

To Set or Not Set Course Prerequisites: The Two Sides of the Issue

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The Two Sides

- **Setting prerequisites will harm ... students** by consigning them to basic skills sequences from which they will not emerge.
- **Failing to set prerequisites will harm ... students** by allowing them to enroll in classes for which they are not prepared to succeed.

Taken from Nancy Schulock, “Regarding Prerequisite Policy in the California Community Colleges” (Sept, 2010)

Content Review rather than Statistical Analysis

- The Academic Senate is currently embarked on a process to establish pilot projects whereby course prerequisite validation is based primarily on content review, without the need for statistical validation.
- Mark Wade Lieu (January 2010) “Putting Prerequisites into Context: How We Got to Where We Are”

The Lesser Evil

- when one balances the lack of success of remedial students against the attrition that occurs in remedial programs, remediation is “the lesser of the evils”.
- Basic Skills as a Foundation for Student Success in California Community Colleges (2007)

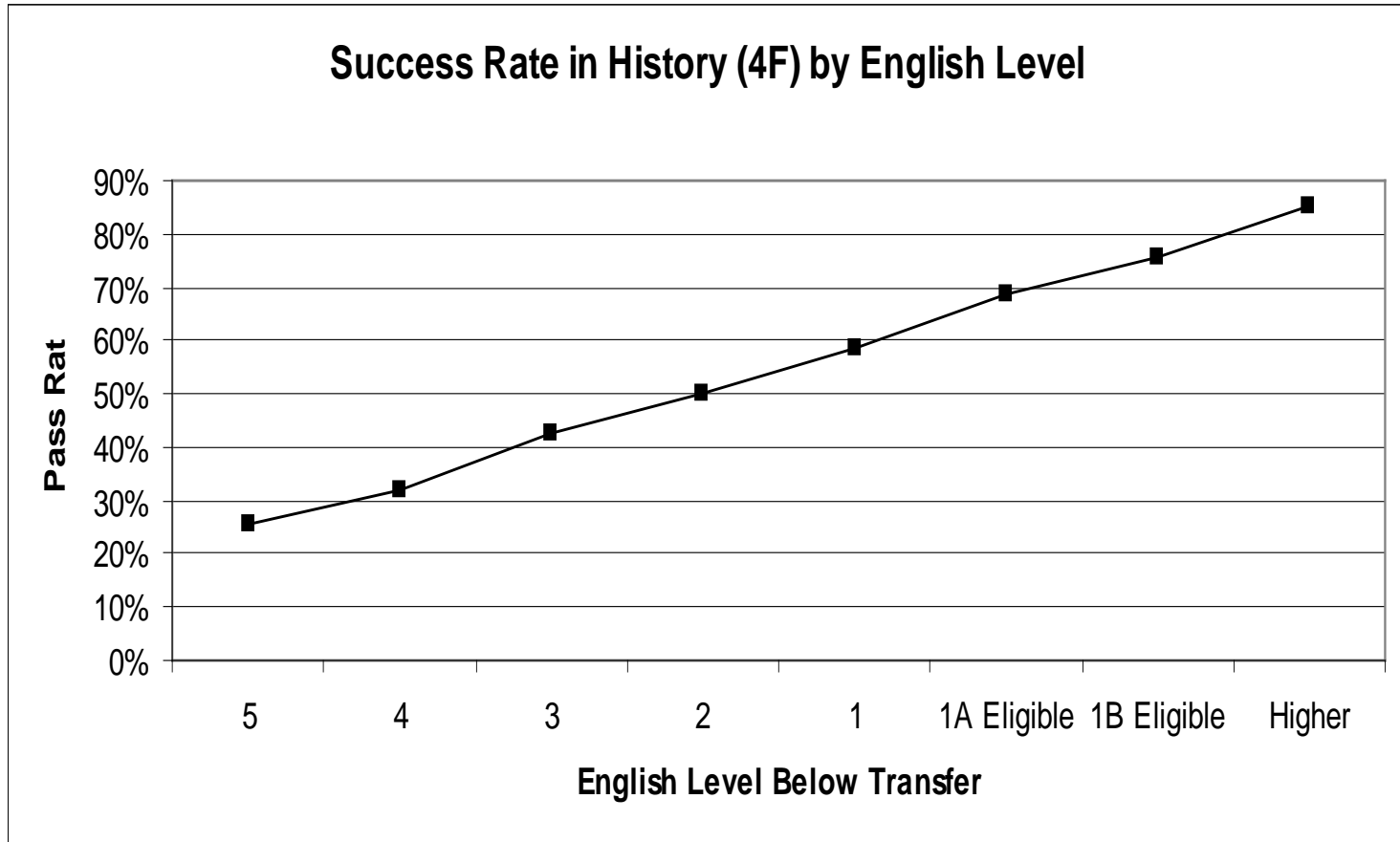
Regression Discontinuity

- Advocates claim that remediation is an important, necessary, and effective component of higher education. On the other side, critics argue that remediation is a barrier that increases the requirements that are needed before taking college-level courses, thereby lowering completion and transfer probabilities.
- Calgano and Long, (2008) “The Impact of Postsecondary Remediation Using a Regression Discontinuity Approach: Addressing Endogenous Sorting and Noncompliance”

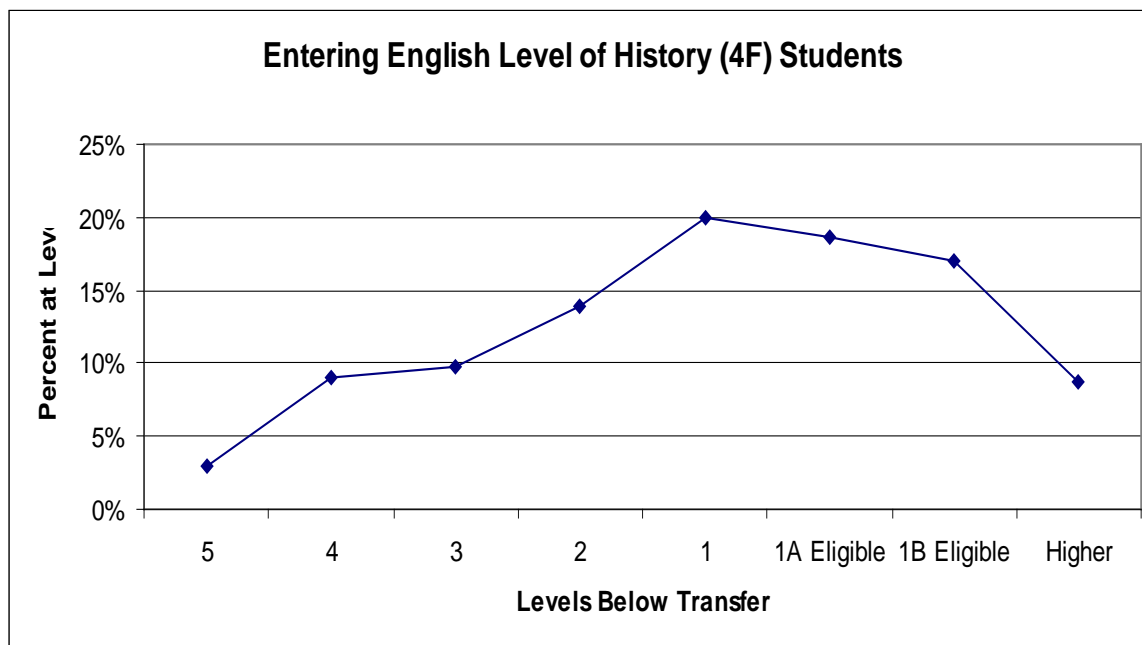
Costs Versus Benefits at City College of San Francisco

