

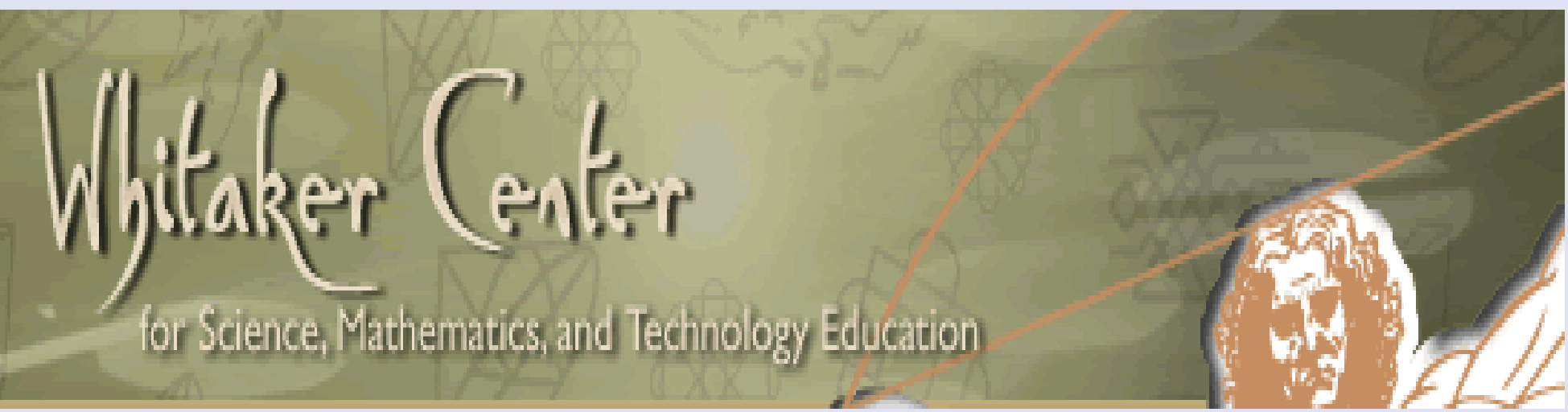


Assessment of Content Knowledge for Diagram or Text-Based Self-Explaining

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Hypotheses

- Researchers proposed that by introducing the element of storyboarding as a rehearsal tool for students, retention of the particular information rehearsed will be superior to that of students who were taught using the traditional manner of presentation.
- Students may be able to communicate a fundamental and powerful concept through text, but be unable to provide adequate visual representation of the concept, resulting in confusion as to whether they know the material.
- Researchers question whether tests adequately reflect student understanding.

Introduction

- Graphic representations of complex scientific and mathematic concepts have been shown to be an effective tool in transmitting complex ideas to students in these fields.
- One explanation may come from the possibility that in presenting students with visual representations of problems, they are able to create self-explanations for the issue, rather than to only rely on specific wording used by the instructor and text to describe the problem.
- By creating self-explanations, students may form more salient cues to retrieve the information by using self-relevant language and examples.
- Currently, traditional assessment practices often test recognition of concepts using text (e.g. multiple choice).

Method

Participants: Undergraduate students at Florida Gulf Coast University, enrolled in General Biology I, a science course for students majoring in science and various health professions that focuses on cellular and sub-cellular biological concepts.

