Performance in Related Science Courses

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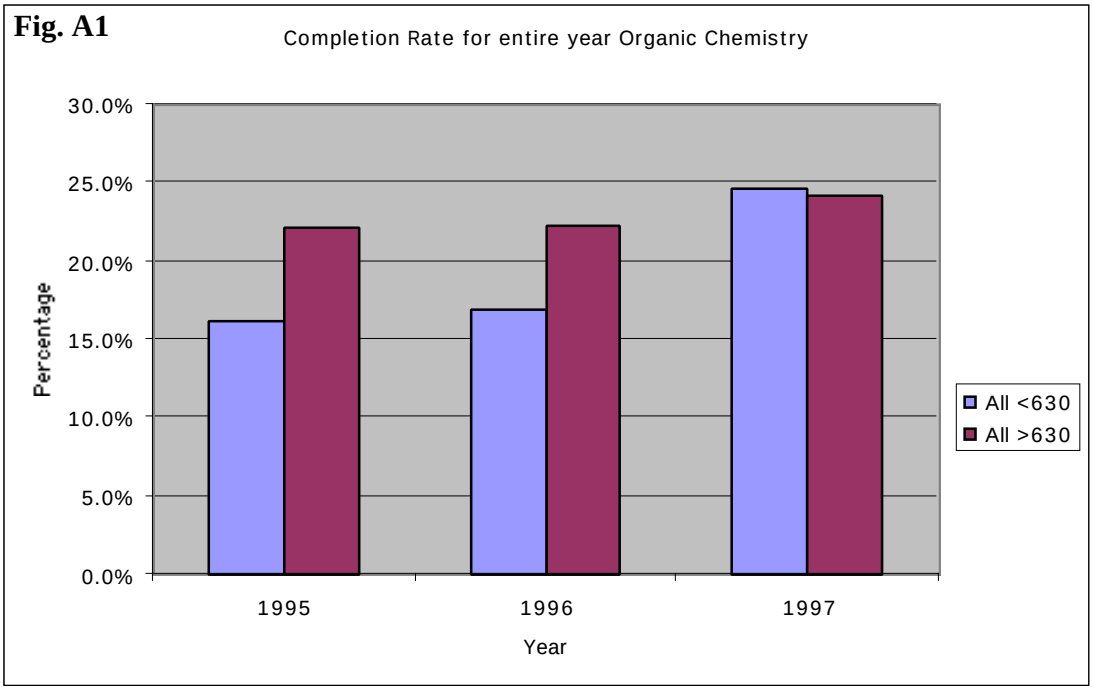
A longitudinal study was performed to examine whether cooperative learning methods, introduced in the first-year General Chemistry course, affect student performance in other science courses. Three year-long courses were studied in particular: Organic Chemistry, Concepts in Biology, and General Biology. A sizeable fraction of the General Chemistry clientele take one or more of these three science courses by the end of their sophomore year. At this date, we don't yet have data for a class of juniors who experience CHEM 113/114.

It is useful to compare the success rate for at-risk students (Math SAT $\leq$ 630) with those who are less at risk (Math SAT >630). Cohorts of these two groups can be tracked before and after CHEM 113/114 was introduced. Years are referenced to the point of matriculation. On occasion, we will look exclusively at the success rates of CHEM 113/114 students, but most frequently we will not differentiate students by the precise General Chemistry course they took.

A. Organic Chemistry

Organic Chemistry is typically taken in the sophomore year by students majoring in pre-professional studies, biological sciences, chemistry, and biochemistry. Figure A-1 shows the success rate, defined as the number of students completing one full year of Organic Chemistry with a grade of C or better, divided by the number of students from the same class who started General Chemistry in the first year.

Fig. A1



The average grades earned by students in the first and second semesters of Organic Chemistry are shown in Figs. A-2 and A-3, respectively.

