



## **Validation of English 1A as a Prerequisite for Psychology 1A**

### **Planning and Research Office**

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### **Conclusions & Recommendations**

If the same criteria used in prior Cabrillo College prerequisite studies are applied, then the conclusion is that English 1A as a prerequisite for Psychology 1A does, indeed, meet Matriculation standards for validity. While there is evidence of disproportionate impact among some groups of students (American Indians, Mobility Impaired and those in the 14-17 age group), the impact on the former two groups is boarder line and the latter age based group is not mainstream to the College. Thus, under previously employed criteria for validity, the recommendation would be in favor of implementing the English 1A prerequisite.

However, the current study includes a proposal for changing our criteria for validity to be in concert with those used for evaluating disproportionate impact. If that proposal is accepted, then English 1A fails to meet that new validity standard. Thus, if the proposed change to the validity criteria is accepted, the recommendation would be against implementing the English 1A prerequisite.

### **Introduction**

California Title V regulations state that prerequisites and other enrollment limitations be “necessary and appropriate” (Title 5 §55200). Normally, the appropriateness of prerequisites is determined by a faculty conducted content review. However, in the case of out of sequence communication and computation courses, Title 5 requires research to validate the necessity of the prerequisites and it further requires disproportionate impact research on courses requiring auditions. Psychology 1A currently has eligibility for English 1A as a prerequisite/recommended preparation. The proposed prerequisite is the successful completion of English 1A. This report explored the validity of this class as a prerequisite and further examined for disproportionate impact of such a prerequisite on groups defined by gender , ethnicity, age and disability.

## Methods

This study replaces a previous validation study conducted by this office. The dataset development of that study was found to be in need of improvement in several areas. In order to determine the English 1A experience of the students under study, that prior study should have:

- chosen semesters much more recent than Summer '92 (the first term in the Data Warehouse) to ensure that enough historical data was available for correctly identifying students who had (and had not) enrolled in English 1A classes prior to enrolling in Psychology 1A;
- excluded students who transferred from another institution since their English 1A experience cannot be clearly determined based on the Data Warehouse.

The dataset used for the current study was constructed to meet the following specifications:

- Success/Failure in PSYCH1A was based on students' first enrollment in that course.
- Only first PSYCH1A enrollments dating from Fall '95 to Spring '01 were included.
- New/Returning transfers during (or prior to) their first PSYCH1A term were excluded.
- Students holding an AA degree or higher at first PSYCH1A enrollment were excluded.
- "Success" for both PSYCH1A and ENGL1A was a grade of A, B, C or CR.
- "Failure" for both PSYCH1A and ENGL1A was a grade of D, F, IF or NC.
- Success/Failure in ENGL1A is based on most recent grade prior to 1<sup>st</sup> PSYCH1A term.
- Students shown as not having the prerequisite had no ENGL1A prior to 1<sup>st</sup> PSYCH1A.
- Students shown as having met the prerequisite had a success grade in the most recent ENGL1A they took prior to 1<sup>st</sup> PSYCH1A enrollment.

A total of 3,491 first time student enrollments in Psychology 1A were used in the current analysis.

## Disproportionate Impact Analysis

The Matriculation Home Page ([www.cccco.edu/cccco/ss/MatriculationHomePage.htm](http://www.cccco.edu/cccco/ss/MatriculationHomePage.htm)) maintained by the Chancellor's Office includes a link to “A Guide to Evaluate Tests”. The referenced document is entitled *A Guide to Assist with the Design and Implementation Investigations to Evaluate Tests in consideration of the CCC Assessment Standards (March, 2001, 4<sup>th</sup> Edition)* prepared by Douglas Glasnapp and John Poggio of the Center for Educational Testing and Evaluation at the University of Kansas.

In Glasnapp & Poggio’s chapter on “Monitoring Disproportionate Impact”, they explain:

“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 data in the following table were borrowed from the first example given by Glasnapp & Poggio in the chapter from which the above quotation was extracted. The example focuses on the determination of whether or not a disparity exists between female and male placement into high math courses (i.e. Math 101/105).

<b>Example</b>				
<b>Arithmetic and Elementary Algebra Tests</b>				
Math Placement	Gender			
	Male		Female	
	#	%	#	%
Math 200	26	33%	48	61%
Math 101/105	52	67%	31	39%
Total	78	100%	79	100%

When the female placement rate is divided by the male placement rate, the resulting ratio of 58% ( $=39\% \div 67\%$ ) falls below 80%. Therefore, it is concluded that the placement test disproportionately impacts females.

