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STUDENT SUCCESS IN BEGINNING CHEMISTRY (CHEMISTRY 3) AT EL CAMINO COLLEGE, 1964-65.

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THE PURPOSE OF THE STUDY WAS TO DETERMINE THE RELATIONSHIP BETWEEN STUDENTS' ACHIEVEMENT ON BEGINNING CHEMISTRY AND THEIR BACKGROUND PRIOR TO ENROLLMENT IN THE COURSE. OF THE 609 STUDENTS ENROLLED IN BEGINNING CHEMISTRY IN THE 1964-65 ACADEMIC YEAR, 45 PERCENT RECEIVED GRADES OF A, B, OR C. OF THE GROUP STUDIED, 23 PERCENT WERE REPEATING THE COURSE, AND 58 PERCENT HAD COMPLETED HIGH SCHOOL CHEMISTRY. GROUPS IN WHICH OVER HALF OF THE STUDENTS SUCCEEDED WERE (1) THOSE WHO HAD COMPLETED A YEAR OF HIGH SCHOOL CHEMISTRY, (2) THOSE REPEATING A COLLEGE CHEMISTRY COURSE, (3) THOSE WHO HAD COMPLETED MATHEMATICS THROUGH TRIGONOMETRY BEFORE THE CHEMISTRY COURSE, (4) THOSE WHO WERE ENROLLED FOR 12 TO 15 UNITS OF CREDIT, AND (5) THOSE WITH THREE OR MORE POINTS ON THE COLLEGE'S CHEMISTRY PLACEMENT TEST. LACK OF SUCCESS WAS NOTED AMONG THOSE WHO (1) HAD NO PREVIOUS CHEMISTRY EXPERIENCE, (2) RECEIVED TWO OR FEWER POINTS ON THE PLACEMENT TEST, (3) WERE ENROLLED IN FROM NINE TO 11 UNITS, AND (4) HAD NOT COMPLETED OR WERE NOT ENROLLED CONCURRENTLY IN TRIGONOMETRY. THESE FINDINGS LED TO RECOMMENDATIONS THAT (1) A NEW COURSE BE ESTABLISHED FOR THOSE WITH NO PREVIOUS CHEMISTRY; (2) STUDY LOADS OF CERTAIN STUDENTS SHOULD BE LIMITED, AND (3) CHANGES SHOULD BE MADE IN THE PREREQUISITES FOR THE CHEMISTRY PROGRAM AT THE COLLEGE. DETAILS OF SEVERAL RECOMMENDED PLANS, TABLES OF FINDINGS, AND COMPARISONS OF BEGINNING CHEMISTRY GRADES WITH THOSE EARNED IN LATER COURSES ARE INCLUDED. (WO)

STUDENT SUCCESS IN BEGINNING CHEMISTRY (CHEMISTRY 3) AT EL CAMINO COLLEGE, 1964-65

One of a Series of Research Reports

on the Physical Sciences at El Camino College

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STUDENT SUCCESS IN BEGINNING CHEMISTRY (CHEMISTRY 3) AT EL CAMINO COLLEGE, 1964-65

I. Purpose

The purpose of this study was to investigate the relationship between the success of students in the beginning chemistry course (Chemistry 3) at El Camino College and their background in chemistry, their results on the chemistry placement examination, their mathematics background, and their total work load.

II. Summary

Beginning chemistry (Chemistry 3) has proven to be successful as a prerequisite course to general college chemistry (Chemistry 1A) at El Camino College. Students receiving "A" or "B" grades in Chemistry 3 have been highly successful in Chemistry 1A. The status of the "C" student from Chemistry 3 in Chemistry 1A has improved in recent years but a need for additional improvement in the success of these students in Chemistry 1A is indicated by the study.

During the 1964-65 academic year, 609 students enrolled in Chemistry 3 and 45 percent of the enrollees successfully completed the course, that is, received a grade of "A", "B", or "C". Of students enrolled in Chemistry 3 during 1964-65, 23 percent of them were repeating enrollment in a beginning chemistry type of course in college, and 58 percent of the enrollees had completed high school chemistry prior to their enrollment in Chemistry 3.

These facts suggested the need for a detailed analysis of the success of students in Chemistry 3 during 1964-65, in terms of their background in chemistry, chemistry placement scores, background in mathematics, and total work load.

