

Research Report

THE RELATIONSHIP BETWEEN ENGLISH READING PREPARATION AND SELECTED CONTENT-AREA COURSE SUCCESS AT SACRAMENTO CITY COLLEGE

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The Relationship between English Reading Preparation and Selected Content-Area Course Success at Sacramento City College

INTRODUCTION

This study examines the relationship between students' English reading preparation levels and success rates in selected content-area courses at Sacramento City College (SCC). At SCC, more than half of the first-time in college students who take the reading assessment tests place below the transfer level (SCC Institutional Effectiveness Reports 2017¹). Studying the relationship between students' reading preparation level and success in content-area courses is of interest to the college in curriculum process and student achievement analysis.

In examining the relationship between reading preparation levels and outcome course success, the study seeks to answer the following questions:

Question 1. Is there a relationship between students' English reading preparation level and outcome course success?

Question 2. At which reading preparation level does the percentage of successful students exceed the percentage of unsuccessful students in a given outcome course?

This report proceeds as follows. First, we will provide a brief review on prior studies done on the relationship between basic skills and student performance in content-area courses at the College. The next section presents the data and methods used in this study. After that we will discuss the results and provide discussion and concluding remarks.

PRIOR STUDIES AT SCC ON BASIC SKILLS PREPARATION AND CONTENT-AREA COURSE SUCCESS²

This is not the first time this type of study has been done at the College. Danenberg, Cull and Buechner (2009) examined the relationship between basic skills preparation (English reading,

¹ The SCC Institutional Effectiveness Reports 2017 can be accessed here
<https://www.scc.losrios.edu/prie/institutional-effectiveness/institutional-effectiveness-reports-2/>

² For a brief literature review on the relationship between basic skills preparation levels and content-area course success, see Danenberg (2009) and Danenberg (2015).

English writing, and Math) and content area course success rates using institutional data from 2007 to 2008 at Sacramento City College. In fact, the current study attempted to replicate Danenberg et al. (2009) study with later data and focusing only on reading preparation in selected subject-area courses. By studying the difference between average preparation levels in each of the skills among successful and unsuccessful groups in the content-area courses, Danenberg et al. (2009) indicate that there seems to be a relationship between basic skills preparation and successful outcome in content-area courses. The study also suggests that, for a given content-area course, there might be a “tipping point” in basic skills preparation level at which students in content-area courses are more likely to success. One of the limitations of the study, as stated by the authors, is that there were a large number of students who completed the content-area courses analyzed but did not have basic skills preparation data and thus are not included in the study.

Danenberg (2015) analyzed the relationship between English reading and writing preparation and sociology course success rates. The 2015 study found evidence for strong positive relationship between English writing preparation level and success in selected sociology courses but weak or no relationship between reading preparation level and sociology course success (Danenberg, 2015). One of the possible explanations for this is, while writing requires certain level of reading readiness, reading skills are not as closely tied with writing skills (Tierney & Pearson, 1983, cited in Valeri-Gold & Deming, 2000, p. 150).

DATA AND METHODS

This study replicates the methods used in Danenberg (2009) to analyze the relationship between English reading preparation levels and success rates in selected content-area courses. This section describes the data and methodology adapted for this study.

Outcome courses

The content-area courses selected for the study, which will be referred as the outcome courses in the study, include three social science courses and two natural science ones. Table 1 presents the outcome courses and their respective prerequisites and/or advisories. None of the five courses have English reading as a prerequisite. With the exception of Chemistry 300, which students can assess into or completed elementary algebra course before enrolling, none of the courses have prerequisites but advisory requirements. One level below college-level English reading and writing is advised for students who enroll in Psychology 300 and Sociology 310. Political Science 301 has advisory for successful completion of college-level English writing before enrolling. Astronomy 310 has advisory for Mathematics 34 and Chemistry advises Chemistry 317 co-requisites.