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 English 1A prerequisite on groups defined by gender, ethnicity, age and disability.

## Gender Analysis

Table 1 displays the findings from the gender analysis. Per Glasnapp & Poggio, we must concern ourselves with how the minority group (males) fairs versus the majority group (females). It can be seen that 34.9% of the female majority would be in the favorable position of experiencing literally no impact from the imposition of the English 1A prerequisite -- since they already self-elect to take that course prior to enrolling in Psychology 1A. In order determine whether there would be a disproportionate impact on the male minority, we divide the corresponding male percentage by the female percentage –  $31.7/34.9 = 90.8\%$ . Since that result does not fall below the 80% standard, we fail to conclude that the male minority would be disproportionately impacted by imposition of the English 1A prerequisite.

Rather than computing the male percentage as a proportion of the corresponding female percentage, we could just as well come at it another way. That is, as long as the male percentage is not less than 80% of the female percentage, then there is no strong evidence of disproportionate impact. As shown to the right of the table, 80% of the female percentage equals 27.9%. As long as the male percentage doesn't fall below that value, we fail to conclude that the male minority would be disproportionately impacted.

**Table 1**  
**Gender \* Status of Proposed ENGL1A Prereq Crosstabulation**

		Status of Proposed ENGL1A Prereq			
		HavePreReq	NoPreReq	Total	
Gender	F	Count	738	1376	2114
		% within Gender	34.9%	65.1%	100.0%
	M	Count	417	899	1316
		% within Gender	31.7%	68.3%	100.0%
Total		Count	1155	2275	3430
		% within Gender	33.7%	66.3%	100.0%

$34.9\% \times 80\% = 27.9\%$

Chi-Square = 3.8, df = 1, p=.052 (not significant at  $p < .05$ )

It is interesting to note that that while the males were at over 90% equity with the females (a good healthy margin above the 80% standard), the Chi-Square test for differences between the observed male and female distributions came extremely close to reaching “statistical significance”.

The Chi-Square statistic is used to test the hypothesis that male and female success rates are identical – i.e. that the two gender groups are both representatives of the same population and therefore have equivalent success rates (from a statistical point of view). The computed Chi-Square value has a “known” distribution, which allows us to determine the probability of obtaining a Chi-Square value that large or larger when both groups share identical success rates. If that probability is sufficiently “low” (by convention, less than .05 is considered *low*), we reject the hypothesis that the underlying success rates of the two groups are equal to one another. In which case we conclude that the difference between gender success rates is *statistically significant*. Note that statistical significance does not speak directly to the absolute magnitude of the difference between the success rates, it merely quantifies the probability of observing differences of that magnitude or larger if the success rates were truly identical.

### Ethnicity Analysis

Using the procedure outlined in the gender analysis, disproportionate impact for minority ethnic groups is evaluated by comparing the corresponding percentage for each one to 80% of the majority (white) percentage. As can be seen to the right of Table 2, 80% of the majority computes out to 26.9% in this case. One minority ethnic group (American Indian) falls below 26.9% and, thus, is at less than 80% parity with the majority (white) group. We must therefore conclude that there is evidence that imposition of the English 1A prerequisite would have disproportionate impact on the American Indian student subpopulation. However, it should be noted that the impacted group came “very close” to being at 80% parity.

**Table 2**  
**Ethnicity \* Status of Proposed ENGL1A Prereq Crosstabulation**

Ethnicity		Status of Proposed ENGL1A Prereq		
		HavePreReq	NoPreReq	Total
Af. Am.	Count	15	31	46
	% within Ethnicity	32.6%	67.4%	100.0%
Am. Ind.	Count	12	34	46
	% within Ethnicity	26.1%	73.9%	100.0%
Asian	Count	45	89	134
	% within Ethnicity	33.6%	66.4%	100.0%
Filipino	Count	16	36	52
	% within Ethnicity	30.8%	69.2%	100.0%
Hispanic	Count	212	410	622
	% within Ethnicity	34.1%	65.9%	100.0%
Other	Count	20	26	46
	% within Ethnicity	43.5%	56.5%	100.0%
Unknown	Count	28	60	88
	% within Ethnicity	31.8%	68.2%	100.0%
White	Count	826	1631	2457
	% within Ethnicity	33.6%	66.4%	100.0%
Total	Count	1174	2317	3491
	% within Ethnicity	33.6%	66.4%	100.0%

$33.6\% \times 80\% = 26.9\%$

Chi-Square = 3.6, df=7, p=.828 (not significant at p<.05)

In this case, it is interesting to note that while the Chi-Square test for differences among the observed ethnic distributions shows no evidence of such differences, the 80% rule still shows evidence of disproportionate impact for one of the ethnic groups subjected to analysis.

