

REEDLEY COLLEGE

Prerequisite Validation Study

Examination of English 1A as a Prerequisite to
Political Science 2

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Executive Summary

The following met the prerequisite criteria for PolSci-2

- **Successfully completing English 1A or placing into English 1A or higher**

Further research determined the following:

- **Successfully completing English 1A or placing into English 1A or higher**
 - **35% of the PolSci-2 students met the prerequisite**
 - **The success rate of those who met the prerequisite was 75% compared to 45% for those who did not meet the prerequisite**
 - **The current PolSci-2 success rate is 62% and would increase to 75% with English 1A as a prerequisite**
 - **Disproportionate impact did occur when African American students were compared with White/non-Hispanic students**
 - **Disproportionate impact did occur when students in the age groups 25-29, 30-34, 35-39, and 50+ were compared to the majority age group**
 - **Disproportionate impact was not observed on gender or disability**

Reedley College Prerequisite Validation Study

Examination of English-1A as a Prerequisite to PolSci-2

Background

As stated in Title 5 Matriculation regulations (rev. March 1998), Section 55201(a), “the governing board of a community college district may establish prerequisites, corequisites, and advisories on recommended preparation (defined in Section 55200), but must do so in accordance with the provisions of this Article (Matriculation Regulations Article 2.5).” At a minimum, “...prerequisites, corequisites, and advisories on recommended preparation shall be based on content review (Title 5, Section 55201(b)(2).” Content review, “...is conducted by faculty to identify the necessary and appropriate body of knowledge or skills students need to possess prior to enrolling in a course, or which students need to acquire through concurrent enrollment in a corequisite course.” Beyond content review, in some instances additional evidence is required before a district can enforce prerequisites, corequisites, or advisories. As stated in Title 5, Section 55201(3)(e), “a course in communication or computation skills may be established as a prerequisite or corequisite for any course other than another course in communication or computation skills only if, in addition to conducting a content review, the district gathers data according to sound research practices and shows that a student is highly unlikely to succeed in the course unless the student has met the proposed prerequisite or corequisite.”

To assist districts in identifying and establishing “sound research practices,” the California Community College Chancellor’s Office, Academic Senate for California Community Colleges, the California Association of Community Colleges (CACC) Commission on Research, the Research & Planning (RP) Group (at the time divided into two entities – the Northern California Community College Research Group (NORCAL) and the Southern California Community College Institutional Research Association (SCCCIRA)), and the Matriculation Regional Advisory Committee all worked diligently throughout the late 1980s and 1990s to develop a number of seminal documents that have served as blueprints for researchers engaged in matriculation evaluation. Influential publications include:

- “The Model District Policy for Prerequisites, Corequisites, and Advisories on Recommended Preparation, and Other Limitations on Enrollment” (September, 1993)
- California Community College Chancellor’s Office “Matriculation Regulations” (rev. March 1998)
- “Prerequisites, Corequisites, Advisories, and Limitations on Enrollment” (Fall 1997) – A questions-and-answers document prepared by the California Community College

Chancellor's Office and the Academic Senate of California Community Colleges that provides technical assistance and interpretation of Title 5 regulations.

- "Are Prerequisites Really That Hard to Establish?" – A short follow-up document prepared by Bill Scroggins
- "Matriculation Standards" – Prepared by the Chancellor's Office, this document identifies the various components of Matriculation and provides cross-references to Title 5 and AB-3 (Seymour-Campbell Matriculation Act of 1986)
- "Matriculation Local Research Options Project" (November, 1989) – the initial document prepared by the California Community College Chancellor's Office, CACC, SCCCIRA, NORCAL, and the Matriculation Regional Advisory Committee to assist districts in developing and conducting local Matriculation research
- "Assessment Validation Project Local Research Options" (February, 1991)
- "Matriculation Evaluation: Monographs on Designs from the Local Research Options Project" (February, 1992) – the second series of Matriculation research studies presented by the aforementioned groups
- "Matriculation Evaluation: Phase III Local Research Options" (June, 1992) – the third series of Matriculation research designs addressed by the CCCCCO, CACC, SCCCIRA, and NORCAL

The Reedley College (RC) Office of Research has reviewed these various documents and has incorporated a number of the identified best practices into this study. In this study, the prerequisite and target course are interdisciplinary, therefore, Title V requires that the college gather data according to sound research practices and shows that a student is highly unlikely to succeed in the course unless the student has met the proposed prerequisite (Title 5 §55201). The purpose of this research study is to use "sound research practices" to examine what extent Engl-1A is a valid predictor of success in PolSci-2.