The analysis showed the following groups to be more than 50 percent successful in Chemistry 3: Those who were placed into Chemistry 3 by the placement test after completing one year of chemistry in high school, 51 percent successful; those who were repeating a previous chemistry course taken in college, 57 percent successful; those who received three or more chemistry placement points on the El Camino College chemistry placement scale, 66 percent successful; those who had completed mathematics through trigonometry, 54 percent successful; and those who had a total of five work load units, as defined in this study, when enrolled in Chemistry 3, 50 percent successful.

Groups of Chemistry 3 students which were shown to be less than 40 percent successful were as follows: Those who had not completed any previous course in chemistry, 26 percent successful; those who received two or less placement points on the El Camino College chemistry placement scale, 30 percent successful; those who had not completed or were not concurrently enrolled in trigonometry along with Chemistry 3, 32 percent successful; and those who had a total of nine or more work load units, as defined in this study, when enrolled in Chemistry 3, 27 percent successful.

An analysis of the results of this study has led the author to make several recommendations related to beginning chemistry at El Camino College. These recommendations are outlined in Section III of this report and deal with the establishment of a new course and changes in prerequisites for the present course; consideration of the work load of students enrolling in Chemistry 3; utilization of waivers in exceptional cases; out-of-class materials; and the consideration of Chemistry 3 as a repeat of high school chemistry.

III. Recommendations

Analysis of the results of the study of the success of students in Chemistry 3 has led the author to propose the following changes in the chemistry program at El Camino College. The author believes that the adoption of these recommendations will significantly improve the performance of "C" students from Chemistry 3 in Chemistry 1A and significantly improve the success of students in beginning chemistry at El Camino College without lowering of the standards in the course.

1. Establishment of a new course and changes in prerequisites of the present course: It is recommended that the Chemistry Department adopt one of three alternative plans, described below, as Plan A, Plan B, and Plan C.

Plan A

Establish a new course, Chemistry 3A, 3 units, 2 hours per week lecture, and 3 hours per week laboratory, entitled beginning Chemistry 1. This course would be required of students who have no previous course in chemistry and for students who receive two or less points on the chemistry placement point scale. The prerequisite in mathematics for this course should be, at least, completion of elementary algebra and, possibly, concurrent enrollment in mathematics, intermediate algebra or Elementary Analysis I. This plan would require changing the present course to Chemistry 3B, beginning Chemistry II, 4 units, 3 hours per week lecture, and 3 hours per week laboratory. This plan requires the change of the prerequisite for Chemistry 1A from Chemistry 3 to Chemistry 3B with a grade of "C", or better. Students enrolling in Chemistry 3A would be required to complete Chemistry 3B before enrolling in Chemistry 1A. Chemistry 3A would emphasize the elementary language of chemistry, observations, basic laboratory techniques, elementary chemical calculations and equations, and some of the basic principles or big ideas of chemistry. The course should have one or more definite themes or threads running through it to tie the various topics together. Chemistry 3B would spend less time on the fundamentals in 3A and more time on the chemistry of the elements, energy, equilibrium and structure.

If this plan is adopted, the placement of students in chemistry would be as follows: 0 - 2 placement points, Chemistry 3A; 3 - 7 placement points, Chemistry 3B; 8 placement points, Chemistry 3B or 1A; and 9 - 14 placement points, Chemistry 1A.

Plan B

Establish a new course, Chemistry 21, 1 unit, 3 hours per week problem solving and quiz section, entitled Chemical Problems, Beginning. Concurrent enrollment in Chemistry 21 and 3 would be required of students who have no previous courses in chemistry and for students who receive two or less points on the chemistry placement point scale. No change in mathematics prerequisite for Chemistry 3 would be made under this plan at first; however, if the success of students in Chemistry 3, who have not completed or are not concurrently enrolled in trigonometry or Elementary Analysis II is not significantly improved by this plan, then the mathematics prerequisite should be changed to require trigonometry or Elementary Analysis II concurrently with Chemistry 3 and 21. This course would offer the student additional work in chemical nomenclature, chemical equations, and chemical calculations, and should also make extensive use of programmed instructional materials, problem books, and specially developed audio-visual tutorial materials.

If this plan is adopted, the placement of students in chemistry would be as follows: 0 - 2 points, Chemistry 3 and 21; 3 - 7 points, Chemistry 3; 8 points, Chemistry 3 or 1A; and 9 - 14 points, Chemistry 1A.