Age Analysis

As can be seen to the right of Table 3, 80% of the majority (18-19 year old) percentage computes out to 24.2%. By virtue of being less populace than the 18-19 year old group, the remaining groups are considered to be “minority” age groups. One minority age group (14-17 year olds) falls well below 80% parity with the majority age group. We must therefore conclude that there is evidence that imposition of the English 1A prerequisite would have disproportionate impact on the 14-17 year old student subpopulation. However, given that the majority of such High School age students are probably admitted on an exception basis to begin with, their being disproportionately impacted is of lesser concern than it would be for a more mainstream age group. (In that vein, it is somewhat distressing to see how close the 40+ age group came to falling below parity).

**Table 3**

**Age Group \* Status of Proposed ENGL1A Prereq Crosstabulation**

		Status of Proposed ENGL1A Prereq			
		HavePreReq	NoPreReq	Total	
Age Group	14-17	Count	33	228	261
		% within Age Group	12.6%	87.4%	100.0%
	18-19	Count	444	1028	1472
		% within Age Group	30.2%	69.8%	100.0%
	20-21	Count	317	338	655
		% within Age Group	48.4%	51.6%	100.0%
	22-29	Count	241	405	646
		% within Age Group	37.3%	62.7%	100.0%
	30-39	Count	89	179	268
		% within Age Group	33.2%	66.8%	100.0%
	40-Up	Count	33	100	133
		% within Age Group	24.8%	75.2%	100.0%
Total		Count	1157	2278	3435
		% within Age Group	33.7%	66.3%	100.0%

$30.2\% \times 80\% = 24.2\%$

Chi-Square = 131.9, df = 5, p <.000001 (significant at p<.05)

In this case, it is interesting to note the Chi-Square test for differences among the observed age distributions is highly significant. This coincides with the strongest findings, thus far, of disproportionate impact under the 80% rule.

Disability Analysis

In this case, 80% of the majority (Not Disabled) percentage computes out to 27.0%. During the time period under study, four of the disability groups had too few students in them to support meaningful analysis – Acquired Brain Injury (N=3), Hearing Impaired (N=1), Speech/Language Impaired (N=1) and Visually Impaired (N=5). Of the remaining minority disability groups, the Mobility Impaired group does show evidence of disproportionate impact from the proposed imposition of the English 1A prerequisite.

**Table 4**

**Disability \* Status of Proposed ENGL1A Prereq Crosstabulation**

Disability		Status of Proposed ENGL1A Prereq		Total
		HavePreReq	NoPreReq	
Acquired Brain Injury	Count	1	2	3
	% within Disability	33.3%	66.7%	100.0%
Hearing Impaired	Count		1	1
	% within Disability		100.0%	100.0%
Learning Disabled	Count	34	63	97
	% within Disability	35.1%	64.9%	100.0%
Mobility Impaired	Count	7	20	27
	% within Disability	25.9%	74.1%	100.0%
Not Disabled	Count	1119	2205	3324
	% within Disability	33.7%	66.3%	100.0%
Other Disability	Count	5	11	16
	% within Disability	31.3%	68.8%	100.0%
Psychologically Disabled	Count	6	11	17
	% within Disability	35.3%	64.7%	100.0%
Speech/Language Impaired	Count		1	1
	% within Disability		100.0%	100.0%
Visually Impaired	Count	2	3	5
	% within Disability	40.0%	60.0%	100.0%
Total	Count	1174	2317	3491
	% within Disability	33.6%	66.4%	100.0%

33.7% x 80% = 27.0%

Chi-Square = 2.0, df = 8, p = .982 (not significant at p<.05)

Note that the Chi-Square test for differences among the observed disability group distributions was not statistically significant. Nonetheless, the 80% rule indicates that the Mobility Impaired group would be disproportionately impacted.

## Validity of the Proposed English 1A Prerequisite

To determine whether an English 1A prerequisite would increase student success in Psychology 1A, course success rates were compared between students who had successfully completed the English 1A prerequisite and those who had never enrolled in English 1A. That comparison indicated that there is a “statistically significant” difference between the Psychology 1A success rates for those two groups. As be seen in Table 5, the success rate among those who successfully completed English 1A is 15.5 percentage points higher than among those who never took English 1A.