Sample

Six thousand eight hundred and sixty three (n=6,863) made their first attempt in Polsci-2 and earned a grade on record during Fall 2010, Spring 2011, Summer 2011, Fall 2011, Spring 2012, Summer 2012, Fall 2012 or Spring 2013. Of those, 4,260 (62.1%) were successful and 6,093 (88.8%) completed the class for a grade. Demographic data is discussed within the Disproportionate Impact section.

Methodology

Using RP Group definitions that have been adopted by the Chancellor's Office, the RC Office of Institutional Research used student data to initially identify all students who earned a grade on record (A, B, C, CR, D, F, FW, NC, I, or W) in the target course, Polsci-2 for Fall 2010, Spring 2011, Summer 2011, Fall 2011, Spring 2012, Summer 2012, Fall 2012 or Spring 2013. While a student

may have taken the target course multiple times, for purposes of prerequisite validation only the first attempt in the target course was examined. Further coding was created to identify students who were successful (earned an A, B, C, or P or CR grade) or unsuccessful (earned a grade of D, F, FW, NC, I, or W) in the target course. Successful grades were divided by total grades earned on record to compute success rate.

Course outcomes for the prerequisite courses were also computed. For this data, the best attempt was chosen (highest grade) if more than one attempt was made as long as it was completed prior to the political science target course. Using the above criteria, a student was deemed successful in the prerequisite course if they earned a successful grade or if the student had earned a sufficiently high enough placement recommendation on the assessment test. Students who did not meet the prerequisite course requirement were those who: a) did not take the prerequisite course prior to the target course; b) the highest grade earned on record for the prerequisite course was non-successful; or c) did not score at an equivalent level on the assessment test. These notations were then merged with the Polsci grades for analysis.

Once the target course outcome of prerequisite completers and non-completers was identified, the RC Researcher conducted an independent samples t-test and chi-square test to determine whether statistically significant differences in target course outcome existed between prerequisite completers and non-completers. This study will examine the overall success rates and grades in the target courses, the success rates and grades of students who met the prerequisites, the success rates of students who did not meet the prerequisites, the percentage of students in the target courses who met the prerequisite, and whether the success rates of completers/non-completers were identified as statistically different ($p < .05$).

Effect Size

Recognizing that statistically significant differences are often an artifact of sample size (with large samples, only minimal differences can produce statistically significant results; conversely, with small samples large outcome differences may not be identified as statistically different), effect size and average percentage gain were also examined. In essence, effect size measures the strength of a relationship between two variables, controlling for the influence of sample size.

Since t-tests were initially used to explore whether statistically significant differences existed between prerequisite completers and non-completers, the logical measure employed by the RC Research Office to determine effect size was Cohen's d . Cohen's d is defined as the difference between the two means divided by the pooled standard deviation for the two means. Obtaining basic statistical data about the populations in question (means and standard deviations), researchers can easily calculate effect size. While interpretations vary, the most commonly

accepted interpretations suggest that a *d* of 0.20 indicates a small effect, 0.50 a medium effect, and 0.80 or higher a large effect. Recognizing the difficulty in identifying a relationship between two variables in a quasi-experimental environment like postsecondary education, for the purposes of the current study sufficient evidence was considered to exist if an effect size of 0.20 or higher was observed.

Correlation Coefficient

Correlation coefficients are another method of examining the strength of a relationship between two variables. For the purposes of the current study the researcher employed what is probably the most frequently used correlation coefficient, Pearson’s Product Moment Correlation Coefficient, more commonly known as Pearson’s *r*. The Pearson’s *r* employed in the current study examined the relationship between performance in the prerequisite course and performance in the target course. Again recognizing the quasi-experimental nature of postsecondary education, the Chancellor’s Office has established a rough rule-of-thumb for obtained correlation coefficient. While usually considered a moderate association, the Chancellor’s Office has established a positive correlation coefficient of .35 as sufficient evidence that a relationship exists between a prerequisite course and a target course, assuming that $p < .05$.