Plan C

Establish a new course by adding three hours per week to the present Chemistry 3 course. The new course would be characterized as Chemistry 3, beginning chemistry, 5 units, 3 hours lecture, 2 hours problem and quiz section, and two two-hour laboratory periods per week. Recommendations concerning the change in mathematics prerequisite are the same as for Plan B. This plan would provide additional time in the course for more intensive work on the items suggested for Chemistry 21 in Plan B. It would also provide the opportunity for additional laboratory work.

If this plan is adopted, the placement of students in chemistry would be as follows: 0 - 7 points, Chemistry 3; 8 points, Chemistry 3 or 1A; and 9 - 14 points, Chemistry 1A.

2. Consideration of work load when enrolling in Chemistry 3: Counselors should not allow students to enroll in academic loads which, with their employment load, would give them a work load unit total of nine or more as outlined in this report.

3. Waivers in exceptional cases: Exceptions to the recommendations in 1 and 2, above, should be considered for students who have completed at least one course in calculus or who have an unusually high college ability test score or who have an outstanding record ("A" and "B" grades only) in two or more college level science or mathematics courses. Such exceptions should be made by counselors or the dean of the division and the basis of the exception noted in each case.

4. Out-of-class materials: The Chemistry 3 faculty should emphasize to the students that they need to spend considerable time in the study of chemistry out-of-class. The department should see that suitable and helpful materials are made available to the students so they may receive maximum benefit from the time spent in out-of-class study.

It should be noted that four steps have already been taken along this line. These are: The provision of the student supplement, the change to a textbook which appears to be more suitable for a one-semester course than the previous text, the provision of programmed instruction books on selected topics in the reserve room of the library, and the new out-of-class eight millimeter CHEM Study films with accompanying film guides and quizzes.

5. Consideration of Chemistry 3 as a repeat of high school chemistry: Students enrolled in Chemistry 3 who have completed high school chemistry should be warned that their initial enrollment in Chemistry 3 is considered a repeat of a beginning chemistry course and that further enrollment in Chemistry 3 would be subject to available space and a review of their records by the Dean of Counseling and Guidance or the Dean of Registration and Records, or their duly appointed representative, and with the stipulation that their second enrollment in Chemistry 3, their third in beginning chemistry, be their last.

IV. Report of the Study

A. Introduction and Background Information

Chemistry 3, beginning chemistry, exists solely to prepare students deficient in chemistry so they may have a reasonable chance of success in Chemistry 1A, general college chemistry. Students are considered deficient if they have not satisfactorily completed one year of high school chemistry or a one-semester beginning chemistry course in college. Students who have completed high school chemistry must validate their proficiency on the El Camino College chemistry placement examination to qualify for Chemistry 1A. Students who have completed the beginning chemistry in college must receive a "C" or better grade to qualify for Chemistry 1A. Students deficient in chemistry, or who fail to qualify for Chemistry 1A, must complete Chemistry 3 with a grade of "C" or better before they are allowed to enroll in Chemistry 1A.

Mathematical prerequisites have also been established for Chemistry 3 and 1A. These are as follows:

(1) Chemistry 3: Completion of second-year high school algebra or intermediate algebra (Mathematics D) or Elementary Analysis I (Mathematics 25A). Mathematics D or 25A may be taken concurrently with Chemistry 3.

(2) Chemistry 1A: Completion of one semester of high school trigonometry or plane trigonometry (Mathematics C) or Elementary Analysis II (Mathematics 25B). Mathematics C or 25B may be taken concurrently with Chemistry 1A for students receiving "B" or better grades in Chemistry 3 and Mathematics D or 25A at El Camino College.

Table 1, on page 6, shows the success of Chemistry 3 students in Chemistry 1A during 1959-62 and 1963-65 in terms of the grades received in Chemistry 3. The chemistry faculty revised the standards in Chemistry 3 after the 1959-62 study to improve the success of Chemistry 3 students in Chemistry 1A. Since the overall sucess figure improved from 53 to 58, and since each grade level showed an improvement, the changes in standards appear to have had the desired effect.

Table 2 compares Chemistry 3 student success in Chemistry 1A with that of students qualifying for Chemistry 1A by the placement test. This shows, for 1959-62, 53 percent of the Chemistry 3 students were successful in 1A and 58 percent of those qualifying for 1A from high school were successful. During the 1963-65 period the Chemistry 3 success improvement was nearly matched by the high school group which improved to 62 percent. This was probably due to changes in the placement test, more careful screening of borderline cases, and various new developments in the high school chemistry curricula.