Table 1. Selected Content-area Courses: Prerequisites and Advisories

Course Name	Course Abbreviation	Prerequisite	Advisory
Astronomy 310: The Solar System	ASTR 310	None	MATH 34 with a grade of "C" or better.
Chemistry 300: Beginning Chemistry	CHEM 300	MATH 100 (Elementary Algebra) with a grade of "C" or better, or placement through the assessment process.	Concurrent enrollment in CHEM 317.
Political Science 301: Introduction to Government: United States	POLS 301	None	ENGWR 300 (College Composition) with a grade of "C" or better.
Psychology 300: General Principles	PSYC 300	None	ENGRD 110, ENGWR 101, and/or LIBR 318 or placement.
Sociology 310: Marriage and the Family	SOC 310	None	ENGWR 101 and ENGRD 110, or ESLW 340 and ESLR 340, with grades of "C" or better. LIBR 318 with grade of "C" or better.

Source: Socrates

The study employs the transcript dataset by semester, which includes student academic records district-wide. We selected students who enrolled in the outcome courses at Sacramento City College from Fall 2012 to Spring 2017, with a total number of 26,195 students in five outcome courses. Student counts range from 762 (SOC 310) to 11,817 (PSYC 300) in the outcome courses.

To be counted as “Success” in a course, students have to have achieved a grade of A, B, C or P/Cr (Pass/Credit). Those with D, F, NP/NC, I, or W are counted as “No success”. Based on this criterion, we created a dummy variable for Success in the outcome courses, of which (1) is “Success” and (0) is “No success”.

We also applied the RP Group’s (2011) approved definition of course success rate as “Percentage of students who receive a passing/satisfactory grade”, with the numerator being the count of “Success” and the denominator being the count of all valid grades (A, B, C, P/Cr, D, F, NP/NC, and W).

Student reading preparation level

For this study, student reading preparation level is defined as the highest level of English reading that students had achieved or assessed prior to enrolling in the outcome courses. To determine the reading preparation level of students, we relied on two data sources: the College’s Assessment and Placement (ASAP) data and the transcript data files for any English reading courses which students had successfully completed district-wide before taking the outcome courses at SCC. While the outcome course data only dated back to Fall 2012, we did not restrict a time frame for reading preparation data as we were interested in knowing students’ reading preparation before taking the outcome courses. Table 2 summarizes student counts, overall course success rates, and students with reading level data.

Table 2. Outcome courses, student count and success rate Fall 2012 – Spring 2017

Course	Student count	Success		Students w/ Reading Level data	
		Count	Success rate	Count	Percent
ASTR 310	2,165	1,100	50.808%	726	33.533%
CHEM 300	2,765	1,666	60.253%	1,076	38.915%
POLS 301	8,686	6,177	71.114%	3,346	38.522%
PSYC 300	11,817	8,176	69.188%	4,956	41.940%
SOC 310	762	498	65.354%	329	43.176%
Total	26,195	17,617	67.253%	10,433	39.828%

Source: Transcript data and ASAP data

For each of the data sources, the ASAP and the transcript data, we coded students' reading preparation levels from 1 to 4, of which 1 is the lowest and 4 is the highest. Specifically, Level 1 is "Two levels below college-prepared", Level 2 is "One level below college-prepared", Level 3 is "College-prepared", and Level 4 is "Transfer-prepared". We adapted Danenberg (2009)'s crosswalk for the two data sources, matching the level of student reading assessment (in the ASAP data) and reading level completed (in the transcript data) to each of the four levels of reading preparation (Table 3). The values in the two data sources would then be compared--the higher value of which would be assigned for the variable for students' level of reading preparation used in the analysis.

Table 3. English Reading Preparation Level, defined by ENGRD courses assessed into or completed

Reading Preparation Level	Level Definition	Assessed into	Completed
1	Two levels below college-prepared	ENGRD 10 or ENGRD 11	
2	One level below college-prepared	ENGRD 110	ENGRD 10 or ENGRD 11
3	College-prepared	ENGRD 310 or Reading Competency Passed	ENGRD 110
4	Transfer-prepared		ENGRD 310

Source: Adapted from Danenberg (2009)

The final dataset created for the study comprises of 10,433 students who enrolled and received valid grades in one or more of the five outcome courses in any of the semesters from Fall 2012 to Spring 2017, and had English reading preparation level data.

