

Making Organic Chemistry Relevant

A poster session presented as part of the Chemistry Division's program during the 2004 Annual Conference of SLA in Nashville, Tennessee



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Given the task of incorporating a 20 minute information literacy component into an organic chemistry lecture to students waiting to take a quiz, I opted to create an online tutorial with an accompanying assignment. The instructor requested that the tutorial include resources to determine physical properties of compounds, Scifinder Scholar, ACS Journals and Web of Knowledge. Dreamweaver was used to create the website and Adobe Photoshop used to create images. Animation was excluded to eliminate accessibility as a problem and because the site had to be completed within two weeks. The tutorial was designed to teach on two levels; to students familiar with library resources and to those students who have never used the resources of the library.

A recurring complaint students make about organic chemistry is that it is not relevant to their lives - except for being a required course. To address this a current events article was used to connect the different components of the tutorial (physical properties, SciFinder Scholar, etc.) and turn it into a story. Food chains had been sued by a consumer group for not labeling farm-raised salmon "dye added". Dyes are actually added to the salmon feed. One of the dyes, canthaxanthin became the focus of the tutorial by asking the questions: what is it; what are its physical properties; and what studies have been conducted showing the effects of the dye on humans. Students found the topic "interesting".

Introduction

Teaching courses in organic chemistry can be frustrating since students do not usually see any relevancy of the subject to their lives – except as a required course. Teaching information literacy for one lab exercise can be equally frustrating. In the past, librarians at the J. Willard Marriott Library have taught information literacy to organic chemistry students by presenting a 20 minute lecture on all of the resources used by chemists, e.g. handbooks of physical properties and article databases. After the presentation, the students were given an assignment to be completed by their next lab session, usually 11 days later.

The assignment dramatically increased the number of users asking questions at the science and engineering reference desk. This may have been good for reporting statistics to ARL, but it also indicated the ineffectiveness of the presentation. Students found the assignment frustrating since they had nothing to refer to for guidance. Therefore, it was suggested to the professor that an online tutorial would be a better medium by which to teach the students. He agreed to this and development of an online tutorial began in late Spring 2003 for use in Summer 2003. The objective, therefore, was to develop an online tutorial that provided an example of the relevancy of organic chemistry to everyday life. Records of desk statistics were used to monitor the success of the tutorial in teaching chemistry resources.

Procedure

The Story

So how do you interest students in a subject they generally do not relate to very well? News articles can be about organic compounds – drugs, herbal medicine, environmental contaminants, and food additives are a few examples. During May of 2003 a news story broke about the food dyes added to the feed of farm-raised salmon. Two dyes were identified, astaxanthin and canthaxanthin. This news item became the story line for the tutorial.

The tutorial was written to demonstrate to the students how to answer the questions:

- What are the physical properties of the dyes?
- What research has been conducted to determine how safe they are for human consumption?

Students learn that different resources do not always provide the same answer while searching for the physical properties in handbooks. Searches of Scifinder Scholar and ACS Publications for existing research introduced students to different types of article databases. The tutorial also showed students how to follow research by searching Web of Knowledge Science Citation Index.

The Assignment

The assignment was a revised version of the original assignment. It consisted of typical questions to force the students to use the resources. As a result students learned how to use chemistry resources from the tutorial and then applied this information to complete the assignment.



The Website

to see the website click the salmon



Macromedia Dreamweaver MX was used to create the website and Adobe Photoshop 7 used to create images. Cascading style sheets originating from the Science and Engineering Library's website were incorporated to ensure uniformity within the tutorial and also with the Science and Engineering Library's website, thereby branding the tutorial ([figure 2A](#)). Animation was excluded to eliminate accessibility as a problem and, more importantly, because the site had to be completed within two weeks.

The assignment was provided to students in MS Word format directly from the tutorial ([figure 2B](#)). Students were required to hand in a printed copy of the completed assignment. The tutorial consisted of eight pages ([figure 2C](#)). Page 1 was an overview. Pages 2-8 each described one resource. Navigating the tutorial was straightforward – finish page one, go on to page two... The linked page numbers were repeated at the bottom of each page to facilitate navigation.