During 1964-65 six hundred and nine (609) apparently qualified students enrolled in Chemistry 3 at El Camino College. Of this group, 45 percent (272) were successful in Chemistry 3, that is, completed the course with a grade of "A", "B", or "C" and thus qualified for Chemistry 1A.

The 45 percent success figure in Chemistry 3 is lower than desired by the chemistry faculty. This could be increased by lowering the standards for "A", "B" and "C" grades in Chemistry 3. However, this appears undesirable since "C" students in Chemistry 3 are only 45 percent successful in Chemistry 1A and a lowering of Chemistry 3 standards would undoubtedly decrease the percentage success of Chemistry 3 students in Chemistry 1A.

Before deciding on a recommended program for improving the success rate in Chemistry 3, without endangering the success of Chemistry 3 students in Chemistry 1A, it was decided to investigate the success of students in Chemistry 3 in terms of their chemistry background, chemistry placement points, mathematics background, and total work load. Such a study might provide valuable information to the design of a solution to the problem of improving success in Chemistry 3.

B. Method Used in the Study

Chemistry 3 grades and information on the chemistry background, chemistry placement test results, mathematics background, number of units attempted concurrent with Chemistry 3, and number of hours employed while enrolled in Chemistry 3 was readily avilable on the Chemistry Department record card of each student enrolled. These cards were completed by the students when they sat for the placement test and on the first day of class.

The study is in four parts and each part is similarly organized. Part I studies the success of Chemistry 3 students in terms of their previous chemistry experience; Part II in terms of placement points for those who took the placement test; Part III in terms of mathematical background; and Part IV in terms of total work load. In each case students were grouped according to some common factor and the percent of the total group, total number of

TABLE 1

SUCCESS OF BEGINNING CHEMISTRY (CHEMISTRY 3) STUDENTS IN GENERAL COLLEGE CHEMISTRY (CHEMISTRY 1A) AT EL CAMINO COLLEGE, 1959-62 AND 1963-65

Chemistry 3 Grade	Number of Students		Number receiving "A", "B", or "C" grade in Chemistry 1A		Percentage Success	
	1959-62	1963-65	1959-62	1963-65	1959-62	1963-65
A	52	36	46	32	88	89
B	218	110	151	83	69	75
C	428	234	175	105	41	45
TOTAL	698	380	372	220	53	58

TABLE 2

SUCCESS OF STUDENTS IN GENERAL COLLEGE CHEMISTRY (CHEMISTRY 1A) AT EL CAMINO COLLEGE IN TERMS OF METHOD OF QUALIFICATION, 1959-62 AND 1963-65

Method of Qualification	Number of Students		Number receiving "A", "B" or "C" grades in Chemistry 1A		Percentage Success	
	1959-62	1963-65	1959-62	1963-65	1959-62	1963-65
Qualified by Placement Test	194	122	113	76	58	62
Qualified by Chemistry 3	698	380	372	220	53	58

students in the given group, the number of the group receiving "A", "B", or "C" grades in Chemistry 3, and the percentage success for the group were determined. These are reported in tabular form. Significant findings follow the reporting of the data in each part.

C. Part I - Previous Chemistry Experience

Students enrolling in Chemistry 3 were classified into eight groups according to their chemistry background prior to enrollment. These groups are characterized as follows:

Group Code Letter	Description of Group
P	Student has completed one year of chemistry in high school and took the chemistry placement test but did not qualify for Chemistry 1A.
H	Student has completed one year of chemistry in high school but did not take the chemistry placement test.
N	Student has not completed any previous courses in chemistry.
R	Student repeated Chemistry 3 after previously receiving a grade in the same course at El Camino College.
T	Student repeated Chemistry 3 after previously receiving a grade in a similar chemistry course at another college.
G	Student enrolled in Chemistry 3 after initially enrolling in Chemistry 1A at El Camino.
F	Student enrolled in Chemistry 3 after completing Chemistry 10, the non-science majors course.
U	Student enrolled in Chemistry 3 but insufficient information was available to place him into one of the other groups.

Table 3 shows the success in Chemistry 3 of each of these eight groups of students during 1964-65.

The significant findings in this part of the study appear to be as follows:

1. Students enrolling in Chemistry 3 after completing one year of high school chemistry constituted 58 percent of the total group and were 49 percent successful in Chemistry 3 (Groups P and H).