RESULTS

English reading preparation level and outcome course success

Question 1: Is there a relationship between students' English reading preparation level and outcome course success?

To answer the first research question, we used the independent samples t-test to compare the average reading preparation levels between the successful and the unsuccessful groups in each content-area course. A significant test statistics would indicate that there is a significant difference in the means of reading preparation levels between two groups and such a difference did not occur by chance. We also performed a chi-square test to compare the distribution of reading preparation levels among successful and unsuccessful students in each outcome course to determine if success and reading levels are related. A significant test statistics would indicate that student success (or not) in the outcome course is related to, or dependent, on student reading preparation level. Table 4 summarizes the results of the two statistical tests.

Table 4. Compare Reading Preparation Level of Successful and Unsuccessful Students in Content-area Courses

Outcome course	Outcome course success	N	Mean of Reading Preparation Level	Standard deviation of Preparation Level	t-test significance (at alpha = 0.05)	Chi-square test significance (p = 0.05)
ASTR 310	Successful	319	2.859	.949	Yes	Yes
	Not successful	407	2.555	.996	Yes	Yes
CHEM 300	Successful	567	2.873	.929	No	No
	Not successful	509	2.908	.906	No	No
POLS 301	Successful	2,273	2.859	.946	Yes	Yes
	Not successful	1,073	2.606	.955	Yes	Yes
PSYC 300	Successful	3,096	2.716	.926	Yes	Yes
	Not successful	1,860	2.397	.901	Yes	Yes
SOC 310	Successful	208	2.995	.909	No	No
	Not successful	121	2.843	.922	No	No
Overall	Successful	6,463	2.796	.937	Yes	Yes
	Not successful	3,970	2.548	.943	Yes	Yes

There is variation in reading preparation levels in each group in the outcome courses, with standard deviation ranging from .901 to .996 (i.e. varied by approximately one level). With the exception of CHEM 300, the average reading preparation level of students in the successful group is higher than that of the unsuccessful group across the courses. The statistical test shows that there is a statistically significant difference between the average reading preparation level of successful and unsuccessful students in the overall sample and in three individual courses (ASTR 310, POLS 301, and PSYC 300). There is no statistical significance found for the difference of the average reading preparation levels of successful and unsuccessful students in CHEM 300 or

SOC 310. In short, there is empirical evidence that the successful group has a significantly higher average reading preparation level than the unsuccessful one in the overall sample and in outcome courses in astronomy, political sciences, and psychology. There is no empirical evidence found for the difference in the average reading preparation levels of successful and unsuccessful groups in chemistry and sociology courses (2.873 vs. 2.908 and 2.995 vs. 2.843 respectively), indicating that the difference observed might have occurred by chance.

Further statistical test shows similar results. In the overall sample and in college-level astronomy, political sciences, and psychology, success and no success are dependent on students' level of reading preparation. There is no relationship found between reading preparation levels and college-level chemistry and sociology course success.

Reading preparation level tipping point for content-area course success

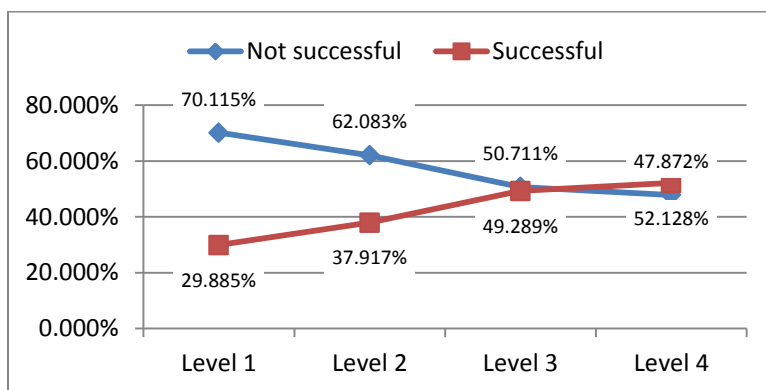
Question 2. At which reading preparation level does the percentage of successful students exceed the percentage of unsuccessful students in a given outcome course?