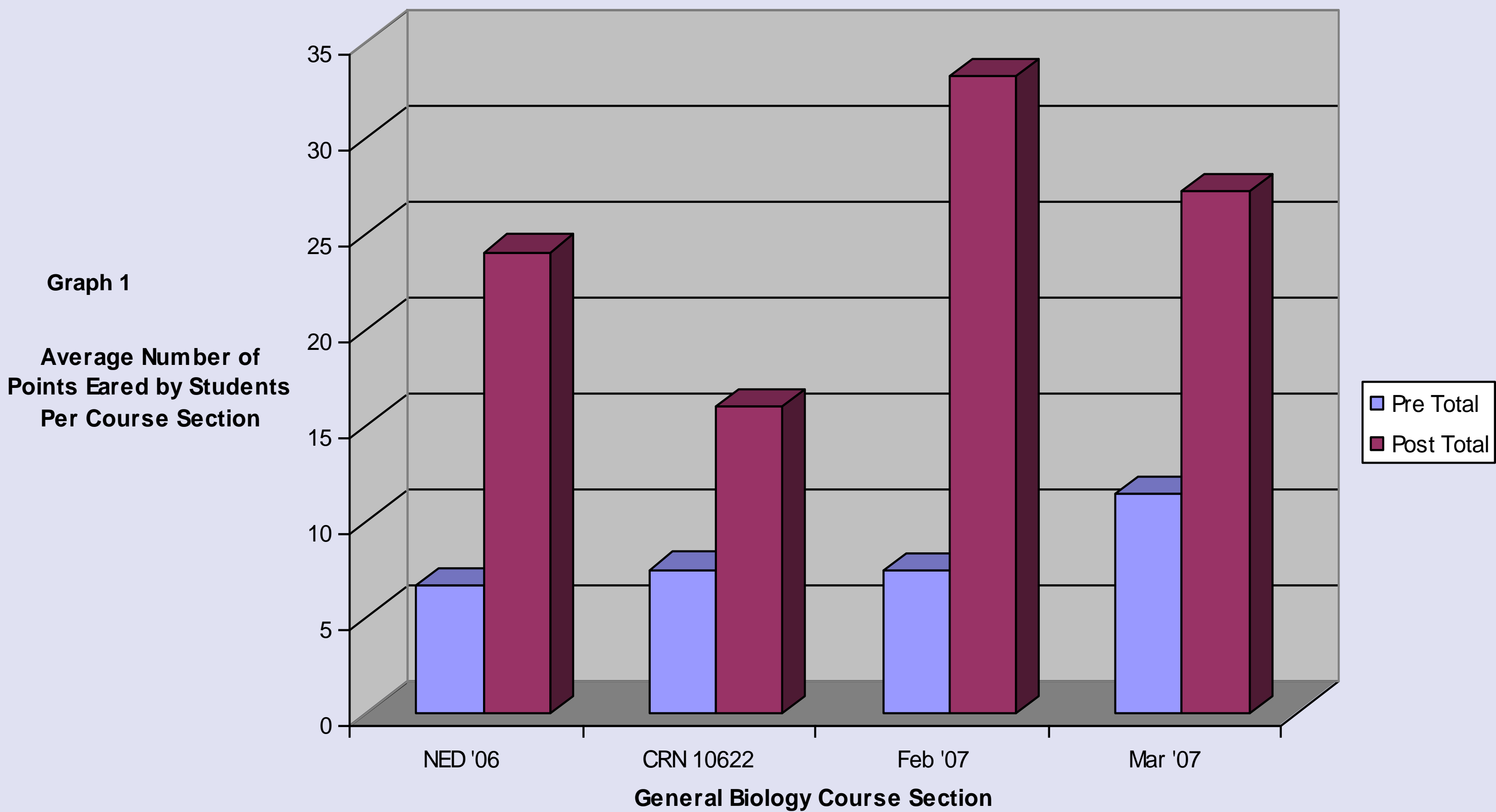
Procedure: Various faculty were invited to participate in the study by using the story boards in their classes in the manner proposed by the researchers or through any modification they proposed.

Students completed a worksheet before and after in-class exercise utilizing **3M's Water Models**.

After an activity or lecture on the topic of the storyboard, the science of water, students were asked to fill out the "Post" side of the worksheet. Some students did the "post" during class, and others as homework to be turned in at the following class session. Some sections used the boards again 2 months later.

Students' responses on the storyboard worksheets were evaluated by the investigators and recorded on a tally sheet. Responses were rated on a 4-point Likert scale ranging from 0 to 3 where 0 indicated no response and 3 indicated a complete response.