Since the class could possibly consist of freshmen to graduate students, the tutorial was designed to teach at multiple levels of expertise ([figure 2D](#)). Students decided what information about the library and literature research they needed to learn from the ADDED TOPICS feature before starting the tutorial. Prompts to learn this information were peppered throughout the tutorial in the event this step was omitted by the student.



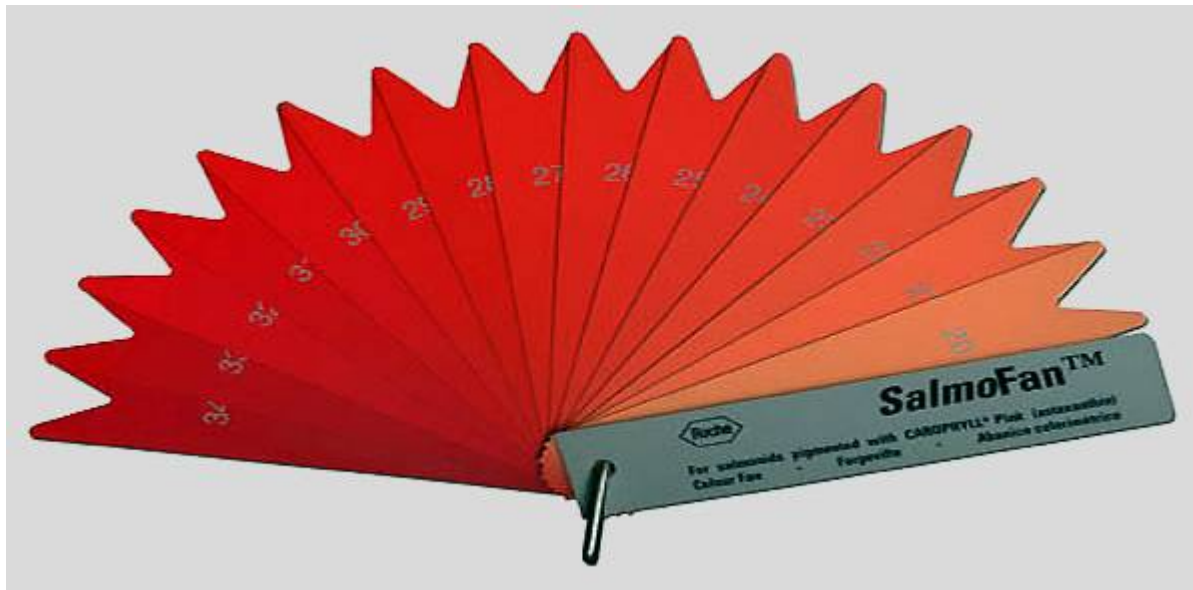
Monitoring Success

An MS Access database had been developed to record desk statistics, e.g. the reference and directional questions ([figure 3](#)). Desk statistics were used to track the number of questions recorded during the assignment (referred to as “lib lab”) and for the period immediately preceding the assignment (referred to as “before”). The desk statistics used were for Fall 2002, Winter 2003 when students only heard a presentation before the assignment and for Summer 2003, Fall 2003, Winter 2004 and Summer 2004 when the students learned from working through the online tutorial followed by the assignment. For Fall 2002 the time periods lasted 14 days. For all other semesters the duration was 11 days.

Data were tabulated for the six semesters and the results weighted to take into consideration the differences in class size. The results were graphed. The weighted difference between the lib lab and the before time periods were calculated and plotted for each semester to account for the difference in duration of the time periods. Insufficient data were collected for statistical analysis.

