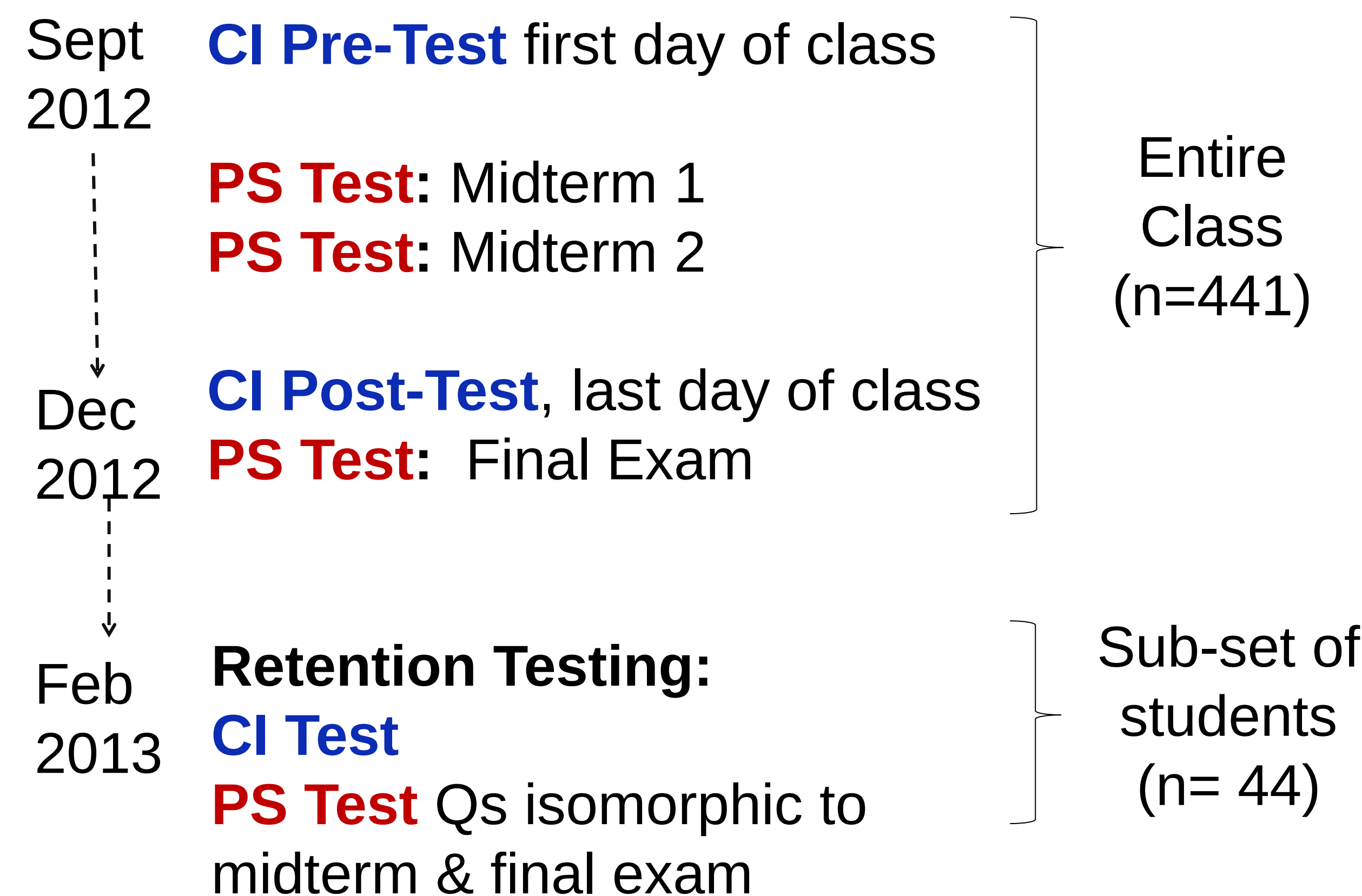
### Can students apply understanding to solve a problem?