**Table 5**  
PSYCH1A Performance \* Status of Proposed ENGL1A Prereq Crosstabulation

		Status of Proposed ENGL1A Prereq			
		HavePreReq	NoPreReq	Total	
PSYCH1A Performance	Failure	Count	242	836	1078
		% within Status of Proposed ENGL1A Prereq	20.6%	36.1%	30.90%
	Success	Count	932	1481	2413
		% within Status of Proposed ENGL1A Prereq	79.4%	63.9%	69.10%
Total		Count	1174	2317	3491
		% within Status of Proposed ENGL1A Prereq	100.0%	100.0%	100.00%

Chi-Square = 87.3, df = 1, p<.000001 (significant at p<.05)

However, there remains a question as to whether or not the above finding is sufficient to warrant a recommendation that English 1A be imposed as a prerequisite for Psychology 1A. Before doing so, we need to consider whether or not such a recommendation would be in keeping with the spirit of the Chancellor’s matriculation guidelines.

Section 8. “Prerequisites, Corequisites, and Advisories on Recommended Preparation” of the *Matriculation Standards* document posted at the Chancellor’s Office site ([www.cccco.edu/cccco/ss/Matric/STANDS.doc](http://www.cccco.edu/cccco/ss/Matric/STANDS.doc)) lists the following standard:

4. Communication or computation pre- or co-requisites for any course other than a communication or computation course are based on content review, sound data-gathering research practices, and demonstration that student is *highly unlikely to succeed without the pre- or co-requisite*. (Italics added)

Yet, a review of the most recent half dozen prerequisite studies conducted at Cabrillo College indicates that the sole criterion used to determine whether a proposed prerequisite is a valid one is the presence of a statistically significant difference between the success rates of those students who have and those who have not completed the prerequisite. Thus, the issue of whether or not students are “*highly unlikely to succeed without the pre- or co-requisite*” was not addressed.

The following true life example is offered to accentuate the point that there is a real need to address the issue of what constitutes “highly unlikely” to succeed. Using the same rigorous methodology described earlier, an analysis was performed to determine whether successful completion of Psychology 1A should be imposed as a prerequisite for English 1A. As shown in Table 6, the English 1A success rate is significantly higher among students who met the Psychology 1A prerequisite – a full 6.0 percentage points higher. [In one of the six recently completed prerequisite studies that recommended in favor of imposing the prerequisite, the corresponding percentage point increase was only 4.2.]

**Table 6**

ENGL1A Performance * Status of Proposed PSYCH1A Prereq Crosstabulation					
			Status of Proposed PSYCH1A Prereq		Total
			HavePreReq	NoPreReq	
ENGL1A Performance	Failure	Count	22	533	555
		% within Status of Proposed PSYCH1A Prereq	5.0%	11.0%	10.5%
	Success	Count	416	4305	4721
		% within Status of Proposed PSYCH1A Prereq	95.0%	89.0%	89.5%
Total		Count	438	4838	5276
		% within Status of Proposed PSYCH1A Prereq	100.0%	100.0%	100.0%

Chi-Square =15.3, df = 1, p=.00009 (significant at p<.05)

Based, solely on the presence of a statistically significant difference between those success rates, the researcher would be inclined to recommend that Psychology 1A be imposed as a prerequisite for English 1A. That would in turn imply that the 89% success rate observed for those without the prerequisite constituted their being “highly unlikely” to succeed.

In order to extricate ourselves from this dilemma, what we really need is an agreed upon yardstick (or rule) for determining what constitutes “highly unlikely” to succeed. We need a means for determining how big the difference between the success rates of those with and without the proposed prerequisite has to become in order for us to conclude that a disservice is being done by our failing to impose the prerequisite.

This analyst would like to suggest that serious consideration be given to adopting the EEOC’s 80% rule as the standard for determining when to recommend that a prerequisite be imposed. That is, if the success rate of students without the prerequisite is not at 80% parity (or better) versus those with the prerequisite, then we recommend in favor of imposing the prerequisite.

Applying the 80% rule to the “Psychology 1A as a prerequisite for English 1A” example, we find that the success rate of those without the prerequisite (89%) is at better than 80% parity with those who met the prerequisite ( $95\% \times 80\% = 76\%$ ). Therefore, we would fail to recommend the imposition of such a prerequisite.

Likewise, applying the 80% rule to the current “English 1A as a prerequisite for Psychology 1A” study, we find that the success rate of those without the prerequisite (63.9%) is at better than 80% parity with those who met the prerequisite ( $79.4\% \times 80\% = 63.5\%$ ). Therefore, we would fail to recommend the imposition of such a prerequisite.

If the 80% rule had been applied in the most recent six prior prerequisite studies (all of which recommended implementing the proposed prerequisite), only one of those six prerequisites would have been recommended.

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