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## Abstract

Note-taking is a strategy widely utilized to facilitate the learning process. Studies show that note-taking is related to improved course performance. However, most students tend to take notes in outlines, which restricts relational learning. This particular study introduces the use of graphic organizers in note-taking in a college-level biology classroom. We compared the effects of matrix-style notes to outline notes on test performance and surveyed students' attitudes towards the use of graphic organizers as a note-taking strategy. Preliminary data show that graphic organizers yield positive results after an initial learning period.

## Introduction

Note-taking and the subsequent review of those notes have generally been thought to be important strategies that contribute to student learning. However, it has been shown that most college students tend to organize their notes in a linear or an outline form (Gubbels, 1999). In an attempt to provide an optimal learning system, the SOAR study method, developed by Jairam and Kiewra, proposes study strategies that include selection, organization, association, and regulation of information (Jairam & Kiewra, 2009). Particularly in organization, the use of graphic organizers as a means of note-taking is presented as a way to encourage students to think relationally. Thus, the goal of this research project is to assess the effectiveness of graphic organizers in note-taking during lecture as well as review afterwards, specifically in a college-level biology classroom.

## Methodology

- *Population*: Students in a Foundations of Biology classroom
- *Outline notes*: Guided outline notes with blanks interspersed amongst the information for each chapter are normally given by the professor.
- *Graphic organizer notes*: Students will be given alternative notes that are arranged into a series of graphic organizers in place of the outline notes for selected chapters. These notes will have the same information and blanks as the outline notes.

## Methodology

<i>Two Types of Cleavages:</i>		
	cleavage	cleavage
Division?	Complete division of the _____	Incomplete division of the _____
Yolk in eggs?	Occurs in species whose eggs have _____ amounts of yolk.	Occurs in species with _____ eggs.
Examples?	_____ and frogs	reptiles and _____

Figure 1. Sample Matrix used for Chapter 47 (Development).

- *Incentive*: Students will be allowed to turn their graphic organizer and outline notes in with the quiz or test provided at the end of the week for a few bonus points.
- *Quantitative Analysis*: Questions regarding the chapter will be selected from the corresponding test or quiz, and each student will be scored based upon how many of these questions they answered correctly. Using the paired t-test, these data will be compared to that of other chapters in the class that are of comparable length and difficulty.
- *Qualitative Analysis*: Students will be asked to complete a voluntary online questionnaire following the intervention.

## Results

- *Quantitative Results*

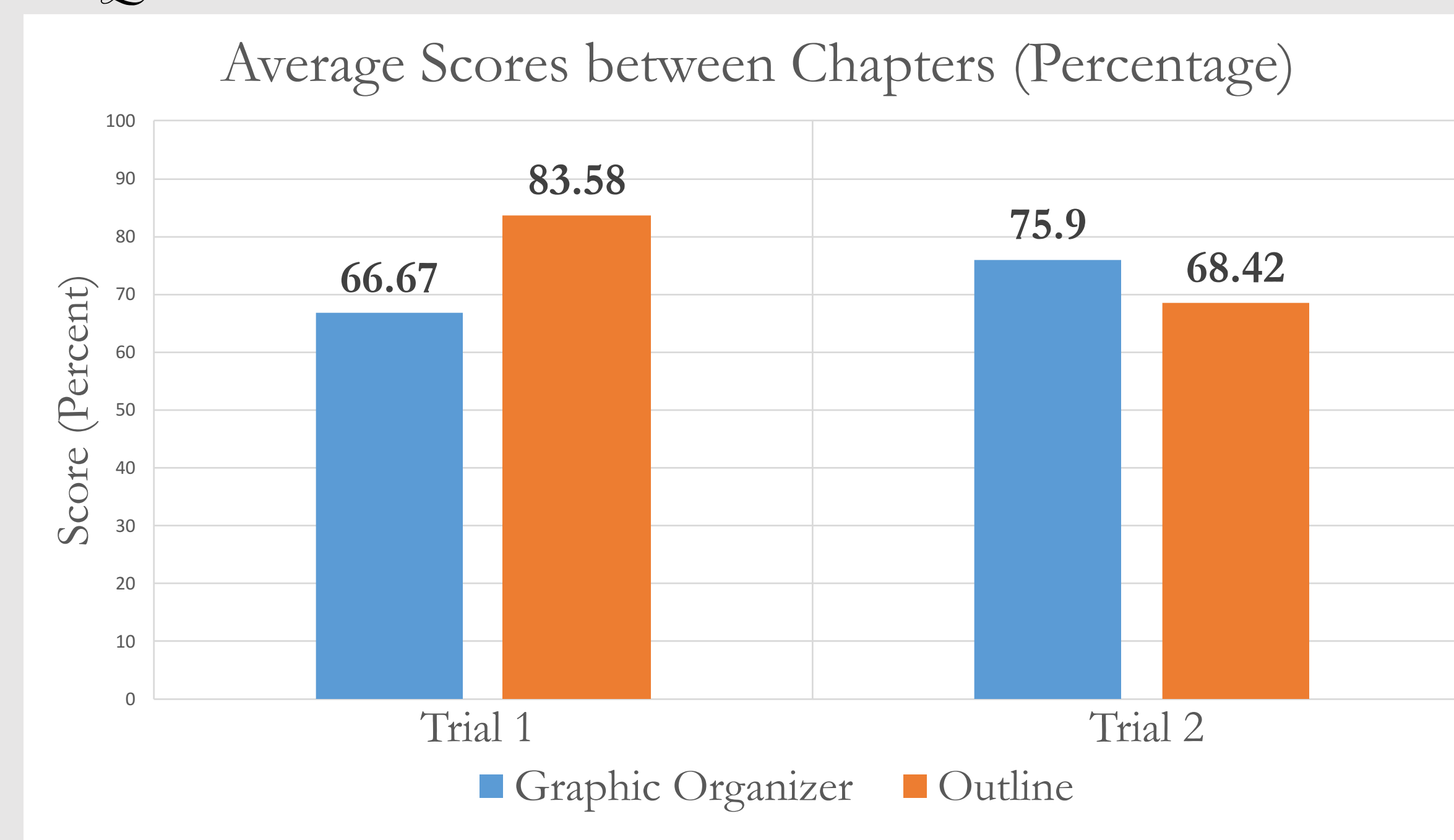


Figure 2. Average achievement test scores from trials 1 and 2.