- The highest level of scrutiny is *data collection and analysis*. This analysis is applied to out-of-sequence communication and computation skills and non-course prerequisites. Examples are “**English 1A: Freshman Composition**” as a **prerequisite to History 17A**.
- The basic premise is that the college must demonstrate, using sound research practices, that students are highly unlikely to succeed without these skills.
- **Academic Senate for the California Community Colleges (1997) ‘Good Practices for the Implementation of Prerequisites’**. <http://asccc.org/node/174851>

The Benefit



Distribution of English Ability Level at Start of History Course

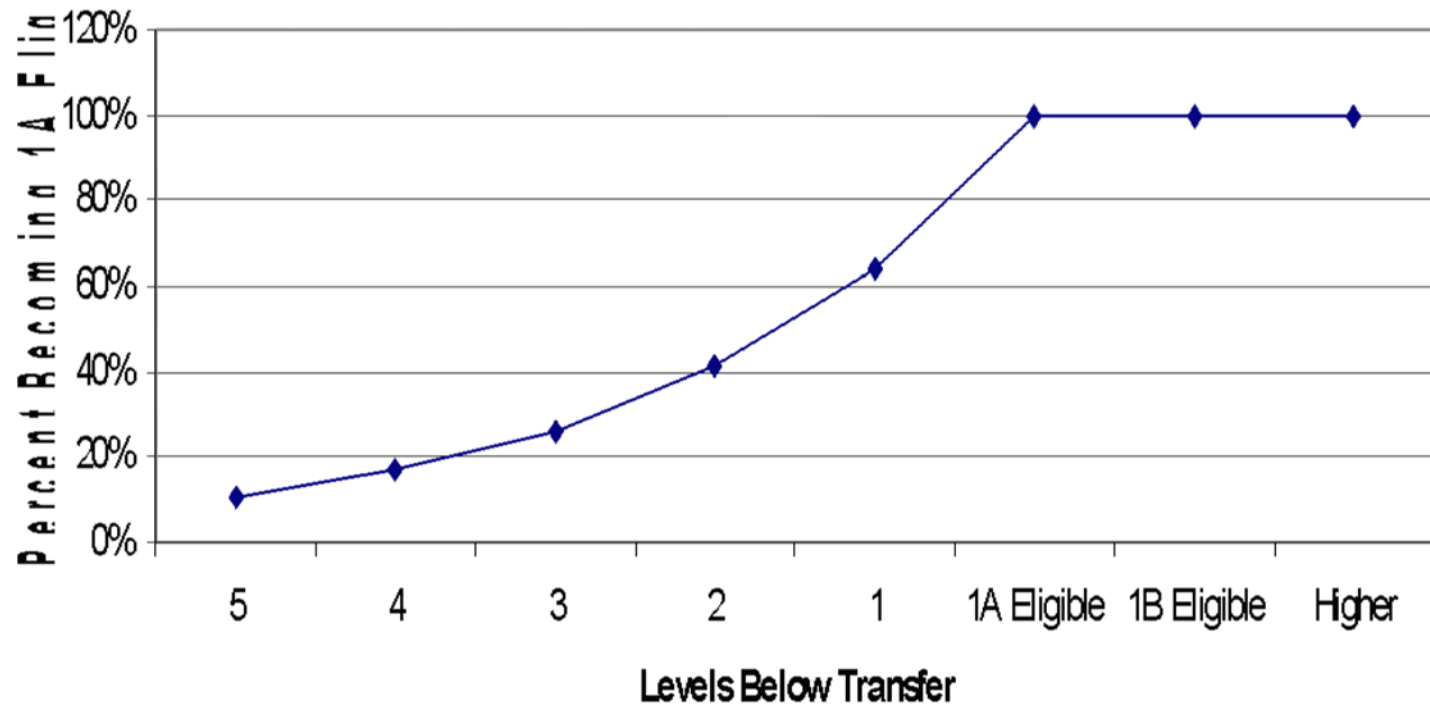


Modeling Remedial Sequence Completion

- $t = p^{2l}$
- t = percent of students that become English 1A eligible in an eight year time span
- p = average success and enrollment rate
- l = number of Levels below 1A eligible.