Pre and Post Test Results for Storyboarding Activity



Pre and Post Test Results for Students' Drawing and Writing of Answers

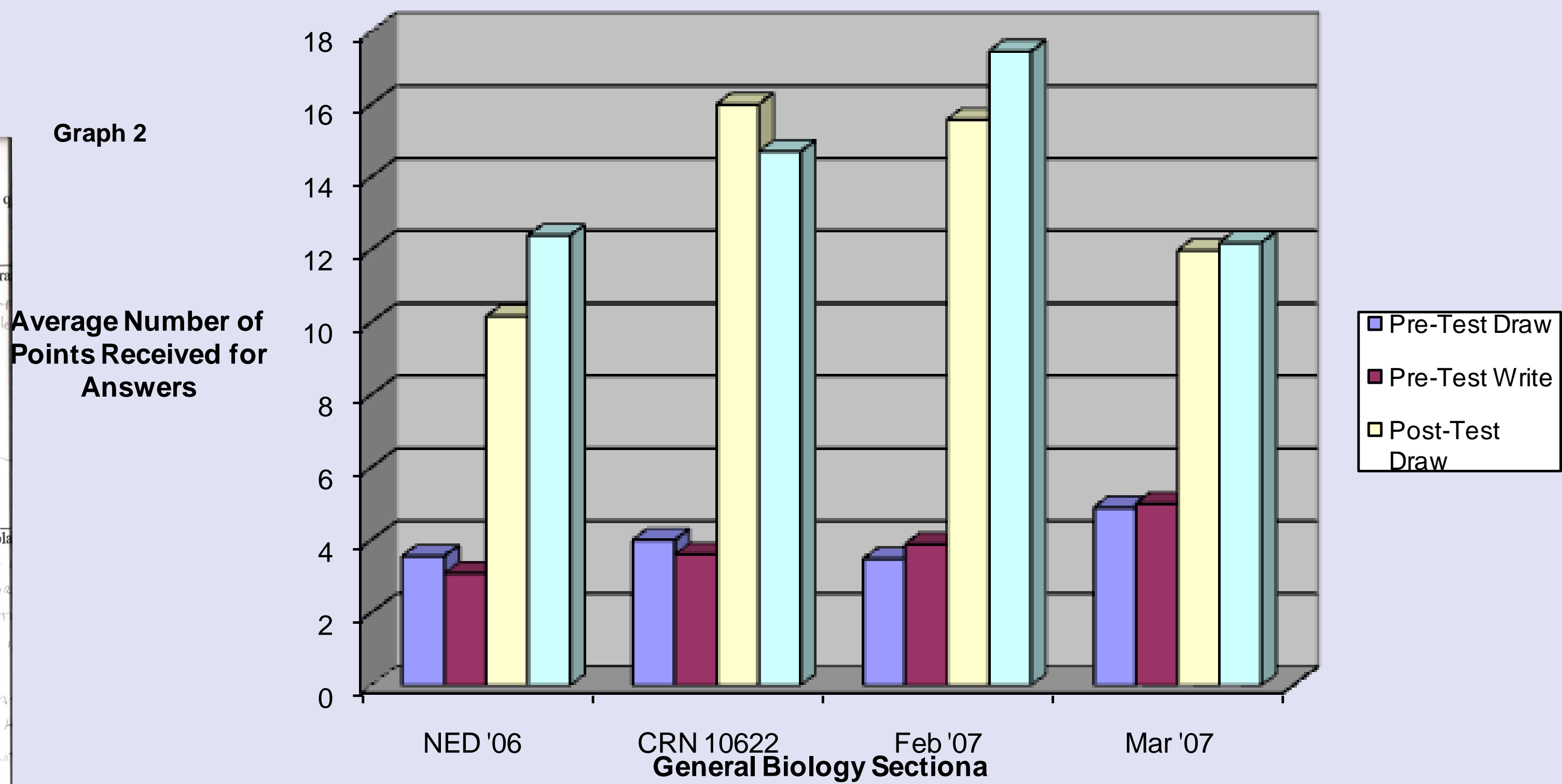


Figure 2: Sample Storyboard worksheet filled out by students after a directed water science activity.