Fig. A2

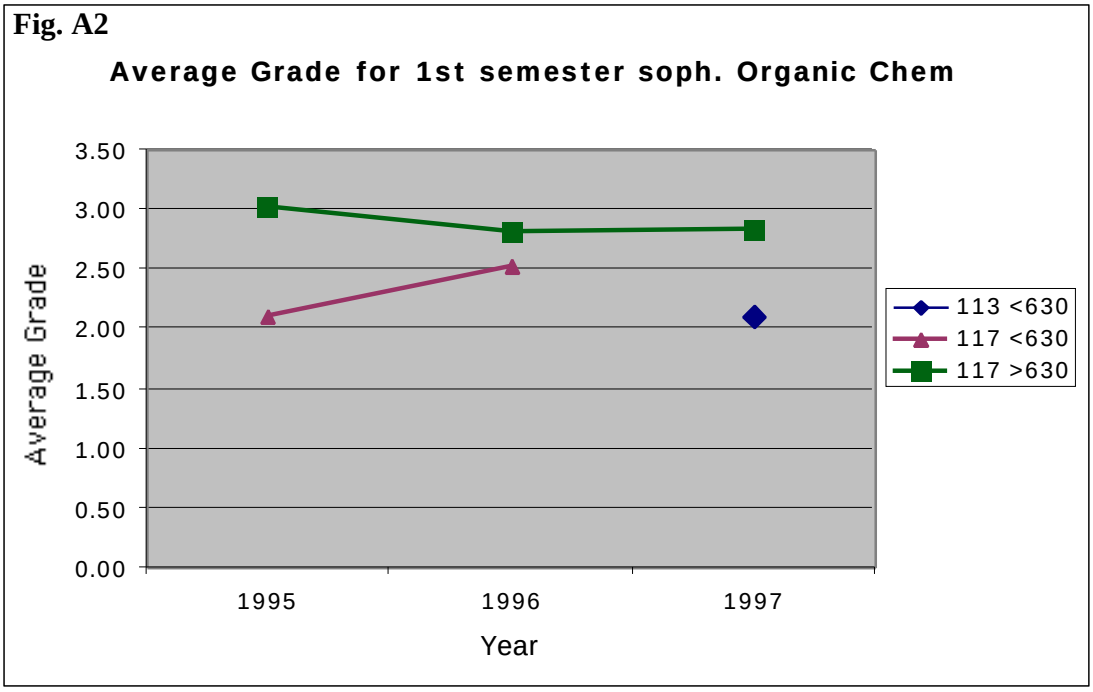
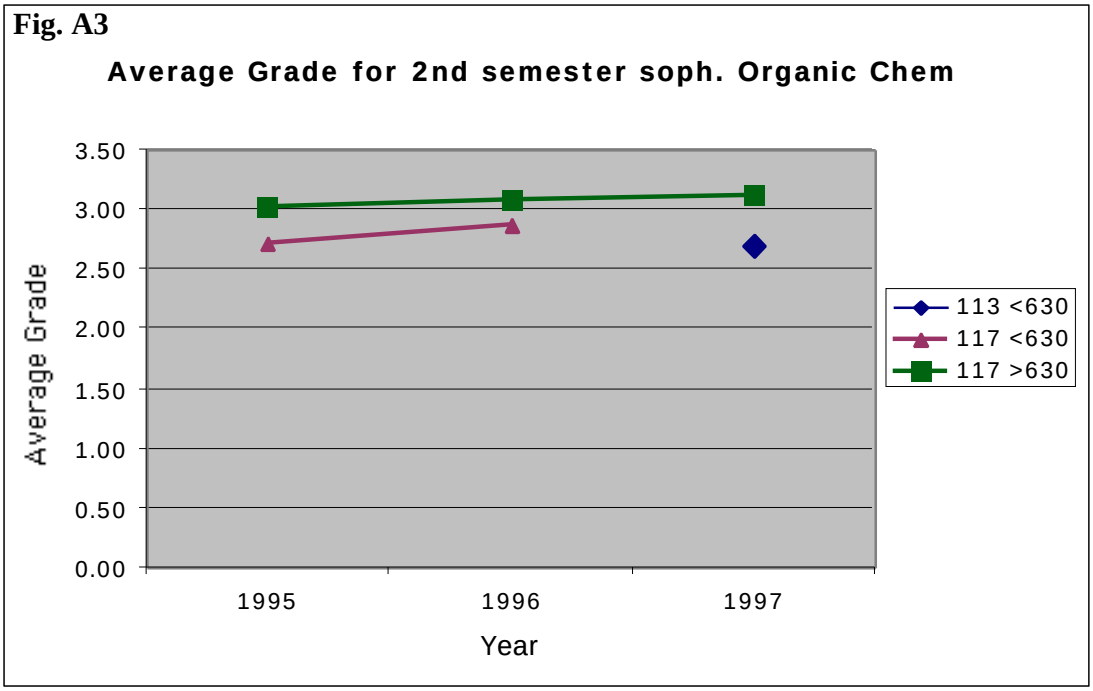