- Trial 1, scores from Ch. 48 (outline notes) were significantly higher than those from Ch. 47 (graphic organizers) ( $t=-6.275$ ,  $df=44$ ,  $p=0.00$ ).
- Trial 2, scores from Ch. 33 (graphic organizers) were significantly higher than those from Ch. 34 (outline notes) ( $t=2.091$ ,  $df=37$ ,  $p=0.043$ ).

## Results

- *Qualitative Results* (Survey)

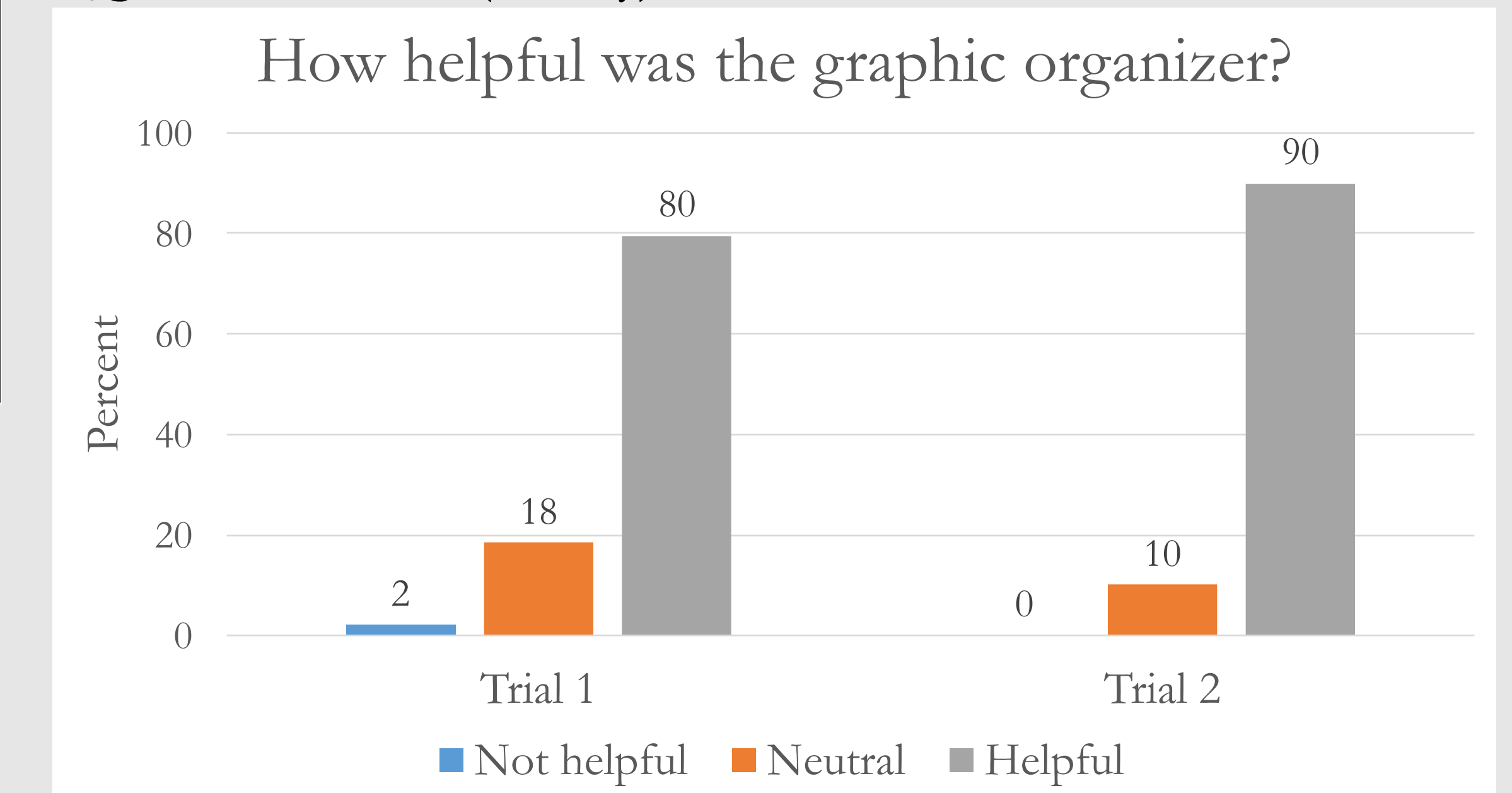


Figure 3. Percentage of responses to a selected survey question for both trials.

## Discussion

- Graphic organizers had a significant, but small effect
  - There was not enough time to see a drastic effect
  - The small effect was anticipated due to number of trials and the scope of the projects
- Limitations
  - Compromise within a pre-planned classroom
  - Ethical concerns (giving everyone equal access)
- Hypothesis: the use of graphic organizers will continue to *improve* students' scores
  - Novel strategies require practice
- Future work:
  - Improved graphic organizers (higher computational efficiency)
  - Extended use (longer test period)
  - Implementation of graphic organizers into class curriculum

## Literature Cited

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