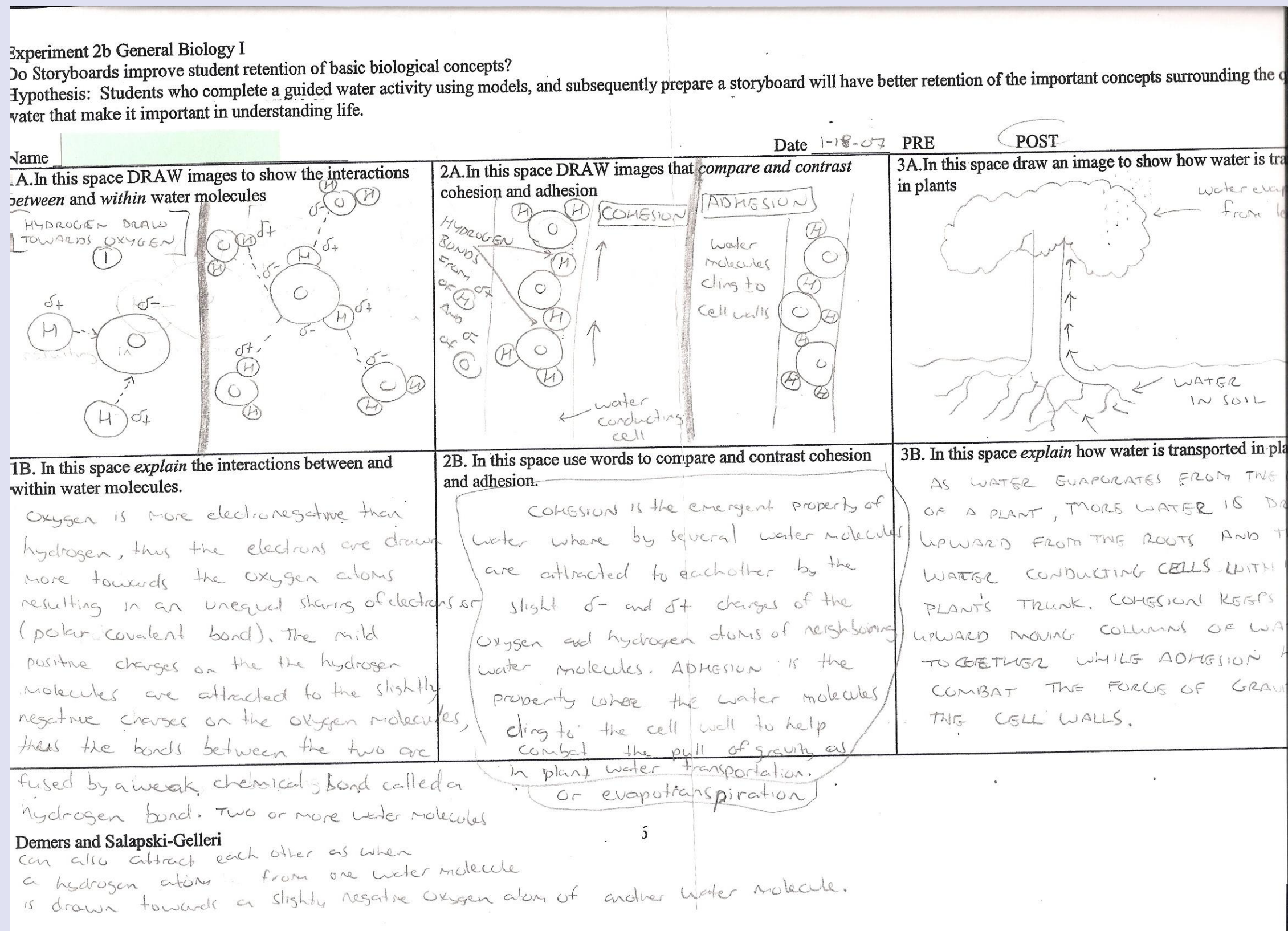


Figure 1: Type of Class and Administration of Storyboard Tool

Class	Course	Number of Students	Males	Females	Mode of Administration
Fall '06 (NED)	Biology	74	28	46	Pre-Test/Activity/Post-Test: In-Class
Spring '07 (CRN 10622)	Biology	62	25	37	Pre-Test/Activity/Post-Test: Homework
Spring '07 (Feb. Shapiro)	Biology	66	29	37	Pre-Test/Activity/Post-Test: Homework
Spring '07 (Mar. Laser)	Biology	51	16	35	Pre-Test/Activity/Post-Test
Jan '08 (A. E)	Human Systems	75	18	57	Homework Only

Results

- 1.A clear difference exists between the Pre and Post scores for the majority of students (Graph 1).
 - Students scored significantly lower on Pre activity answers versus Post activity
- 2.Two of the four groups tested showed a significant difference ($p < .05$) between Drawing and Writing on the Post-Test (NED '06 and Feb '07) (Graph 2).
- 3.No difference was found for Gender, that is males and females did not show significant differences in their content knowledge for Pre and Post test items.
- 4.SAT was correlated with Total scores for PreTestDraw, PreTestWrite, and PostTest Draw
- 5.GPA was correlated with SAT, PreTestWrite, PostTestDraw, and PostTestWrite.

Discussion

- Students improved in their ability to express verbal as well as pictorial representations of basic Water Science knowledge after participating in a guided lab on the topic, although not as much as hoped.
- Student scores on the Post-test activity were on average about 30% of total points available for the activity.
- Faculty buy-in is needed for this sort of activity to become a part of program assessment. Various strategies will be implemented by different participants, which must be taken into account when planning program assessment.

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