Fig. A3



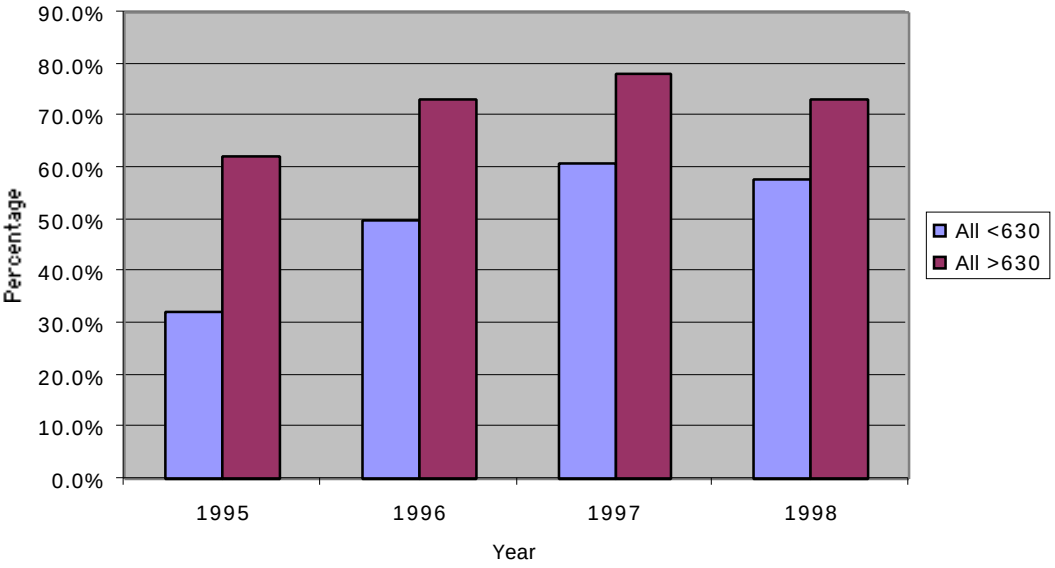
"At-risk" students performed 2/3 and 1/3 of a letter grade below non-at-risk students in the Fall and Spring semesters of 1998/99 (matriculation - 1997). This was a bit worse

than the previous year's class but comparable to the class two years prior. It is expected that with a 50% increase in the number of at-risk students completing the course the average GPA will drop. The average grade earned by at-risk students in CHEM 113 in the first year also lagged behind the grade of non-at-risk students in CHEM 117 by approximately 2/3 of a letter grade.

B. Concepts in Biology

This two-semester course (BIOS 155/156) is designed for first-year students intending to major in biology or biochemistry. Thus it is commonly taken concurrently with General Chemistry. Because it is a first-year course, we have data for two years where CHEM 113/114 was offered (1997 and 1998). The percentage completion rate has risen for the at-risk population over the past four years.

Fig. B1



Figures B-2 and B-3 show the average grade earned by at-risk and non-at-risk students for the Fall and Spring semesters over the past four years. Here the at-risk students tend to lag behind the non-at-risk students by 1/2 of a letter grade. This performance gap is preserved both before and after CHEM 113/114 was introduced. The at-risk students from CHEM 117 (1997 and 1998) are few in number and are clustered

near the 630 GPA cutoff, therefore their relatively strong grade performance is not statistically significant.