TABLE 3

SUCCESS OF STUDENTS IN BEGINNING CHEMISTRY (CHEMISTRY 3)
IN TERMS OF CHEMISTRY BACKGROUND PRIOR TO ENROLLMENT
DURING 1964-1965, EL CAMINO COLLEGE

Group Code	Percent of Total Group	Number of Students	Number of "A", "B","C" Grades	Percent Success
P	44	267	135	51
H	14	87	37	43
N	21	126	33	26
R	13	81	47	58
T	4	21	10	48
G	1	8	4	50
F	1	7	5	71
U	2	12	1	8
TOTAL	100	609	272	45

2. Students with no previous course in chemistry constituted 21 percent of the group and were 26 percent successful in Chemistry 3 (Group N).

3. Students repeating a previous chemistry course taken in college constituted 18 percent of the group and were 57 percent successful in Chemistry 3 (Groups R, T, and F). An additional 28 students, 5 percent of the total group, repeated an enrollment in Chemistry 3, although the first time they did not receive a grade in the course. Therefore, 23 percent were repeating enrollment in a previous chemistry course in college.

D. Part II - Placement Points in Chemistry

Students who had completed one year of chemistry in high school and took the placement test but did not qualify for Chemistry 1A (Group P in Part I), were classified into eight groups according to their chemistry placement points.

A maximum of 14 placement points is possible. During the study period students were placed into Chemistry 1A and 3, as follows:

1. 8 - 14 Placement points into Chemistry 1A

2. 0 - 7 Placement points into Chemistry 3

Students receive placement points for three factors: High school chemistry grades, advanced high school mathematics grades (intermediate algebra, trigonometry, mathematical analysis, etc.), and performance on the chemistry placement examination. Table 4 shows how placement points were assigned for each of these fectors during the study period.

Table 5 reports the success of students placed into Chemistry 3 in terms of the chemistry placement points. The significant findings in this part of the study appear to be as follows:

1. Students receiving more than three placement points (4 - 7) constituted 39 percent of the group and were 75 percent successful in Chemistry 3.

2. Students receiving three placement points constituted 18 percent of the group and were 49 percent successful in Chemistry 3.

3. Students receiving less than three placement points (0 - 2) constituted 43 percent of the group and were 30 percent successful in Chemistry 3.

E. Part III - Mathematical Background

Students enrolling in Chemistry 3 were classified into eight groups according to their mathematical background. These groups are characterized as follows:

TABLE 4

CHEMISTRY PLACEMENT POINT SCALE FACTORS AND PLACEMENT POINTS 1964-1965

P.P. Placement Points	P_C High School Chemistry Grades	P_M Advanced Algebra, Trigonometry, etc., Grades	P_{E1} (A) Total Test Score or (B) Multiple Choice Exam. Score*	P_{E2} Completion & Problems Exam. Score (Pts. II & IV of Iowa Test)
4	------	------	(A) 21 or above (B) 49 - 60	61 - 93
3	AA, BA	All A grades	(A) 91 - 120 (B) 37 - 48	46 - 60
2	------	All B and A grades	(A) 81 - 90 (B) 25 - 36	------
1	BB, BC, CC, AC	If any C grades or if only advanced algebra completed with C or better	(A) 66 - 80 (B) 13 - 24	31 - 45
0	If any D or F grades included	If any D or F grades or if neither course completed	(A) 0 - 65 (B) 0 - 12	0 - 30

$$P.P. = P_C + P_M + P_{E1} + P_{E2}$$

*During 1963 and 1964 the score used for P_{E2} was the total "Iowa Training in Chemistry Test" score. During 1965 a 60 question multiple choice test composed of Part I of one form of the 1959 A.C.S. High School Chemistry examination, plus some locally prepared questions, was used for P_{E1}.

TABLE 5

SUCCESS OF STUDENTS IN BEGINNING CHEMISTRY (CHEMISTRY 3)
IN TERMS OF CHEMISTRY PLACEMENT POINTS
DURING 1964-1965, EL CAMINO COLLEGE

Placement Points	Percentage of Total Group	Number of Students	Number of ABC Grades	Percent Success
7	9	23	20	87
6	5	13	12	92
5	11	29	19	66
4	14	38	26	68
3	18	49	24	49
2	27	72	27	38
1	12	32	7	22
0	4	11	0	0
TOTAL	100	267	135	51