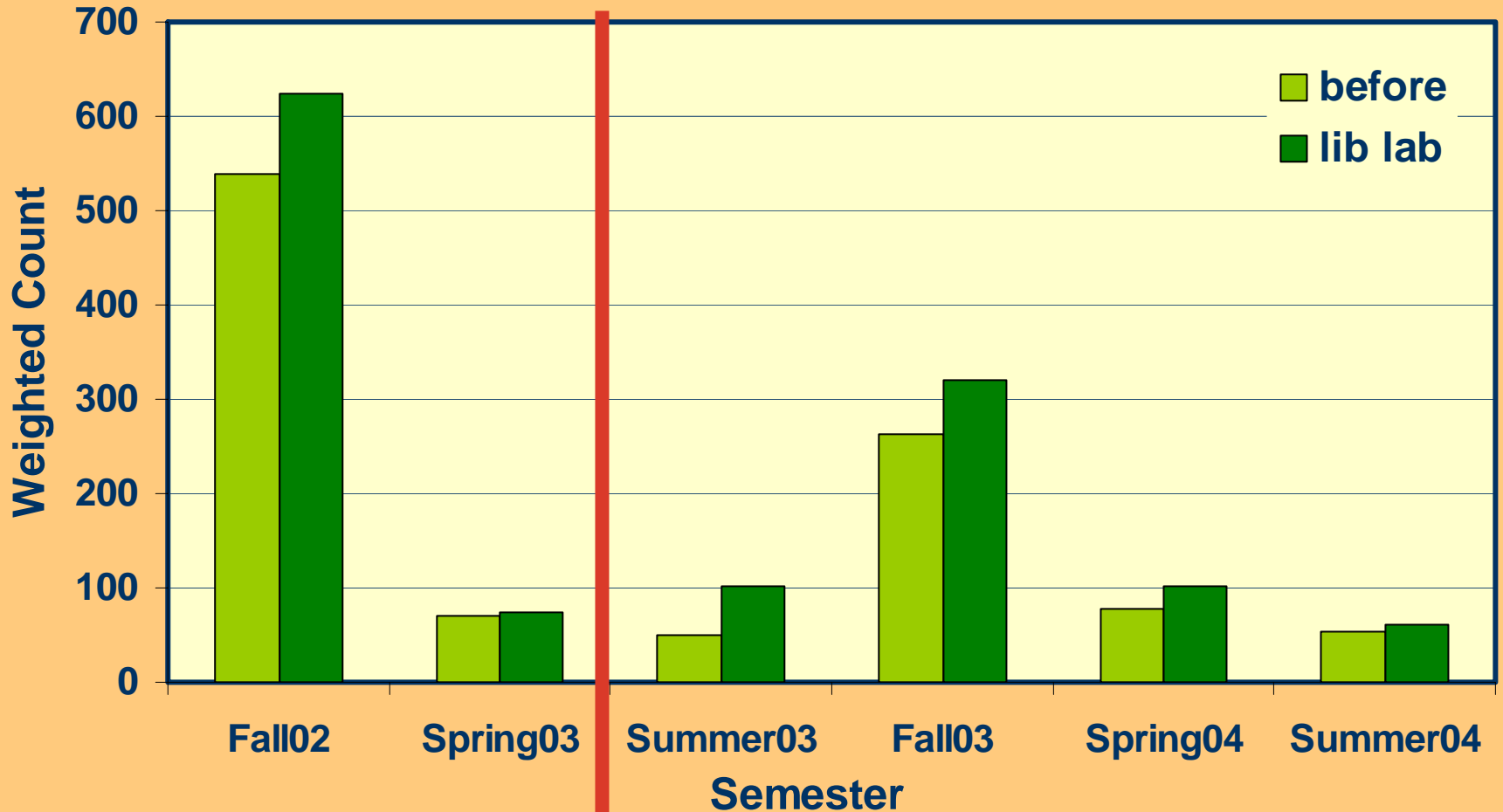
Results

Comments from the students included: Interesting website. Good story. Why don't you pick a story relative to my major -pharmacy? The tutorial has nothing to do with the assignment. See Graphs 1-4.