Fig. B2

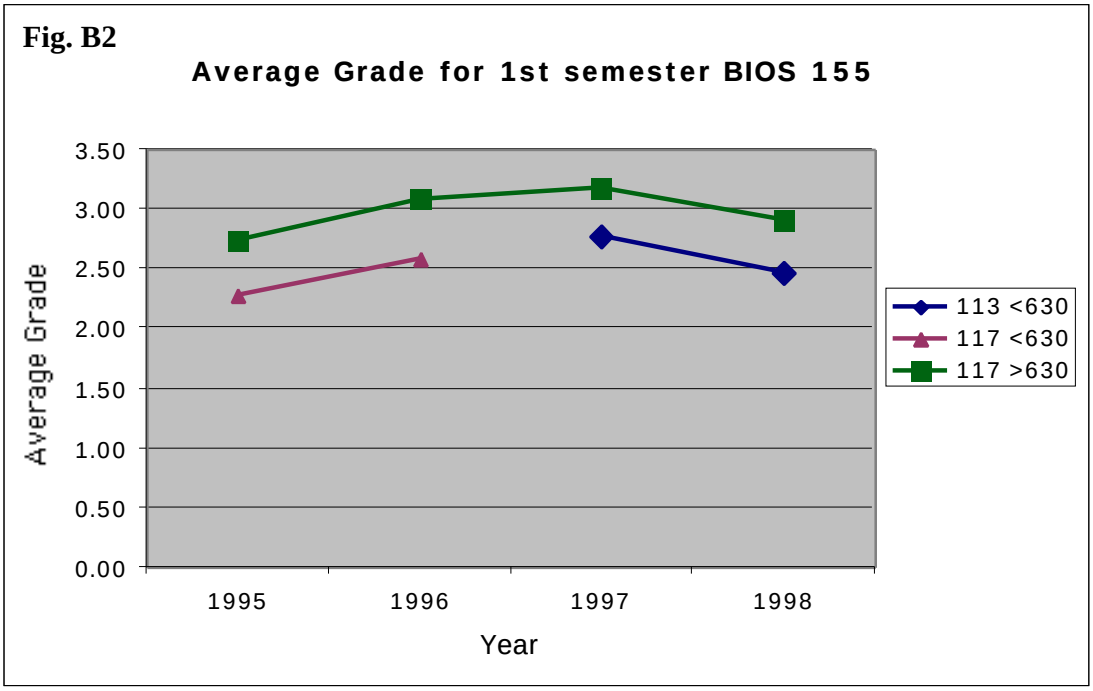
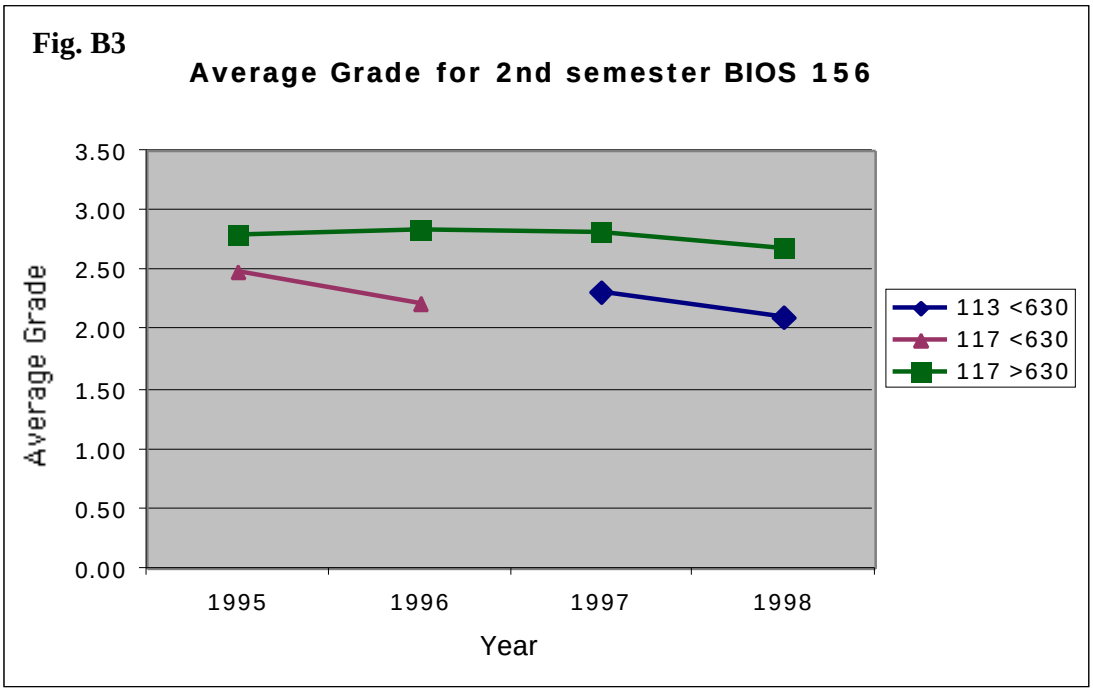