**PS Tests:** written, open-ended, problem solving questions.

Average scores during term (n=441): **66%**



### Measuring Retention

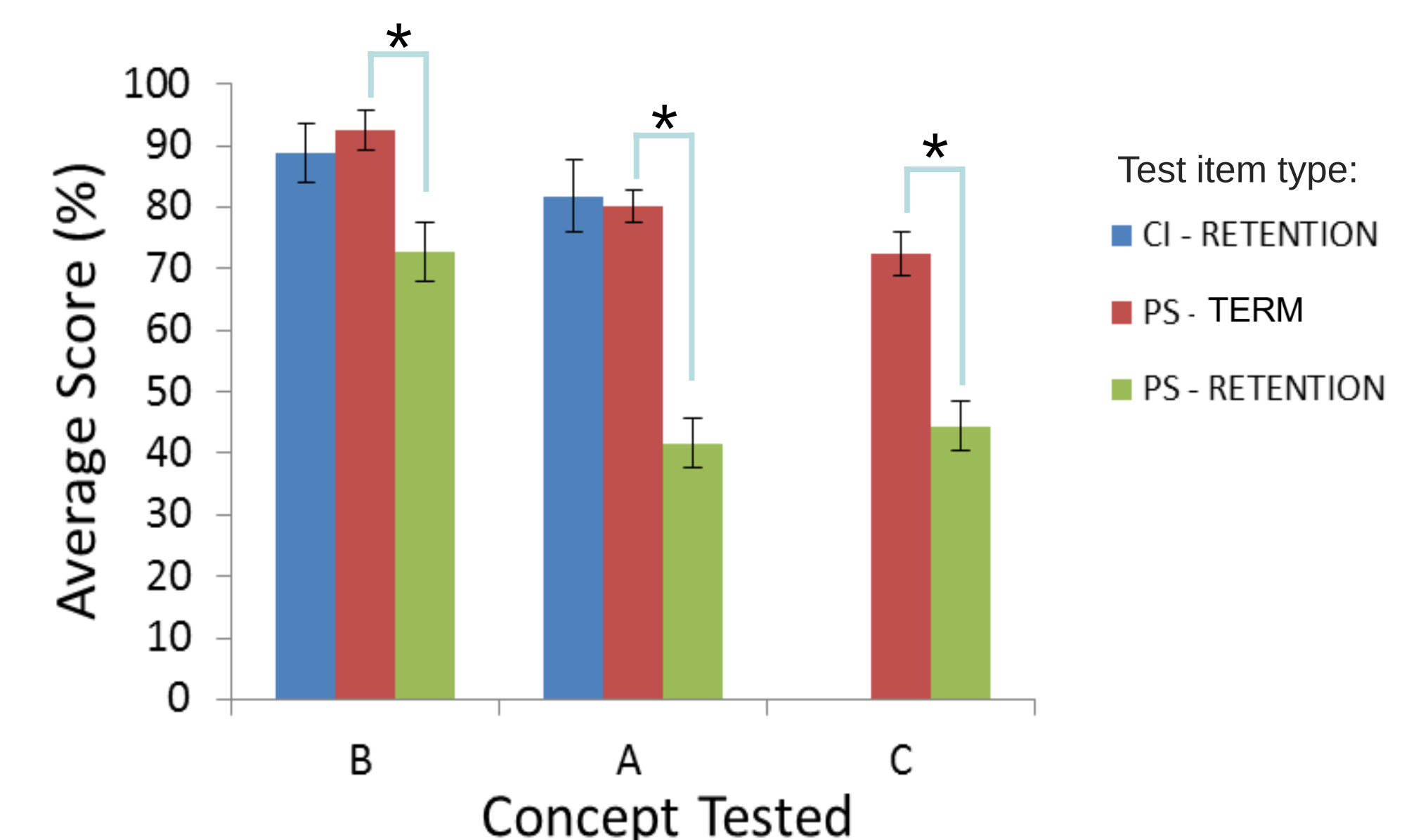


**Figure 1.** Student performance on concept inventory (CI) and the Problem Solving Tests [midterms (I, II), final exam (III)], +/- standard error. N=44. \* t-test, p<0.01.

### Conceptual vs. Problem Solving

Selecting the correct response on the conceptual test (CI) was not correlated with performance on a problem solving (PS) test item that required understanding, application, or integration of that same concept.

| CI Item   | PS Item Required: | Correlation |
|-----------|-------------------|-------------|
| Concept A | Apply             | -0.19       |
| Concept A | Integrate         | 0.07        |
| Concept B | Understand        | -0.16       |
| Concept B | Apply             | -0.14       |



- Reduced success at solving problems at the time of retention resting, \*t-test p<0.01.
- Items which students rely more on memorized tactics (A, C) have greater losses.
- Conceptual understanding (B, A) not correlated to problem solving ability.

### Knowledge gone?

2.5 months after the course, **conceptual understanding retained** but **ability to apply concepts to solve problems is reduced**.