Graph 1

Weighted Number of **All Questions** Recorded Before and During the Library Lab Assignment

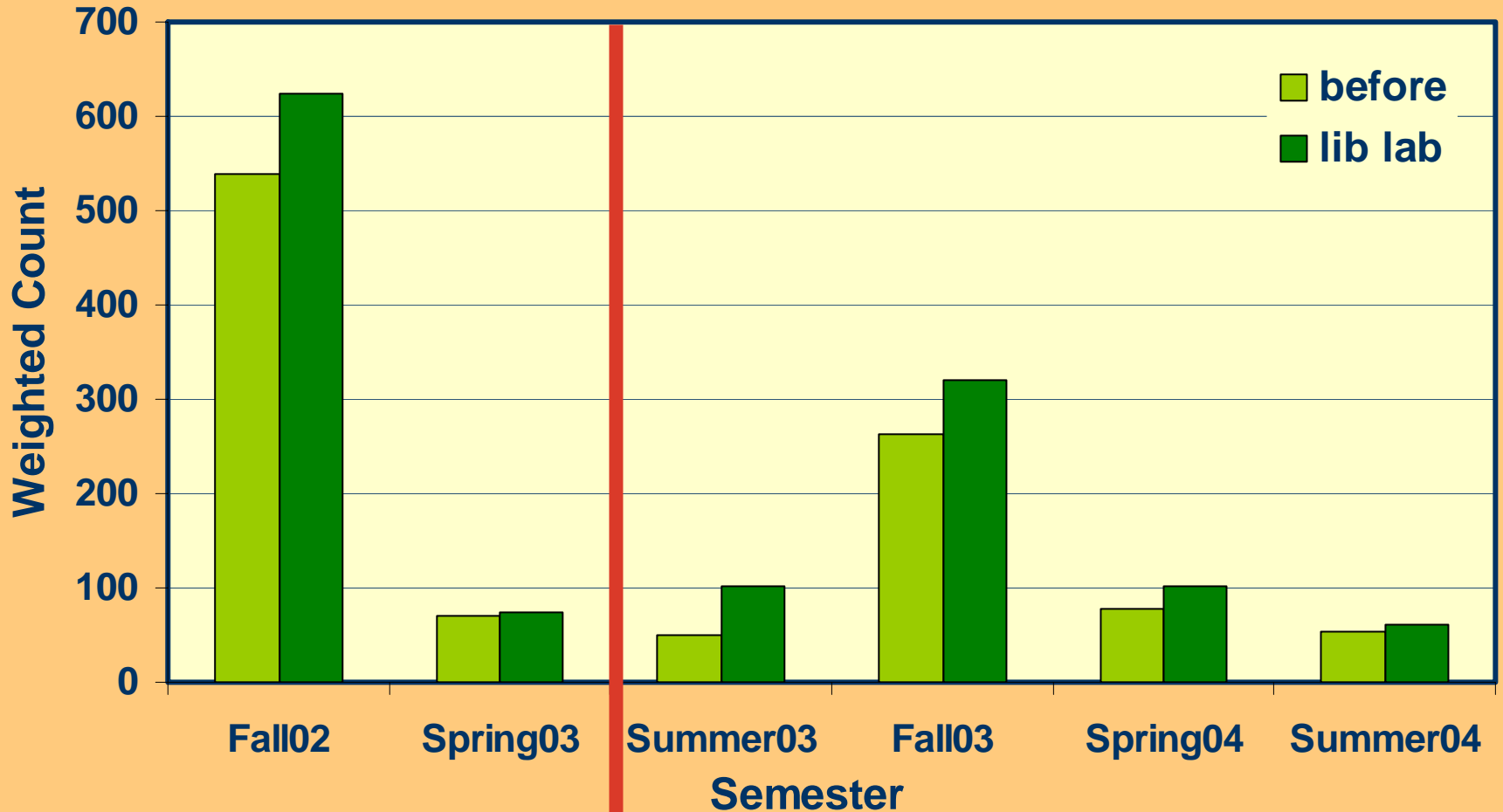


Lecture