Appropriateness of Prerequisites

Three measures were examined between prerequisite completers and non-completers:

1. GPA in PolSci2,
2. Success rate in PolSci2,
3. Correlations between PolSci2 GPA and Engl1A GPA.

Following is the summary of the results.

GPA in Political Science 2

Table 1. Grades in PolSci-2

	Successfully Completed English 1A	Did Not Successfully Complete English 1A
A	461	462
B	700	928
C	625	1,084
D	201	594
F	199	836
W	200	573

Total	2,386	4,477
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Mean GPA	2.46	1.89
T-Value	17.476	
Sig (P-value)	0.000	
Cohen's <i>d</i>	0.448	

To determine if student's GPA in PolSci-2 is significantly different depending on successful completion of the prerequisite, a t-test of independent groups was performed. Data indicated that students who successfully completed Engl-1A had a statistically significantly higher GPA in PolSci-2 than those who did not complete Engl-1A ($p < 0.001$). There is a small to medium effect.

Success Rate in PolSci-2

Table 2. Success Rate in PoliSci-2

	Complete Prerequisite English 1A	
	Yes	No
PS Success	74.9%	55.3%
PS Not Success	25.1%	44.7%

Chi-square = 212.55, df = 1, p = 0.000

To determine if student's success rate in PolSci-2 is significantly different depending on successful completion of the prerequisite, a chi-square test was performed. Data showed that students who successfully completed Engl-1A had a significantly ($p = 0.000$) higher success rate (74.9%) in PolSci-2 than students who did not successfully complete Engl-1A (55.3%). The current PolSci-2 success rate is 62% and would increase to 75% with Engl-1A as a prerequisite (a 13% increase).

Correlations between PolSci-2 GPA and Engl-1A GPA

The Pearson's *r* employed in the current study examined the relationship between performance in the prerequisite course (Engl-1A) and performance in the target course (PolSci-2). The

Chancellor’s Office has established a positive correlation coefficient of .35 as sufficient evidence that a relationship exists between a prerequisite course and a target course, assuming that $p < .05$. The Pearson’s r was 0.392 for this study, indicating sufficient evidence that a relationship exists between the performance in Engl-1A and performance in PolSci-2.

Table 3. Correlations between PolSci-2 GPA and Engl-1A GPA

		PolSci GPA	Engl-1A GPA
Engl-1A GPA	Pearson Correlation	1	.392**
	Sig. (2-tailed)		0.000
	N	6,090	2,029
PolSci GPA	Pearson Correlation	.392**	1
	Sig. (2-tailed)	0.000	
	N	2,029	2,223

** Correlation is significant at the 0.01 level (2-tailed).

Conclusion

For current prerequisite validation study, three measures were examined in the target class PolSci-2: PolSci-2 GPA, success rate, and correlation between grades in target class and prerequisite class. T-test, chi-square, and correlation analysis were performed. All three measures were statistically significant and met the Chancellor’s Office established criteria. Therefore, it is concluded that sufficient evidence exists to recommend Engl-1A as prerequisite of PolSci-2.

Disproportionate Impact Analysis

In addition to providing evidence that the proposed prerequisite is “necessary and appropriate” (i.e., “a strong rational basis exists for concluding that a prerequisite or corequisite is reasonably needed to achieve the purpose that it purports to serve” (Title 5, Section 55200(e)), Title 5 regulations also state that the district should conduct, “...an evaluation to determine whether the prerequisite or corequisite has a disproportionate impact on particular groups of students described in terms of race, ethnicity, gender, age or disability, as defined by the Chancellor. When there is a disproportionate impact on any such group of students, the district shall, in consultation with the Chancellor, develop and implement a plan setting forth the steps the district will take to correct the disproportionate impact.” (Title 5, Section 55201(e)(2)(B)).

To clarify, the Chancellor’s Office has operationally defined disproportionate impact, stating that it occurs when, “...the percentage of persons from a particular racial, ethnic, gender, age or disability group who are directed to a particular service or placement based on an assessment instrument, method or procedure is significantly different than the representation of that group in the population of persons being assessed and that discrepancy is not justified by empirical evidence demonstrating that the assessment instrument, method or procedure is a valid and reliable predictor of performance in the relevant educational setting.”