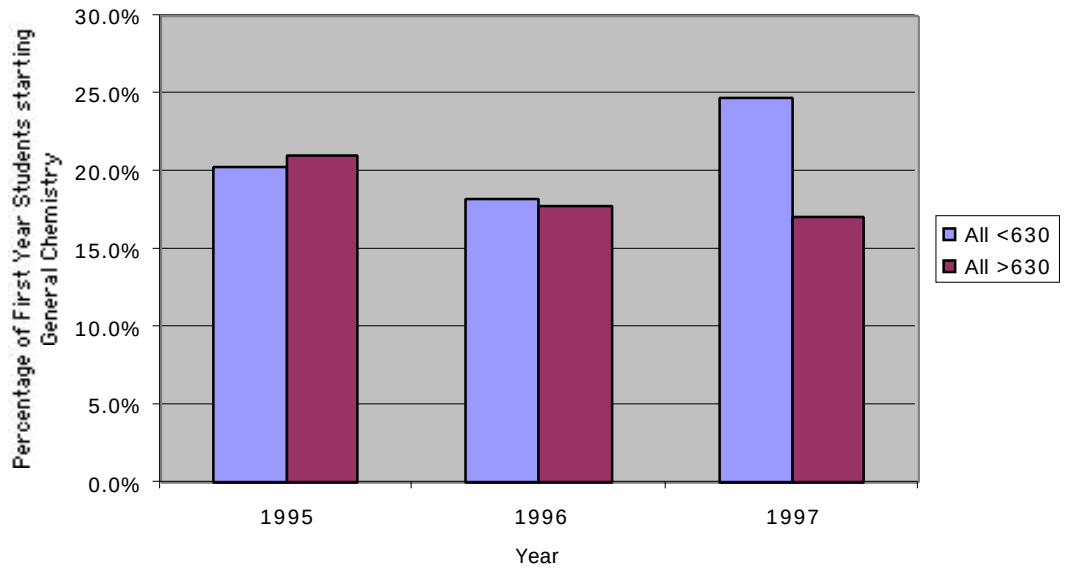
Fig. B3



C. General Biology

Sophomores majoring in pre-professional studies will take BIOS 201/202. Figure C-1 shows the success rate for at-risk and non-at-risk students. The at-risk students who matriculated in 1997 show a dramatically higher completion rate than do the non-at-risk students from the same year.

Fig. C1 Completion Rate for entire sophomore year BIOS 201-202



The average grades earned in the Fall and Spring semesters across this same three-year period are shown in Figs. C-2 and C-3, respectively.