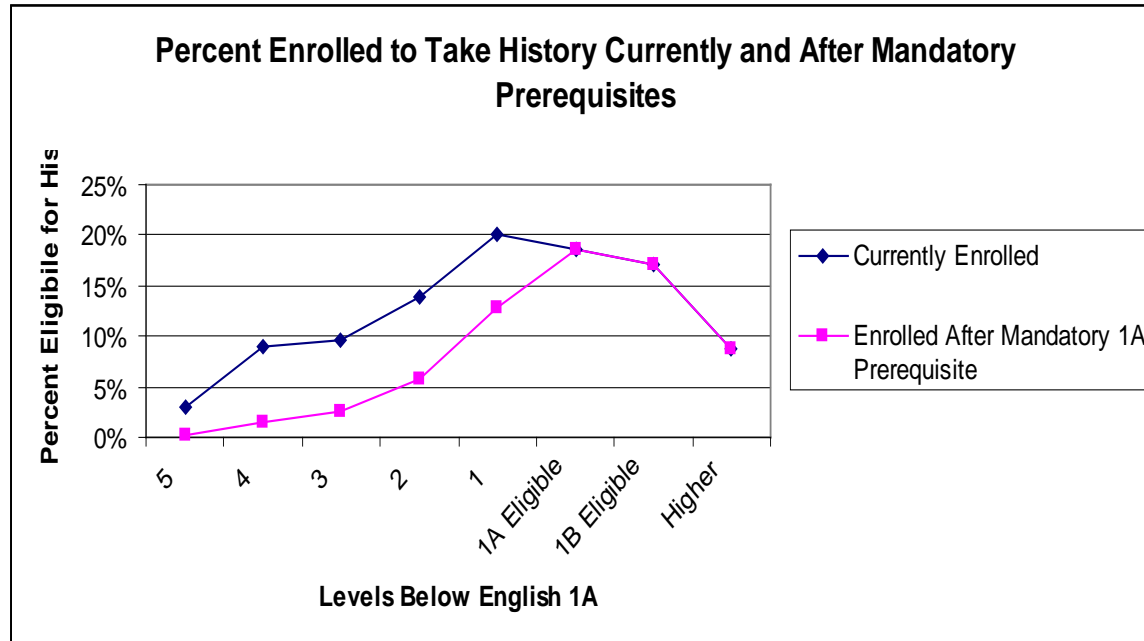
- P has been found to be .8 for students in the English sequence at CCSF. So, for example, students who place at $l=5$ levels below transfer have $2L = 10$ steps to complete (5 passing and 5 enrollment steps). .8 raised to the 10th power is 10.7% reaching a 1A level. For students who place 4 levels below transfer the anticipated percent becoming 1A eligible would be .8 raised to the 8th power or 16.7%.