TABLE 6

SUCCESS OF STUDENTS IN BEGINNING CHEMISTRY (CHEMISTRY 3)
IN TERMS OF MATHEMATICS BACKGROUND
1964-1965, EL CAMINO COLLEGE

Group Code	Percent of Total Group	Number of Students	Number of ABC Grades	Percent Success
C	7	45	30	67
CC	21	125	72	58
TR	25	150	72	48
TC	19	118	48	41
AA	6	38	13	34
AC	9	54	15	28
AR	10	60	21	35
U	3	19	1	5
TOTAL	100	609	272	45

Group Code Letter	Description of Group
C	At least one calculus course completed prior to enrollment in Chemistry 3.
CC	Concurrent enrollment in Chemistry 3 and the first course in calculus.
TR	One semester of trigonometry completed prior to enrollment in Chemistry 3.
TC	Concurrent enrollment in Chemistry 3 and Mathematics C, plane trigonometry, or Mathematics 25B, Elementary Analysis II.
AA	Intermediate algebra, Mathematics D; or Elementary Analysis I, Mathematics 25A; or second-year high school algebra completed prior to enrollment in Chemistry 3.
AC	Concurrent enrollment in Chemistry 3 and either Mathematics D or 25A (first enrollment in this level of mathematics).
AR	Concurrent enrollment in Chemistry 3 and either Mathematics D or 25A (a repeat enrollment of this level of mathematics, including second-year high school algebra).
U	Enrolled in Chemistry 3 but insufficient information was available to put into one of the other groups.

Table 6 (on page 11) reports the success of Chemistry 3 students in terms of their mathematical background. The significant findings in this part of the study appear to be as follows:

1. Students who had completed at least one course in calculus or who were concurrently enrolled in the first calculus course constituted 28 percent of the group and were 60 percent successful in Chemistry 3 (Groups C and CC).

2. Students who had completed the mathematics prerequisites for Chemistry 1A, mathematics through trigonometry or Elementary Analysis II, but who had not yet attempted calculus constituted 25 percent of the group and were 48 percent successful in Chemistry 3 (Group TR).

3. Students completing their mathematics prerequisites for Chemistry 1A concurrently with Chemistry 3 constituted 19 percent of the groups and were 41 percent successful in Chemistry 3 (Group TC).

4. Students who had completed the mathematics prerequisites for Chemistry 3, mathematics through intermediate algebra or Elementary Analysis I, constituted 16 percent of the group and were 35 percent successful in Chemistry 3 (Groups AA and AR).

5. Students completing their mathematics prerequisites for Chemistry 3 concurrently with Chemistry 3 constituted 9 percent of the group and were 28 percent successful in Chemistry 3 (Group AC).

F. Part IV - Total Work Load

The number of semester units in which students were enrolled during their semester of enrollment in Chemistry 3 was converted into work load units (WA). The number of hours per week the student was employed concurrently with enrollment in Chemistry 3 was converted into work load units (WE) and added to the work load units for the academic load to determine the total work load (WT) as follows:

$$WT = WA + WE$$

Table 7 shows the conversion of semester units and hours per week of employment into work load units.

Table 8 reports the success of Chemistry 3 students in terms of their total work loads. The significant findings in this part of the study appear to be as follows:

1. Students with work loads equal to eight (8) work load units or less constituted 88 percent of the total group and were 47 percent successful in Chemistry 3.

2. Students with work loads equal to nine (9) work load units or more constituted 7 percent of the total group and were 27 percent successful in Chemistry 3.

The summary and recommendations have been reported on pages 1 through 4 to aid in the reading of the report.

TABLE 7

CONVERSION OF SEMESTER UNITS AND HOURS PER WEEK OF EMPLOYMENT INTO WORK LOAD UNITS

Work Load Units	Semester Units	Hours per week employed
0	0	0
1	1 - 3	1 - 9
2	3½ - 6	10 - 18
3	6½ - 9	19 - 27
4	9½ - 12	28 - 36
5	12½ - 15	37 - 45
6	15½ - 18	46 - 54
7	18½ - 21	55 - 63

TABLE 8

SUCCESS OF STUDENTS IN BEGINNING CHEMISTRY (CHEMISTRY 3) IN TERMS OF TOTAL WORK LOAD 1964-1965, EL CAMINO COLLEGE

Work Load Units	Percent of Total Group	Number of Students	Number of ABC Grades	Percent Success
0 - 4	6	38	17	45
5	21	126	63	50
6	22	133	63	47
7	20	124	60	48
8	19	114	51	45
9 - 11	7	44	12	27
Insufficient Information	5	30	6	20
TOTAL	100	609	272	45