In this sub-section, we examined the likelihood of success/no success in individual content-area courses by students' reading preparation level.

Astronomy 310

ASTR 310 is a course on the Solar System. The course does not have prerequisites but its advisory suggests that successful completion of pre-algebra course or assessment into elementary algebra prior to enrolling would be likely to improve students' chance of success in the Solar System course. Reading preparation level is not required or advised for ASTR 310. The total number of students with reading preparation data and valid outcome grades in the ASTR 310 sample is 726 and the overall course success rate is 43.939 percent. Figure 1 illustrates the likelihood for success/no success by each level of reading preparation in ASTR 310. It appears that students were more likely to succeed when they are more prepared in English reading. The likelihood for success exceeded the likelihood for no success at reading preparation level 4, i.e. for students who were prepared for transfer-level reading courses. At this level, the likelihood for success is over 52 percent. However, the likelihood of success already approaches 50 percent at Level 3 of reading preparation. At transfer-prepared reading level (Level 4), students' likelihood to succeed in Solar System course would improve by just about 3 percent, compared to college-level reading prepared. Therefore it would probably be appropriate to consider Level 3 of reading preparation to be the tipping point for this course at which the likelihood for success would start to exceed that of no success.

Figure 1. Student Success in Astronomy 310 by Reading Preparation Level (Fall 2012–Spring 2017)

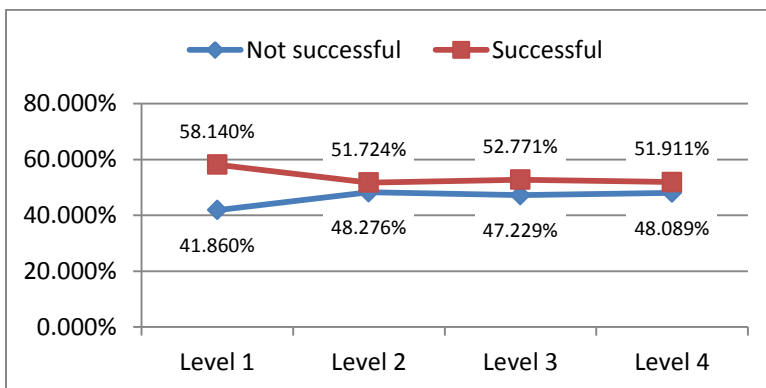


Note: In this chart, data labels for “Not successful” appear above the respective line and “Successful” appear below the respective line.

Chemistry 300

CHEM 300 is a beginning chemistry course. There were 1,076 students included in the analysis who have English reading preparation data and completed the CHEM 300 course. The course requires students to at least be prepared for college-level math. It also suggests that students would be more likely to success in CHEM 300 if they enroll in Strategies for Problem Solving in Chemistry (CHEM 317) at the same time. There is no pre-requisite or advisory for reading preparation level in the course. The overall course success for the beginning chemistry course is 52.695 percent. The analysis above found no relationship between reading preparation level and beginning chemistry course success. The average reading preparation level for unsuccessful group appears to be higher than the successful one but this might have been due to random factors. Examined by each level of reading preparation (Figure 2), the result is consistent with the analysis in the previous section, i.e. there is not a clear relationship between reading preparation level and college-level beginning chemistry course success.