Online Tutorial

Graph 1

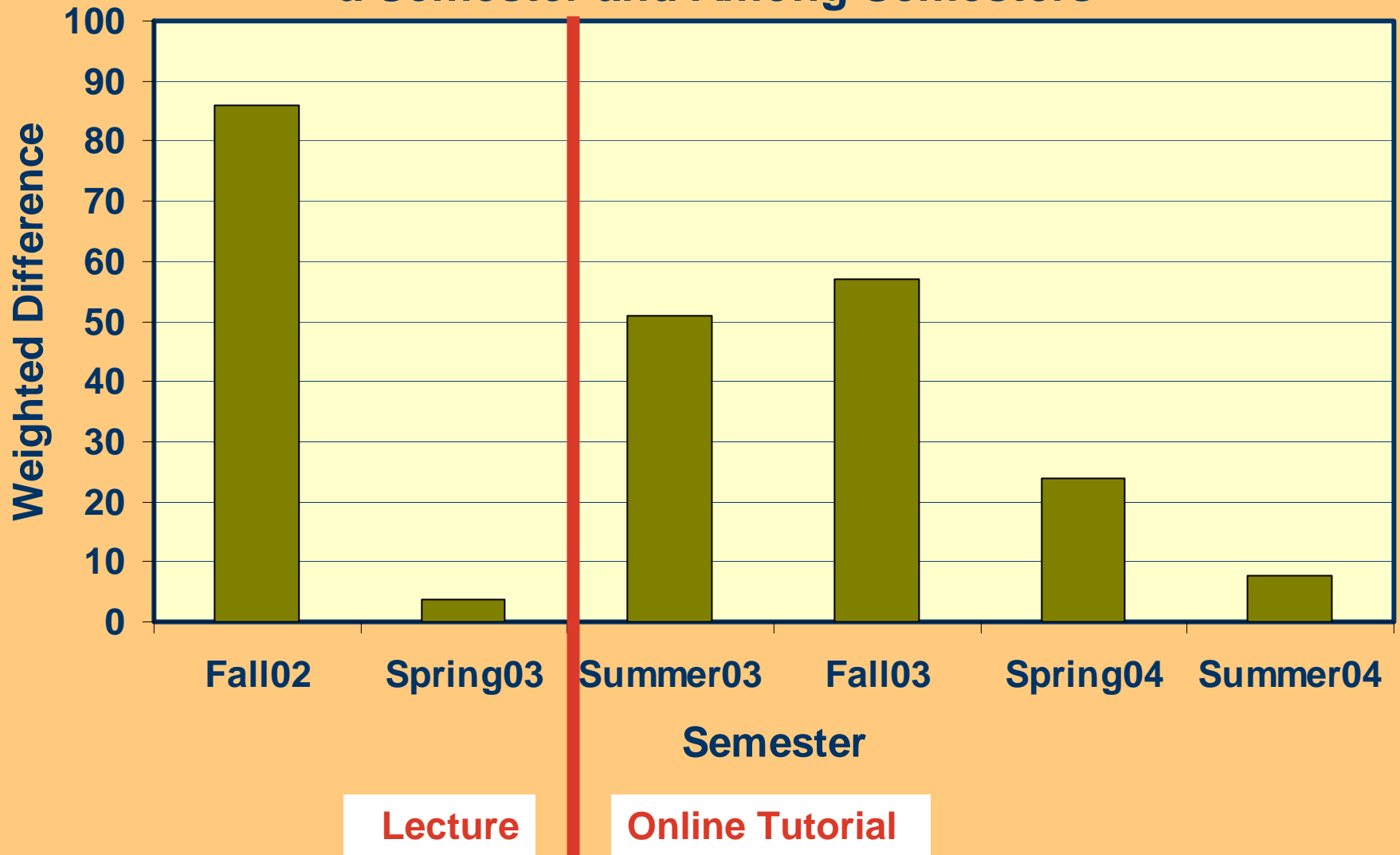
Weighted Number of **All Questions** Recorded Before and During the Library Lab Assignment