Fig. C2

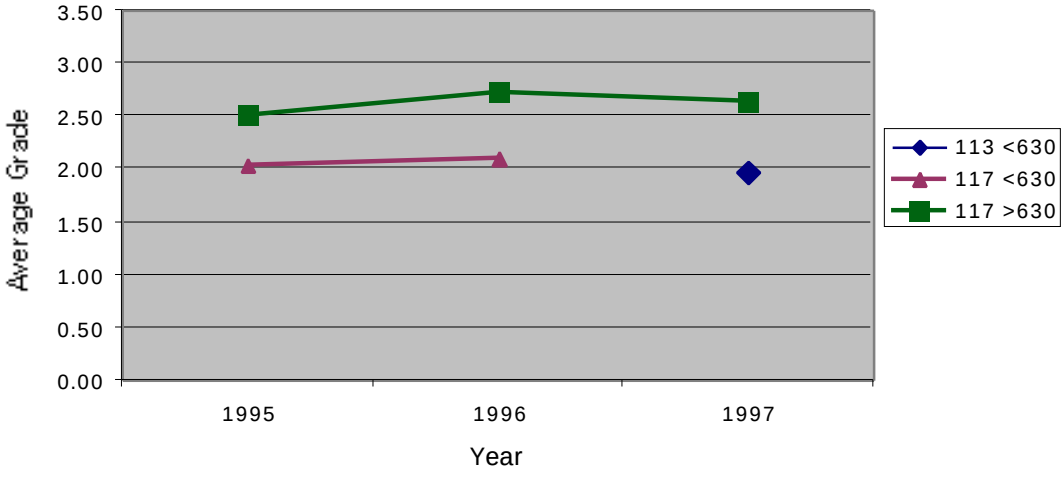
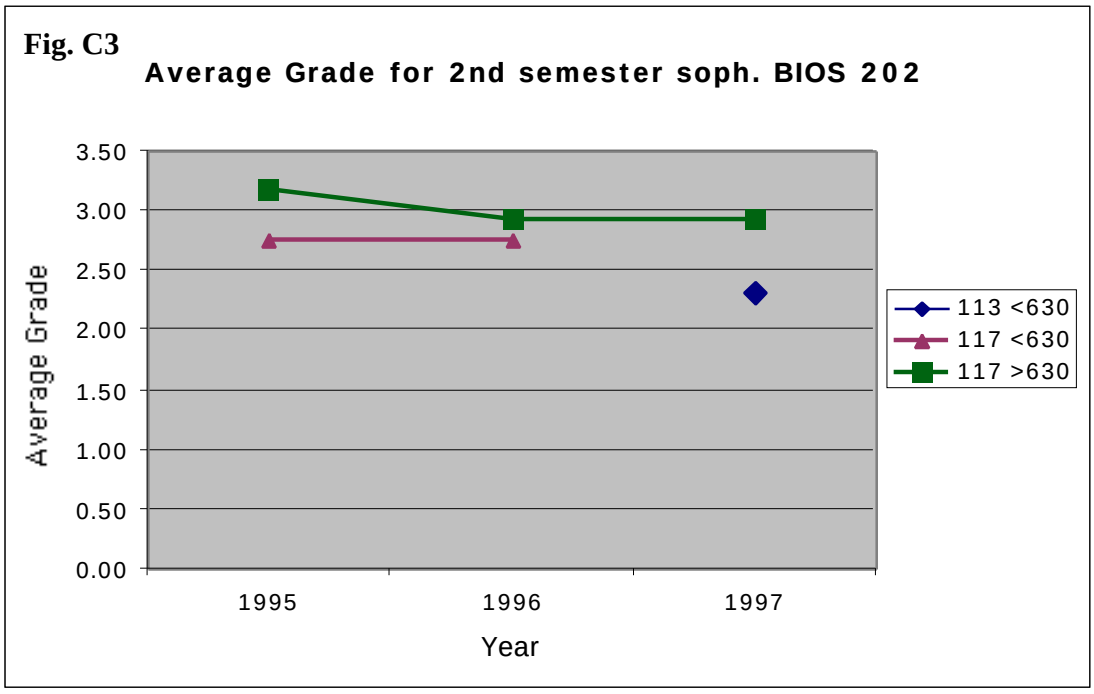


Fig. C3



Again, the at-risk students from CHEM 113 lag behind the non-at-risk students from CHEM 117 by approximately 1/2 of a letter grade.

D. Summary

A longitudinal study was undertaken to examine how CHEM 113/114 students perform in related science courses. Although there is no evidence to suggest that the average grade earned by at-risk students improved with the advent of CHEM 113/114, there is significant evidence to show that the overall success rate of at-risk students in completing sophomore-year science courses has improved by approximately 50%.