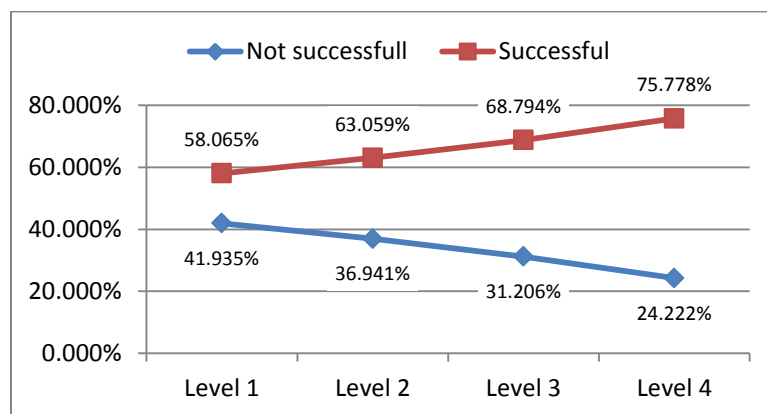
Figure 2. Student Success in Chemistry 300 by Reading Preparation Level (Fall 2012 – Spring 2017)



Political Science 301

Introduction to Government: United States is a political science course (POLS 301). There are no prerequisites set for the course. While there is no advisory for the level of English reading preparation, the course's advisories indicate that students would have a higher chance of success if they enter the course being prepared for transfer-level English writing (i.e. successfully completed College Composition – ENGWR 300). The analysis includes a total number of 3,346 students who completed in the course in any of the semesters between Fall 2012 and Spring 2017 and who had English reading preparation level data. The overall course success is 67.932%. The likelihood for success is higher than that of no success in every level of reading preparation and is higher at higher reading preparation level (Figure 3). With transfer-level English reading preparation (Level 4), the likelihood for success reaches over 75 percent. While students' reading preparation level and success in POLS 301 appears to be positively related with higher success rates associated with higher reading preparation level, it should be noted that even at the lowest level of reading preparation (Level 1), the likelihood for success already exceeds that of no success. Therefore this relationship should be read with caution: the positive relationship does not imply that students at lower reading preparation level are highly unlikely to succeed.

Figure 3. Student Success in Political Science 301 by Reading Preparation Level
(Fall 2012 – Spring 2017)



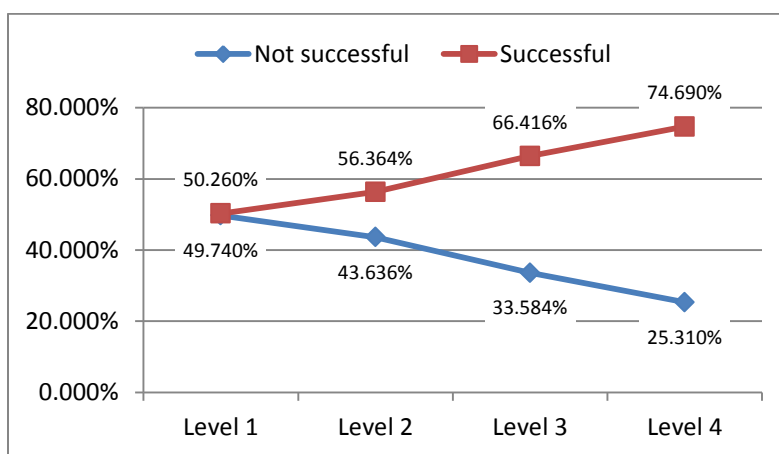
Psychology 300

There are 4,956 students in the sample who completed the college-level course in Psychology General Principles (PSYC 300) and had reading preparation level data. PSYC 300 does not have prerequisites. College-level English reading preparation level (i.e. successful completion of ENGRD 110) is advised for the course. The course's advisories also include college-level writing preparation level and/or successful completion of the course Library Research and Information Literacy (LIBR 318). The course has an overall success rate of 62.470%. The

relationship between students' English reading preparation levels and PSYC 300 course success seems strong. The likelihood for success increases at each increment in English reading preparation levels (Figure 4). At English reading two levels below college-prepared (Level 1), there is an approximately equal distribution of success and no success. At transfer-level (Level 4), the likelihood for success is almost 75 percent. This is similar to the results found for Political Science 301—there is a positive relationship but which does not indicate high likelihood of no success for lower level of reading preparation.

