

## Achievement in Chemistry under the Single Subject System

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Any innovation that promises more effective teaching of chemistry is of general interest to those seeking to improve the work of their classes and the single subject system, or concentration plan, has many teaching advantages claimed for it.

The opportunity for obtaining data to test these alleged advantages came with the appointment of the writer to Eureka College, where the single subject system had been adopted in 1939, after several years of preliminary testing. Previous to coming to Eureka College, the writer had offered instruction in general chemistry under the conventional plan at Ball State Teachers College and at Indiana Central College at Indianapolis. Records in general chemistry from these schools are available and this paper presents a comparison of the achievements of the groups of students under the two plans.

The single subject system operates on the basis of four terms of eight and one half weeks instead of two semesters or three quarters of the usual school year. Under the concentration plan, a student registers for but one subject each term. Classes meet for three hours daily or a total of about 130 times during the term as compared with usual four hour course continuing through two semesters or three terms and meeting about 144 times during the entire course. In general chemistry, this means, under the concentration plan, two lectures or class hours each morning of the school week with one double-length laboratory period in the afternoon.

The records of students in general chemistry under the single subject plan are available from four classes at Eureka College; these are compared with the accomplishments of four similar classes under the conventional system. Measurement of achievement is taken from three sources, final grades in the course, from the number of superior ratings as well as from the number of unsatisfactory marks. This data has been criticised, perhaps rightly, as defective in that it represents the judgment of one individual, and hence is subjective, and being taken over a period of years, makes no allowance for changes of opinion with the passing of time.

It should be noted that the contents of the various courses were essentially identical under each system. The text used was McPherson, Henderson, Fernelius, and Mack, 1940 edition, and the manual designed to accompany it.

In analyzing the data, a special effort has been made to avoid the terminology and treatment of educational statistics and to present the

material in a less technical manner. Where letter grades were given, these have been converted to grade-points with the usual values of four points for an "A", three points for a "B" and so on with the unsatisfactory rating (F) carrying a negative value of one.

Of the total number of students considered in this study, eighty-seven have received instruction under the single subject plan and an approximately like number under the conventional system. The work of four classes under each system are included.

The average passing grade of the concentration plan students was a 2.0 grade-point rating, a percentage equivalent of perhaps 72%. As might have been expected, the average final grade of the students receiving instruction under the conventional system, also fell within the C— range but a fraction of grade point below that of the concentration students, a numerical equivalent of perhaps 70%.

In the conventional classes 9.3% of the grades were unsatisfactory (F or WD) as compared with 12.5% for the concentration students. The number of "B" or better ratings among the concentration students was 35.3% with one small but exceptional class rising to almost 40% of the marks in the above-average group. The conventionally-taught students consistently received ratings of which 34.2% were above average.

Examination grades on the various types of questions—problems, factual, and explanatory—are less readily analyzed but the apparent tendency from a comparative series of examinations is toward a small but significant higher ratings for the concentration students.

Within the limits of this study, is concluded that: (A) Students in general chemistry are rated slightly higher on final grades in the course than the conventionally taught students.

(B) The number of students rated as better-than-average is greater under the concentration plan than under the conventional system.

(C) The number of unsatisfactory grades is smaller under the conventional plan than under the concentration system.

(D) The concentration plan appears to be more effective for the average to superior student and possibly less desirable for the below-average student.

(E) Additional data and study are needed to establish the relative values of the two systems of instruction.