Lecture

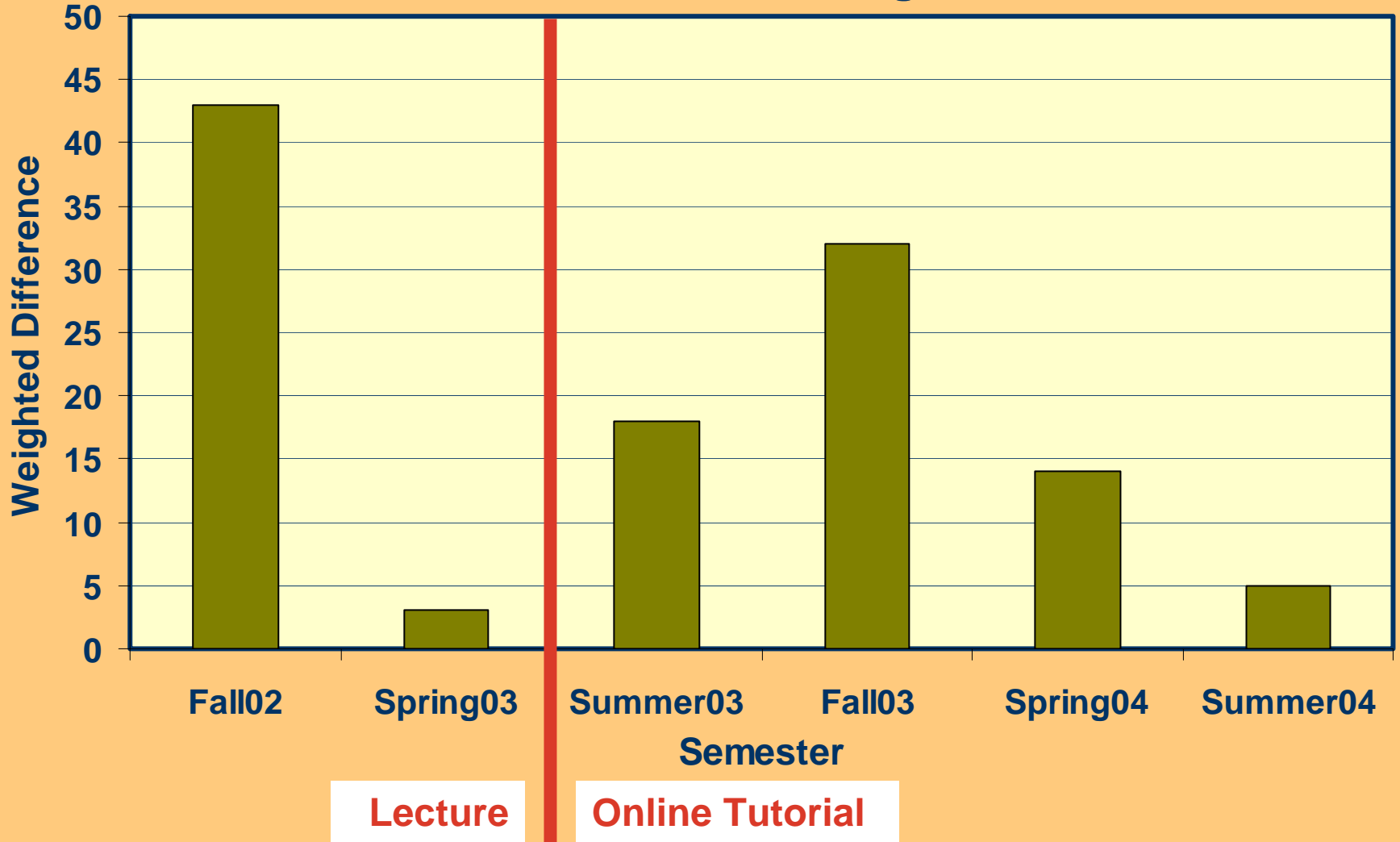
Online Tutorial

Graph 3
Change in All Questions Count Within
a Semester and Among Semesters



Graph 4

Change in the Instruction Question Count Within a Semester and Among Semesters



Discussion and Results

From the comments of both the professor and students the story line used was interesting and demonstrated the relevancy of organic chemistry. The desk statistics collected to determine if the online tutorial improved the students learning of chemistry resources were insufficient. The desk statistics (total and instruction) do, though, demonstrate a drop in the number of questions during the fall semesters – an indication that the tutorial was improving the learning of the information. Data from Spring 2003 appear to be incomplete. The Summer 2004 data, collected during the SLA conference, have been included.

Use of desk statistics could be improved by including a designation for known class assignments. This would allow for isolating of only those records associated with the organic chemistry class.

Storie lines can be gleaned from other sources than the press. Other sources include [Cambridge Scientific Abstract's feature Hot Topics](#) and [Journal of Chemical Education](#).

My colleagues and I are now working on a modular database-driven tutorial which will eventually serve all our science and engineering majors.