Figure 4. Student Success in Psychology 300 by Reading Preparation Level

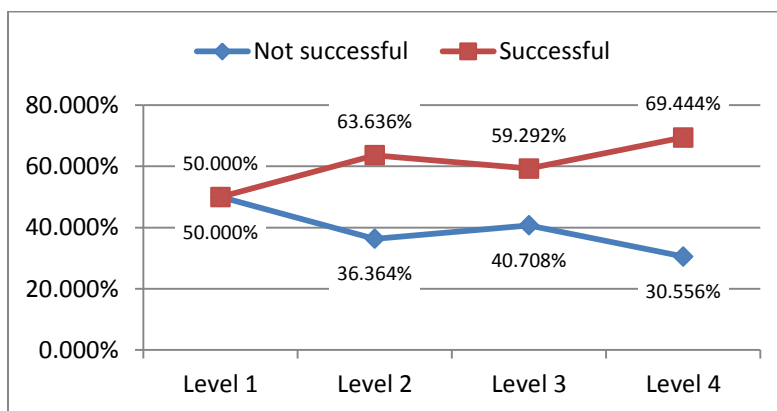
(Fall 2012 – Spring 2017)



Sociology 310

SOC 310 (Marriage and the Family) has the smallest sample size among the content-area courses examined in the study. There is a total number of 326 students who completed the course between Fall 2012 and Spring 2017 and had reading preparation level data. Similar to PSYC 300, the course does not have prerequisites but there are advisories for English reading and writing. The course advises students to be prepared for college-level reading and writing (i.e. successfully completed ENGWR 101 and ENGRD 110, or ESLW 340 and ESLR 340) prior to enrollment in the course. The course's overall success rate is 63.222%. Analysis in the previous section found no relationship between students' English reading preparation levels and SOC 310 course success. Indeed, the proportions of success and no success fluctuate between each increment of reading preparation level, albeit likelihood for success in the highest reading preparation level being higher than in the lowest preparation level (Figure 5).

Figure 5. Student Success in Sociology 310 by Reading Preparation Level (Fall 2012 – Spring 2017)



DISCUSSION AND CONCLUSION

The study found empirical evidence for a positive relationship between students' reading preparation level and course success in Astronomy 310, Political Science 301, and Psychology 300, indicating that students' success in these outcome courses might be dependent on their level of reading preparation. Specifically, in these courses, it would be expected that higher reading preparation level would improve the likelihood for course success. In Astronomy 310, the tipping point at which the percentage of successful students exceeded the percentage of unsuccessful students seems to be between college-prepared reading level (i.e. successful completion of English Reading 110 or assessment into English Reading 310) and transfer level (successful completion of Reading 310). In Political Science 301 and Psychology 300, although success rates seem to improve at each increment of reading preparation, the percentage of successful students is higher than unsuccessful peers at all levels of reading preparation and therefore it cannot be interpreted that there is a high unlikelihood for students with lower level of reading preparation to succeed in these two courses. There is no empirical evidence found for the relationship between reading preparation level and course success in Chemistry 300 and Sociology 310.

It should be noted that there are many other factors, including socio-economic ones, that affect students' performance and success. Also, as students progress through their college career, the amount of previous learning and coursework contributes to their performance in a given course at a given time. All of these factors are not taken into account in the analyses in this study and thus the findings from this study only serve diagnostic purposes. They do not demonstrate a causal relationship and are not sufficient to be used as a basis for prerequisite establishment.

Nonetheless, the findings in the study are consistent with prior studies on the topic. Students with different levels of English skills vary in their performance in content area courses (Perin, Keselman, & Monopoli, 2003). However, English reading might not be as strong of a predictor

of student success as English writing, and/or Mathematics. In fact, the relationship between basic skills preparation and content-area course success varies, depending on the disciplines of the outcome courses (Danenberg, 2009; 2015).

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