To assess if there is a disproportionate impact for this student, a combination of Chi-Square test and Glasnapp and Poggio’s (2001) 80% method were utilized. To determine if there is a significant difference between groups, a Chi-square test was applied. If the difference was significant, the 80% rule (Glasnapp and Poggio’s, 2001) was used to identify where the difference is.

According to Glasnapp and Poggio’s (2001), “Evaluation for impact is accomplished by dividing the minority percent placement rate (African American, Hispanic, female, Spanish speakers, etc.) by the majority (white, or male, etc.) percent in specific courses. If this ratio is less than 80% then there is evidence of disproportionate impact.”

The “80% Rule”, as it is sometimes called, traces its origin back to the Equal Employment Opportunity Commission (EEOC) which includes that rule in its uniform selection guidelines. Following the examples given by Glasnapp & Poggio, the 80% rule was applied to the data from the current study to evaluate potential disproportionate impact of an Engl-1A prerequisite on groups defined by gender, ethnicity, age and disability.

To examine whether disproportionate impact existed, data were generated for prerequisite course/target course combination. The last column in the following tables (“Disproportionate Impact”) identify whether disproportionate impact was observed (“Yes” if disproportionate impact was observed).

Table 4. Disproportionate Impact by Age

Age	Completed Engl-1A		Total	% of Completed Engl-1A	Disproportionate impact
	YES	NO			
19 or Younger	868	1,526	2,394	36.3%	NO
20-24	1,181	1,963	3,144	37.6%	Majority group
25-29	140	447	587	23.9%	YES
30-34	66	215	281	23.5%	YES
35-39	47	124	171	27.5%	YES
40-49	67	147	214	31.3%	NO

50+	17	55	72	23.6%	YES
Total	2,368	4,477	6,863	34.8%	

Chi-square = 68.87, df = 6, p=0.000 (significant at $p < .05$)

Table 5. Disproportionate Impact by Ethnicity

Ethnicity	Completed Engl-1A		Total	% of Completed Engl-1A	Disproportionate impact
	YES	NO			
African-American/non-Hispanic	54	153	207	26.1%	YES
American Indian/Alaskan Native	29	61	90	32.2%	NO
Asian/Pacific Islander	161	340	501	32.1%	NO
Hispanic	1,093	2,115	3,208	34.1%	NO
White/non-Hispanic	947	1,612	2,559	37.0%	Majority group
Total	2,284	4,281	6,565	34.8%	

Chi-square = 15.002, df = 4, p= 0.005 (significant at $p < .05$)

Table 6. Disproportionate Impact by Gender

	Completed Engl-1A		Total	% of Completed Engl-1A	Disproportionate impact
	YES	NO			
Female	1,317	2,520	3,837	34.3%	NO
Male	1,053	1,912	2,965	35.5%	Majority Group
Total	42,370	4,432	6,802	34.8%	

Chi-square = 1.044, df =1, p = 0.307 , (not significant at $p < .05$)

Table 7. Disproportionate Impact by Disability

DSPS	Completed Engl-1A		Total	% of Completed Engl-1A	Disproportionate impact
	YES	NO			
NOT DSPS	2,348	4,392	6,740	34.8%	Majority Group
DSPS	22	40	62	35.5%	NO

Total	2,370	4,432	6,802	34.8%
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Chi-square = 0.011, *df* = 1, *p* = 0.915, (not significant at $p < .05$)

Results on Disproportionate Impact

Tables 4 to 7 in the previous pages are to identify disproportionate impact when Engl-1A is the prerequisite for PolSci-2.

Chi-square tests revealed that there is a significant difference between age groups. Overall, 35% of students who enter PolSci-2 successfully complete the Engl-1A prerequisite. However, 24% of 25-29 year olds who entered PolSci-2 had successfully completed the Engl-1A prerequisite. According to Glasnapp and Poggio's (2001) 80% rule, any group that falls below 30% will indicate a disproportionate impact. Table 4 shows that four groups (25-29, 30-34, 35-39, and 50+) fell below 30%. **This finding indicates an observed disproportionate impact by age.**

Chi-square tests reveal that this is a significant difference between ethnic groups. Overall, 34% of students entering PolSci-2 have successfully completed Engl-1A. When applying the 80% rule to the majority group, $37\% * 80\% = 29.6\%$ the African American group falls below the benchmark. **This finding indicates disproportionate impact by ethnicity.**

There are no differences on gender or disability.

References

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