Anticipated Percent of Current History Students Becoming 1A eligible



The Cost

Current History Enrollment Falls by 1/3

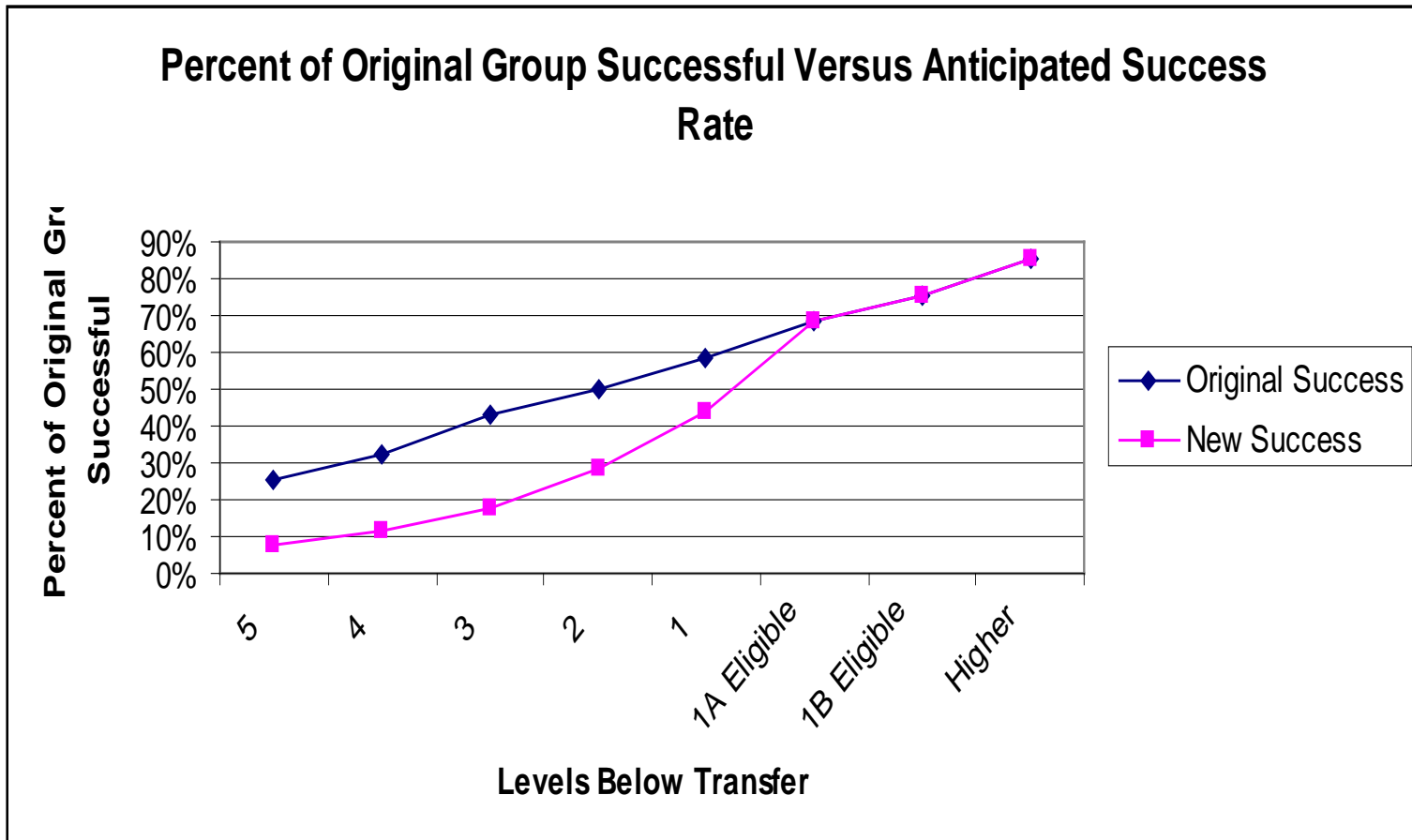


Explanation

- 3% of the current History population is at 5 levels below transfer. If 10.7% of this 3% reached an English 1A level and took History, that percent would drop to .3%. For all levels below transfer, because of the attrition in the English sequence, the percent of each group that would then take History would be much smaller than their current enrollment. **In fact, of the current History population only 67% would take history if an English 1A requirement were in place given the assumptions about English sequence attrition in figure 3.** This is calculated by summing all of the data points on the 'Enrolled after Mandatory 1A prerequisite' line.

The Cost

Percent of Each Original Group that would be Successful in History



Explanation

- at 5 levels below transfer, currently 25% of students succeed. If all of these students were required to be 1A eligible, the 10.7% that would do so would have the anticipated success rate of current 1A eligible students or 69%. So $10.7\% \times 69\%$ would be 7.4%. The percent of this group what would be successful in History would fall from 25% to 7.4% - a 17.6% decline.

The math model

- $n_1 = s_0 t_1$
- S_0 is the percent of English 1A eligible students who are successful in History and it is the anticipated success rate of all students once they become 1A eligible.
- For students 5 levels below transfer, the percent successful after the imposition of prerequisites would be
 - $n_1 = s_0 p^{21}$
 - $n_5 = .69(.8)^{2(5)}$
 - $n_5 = .69(.107)$
 - $n_5 = .074$

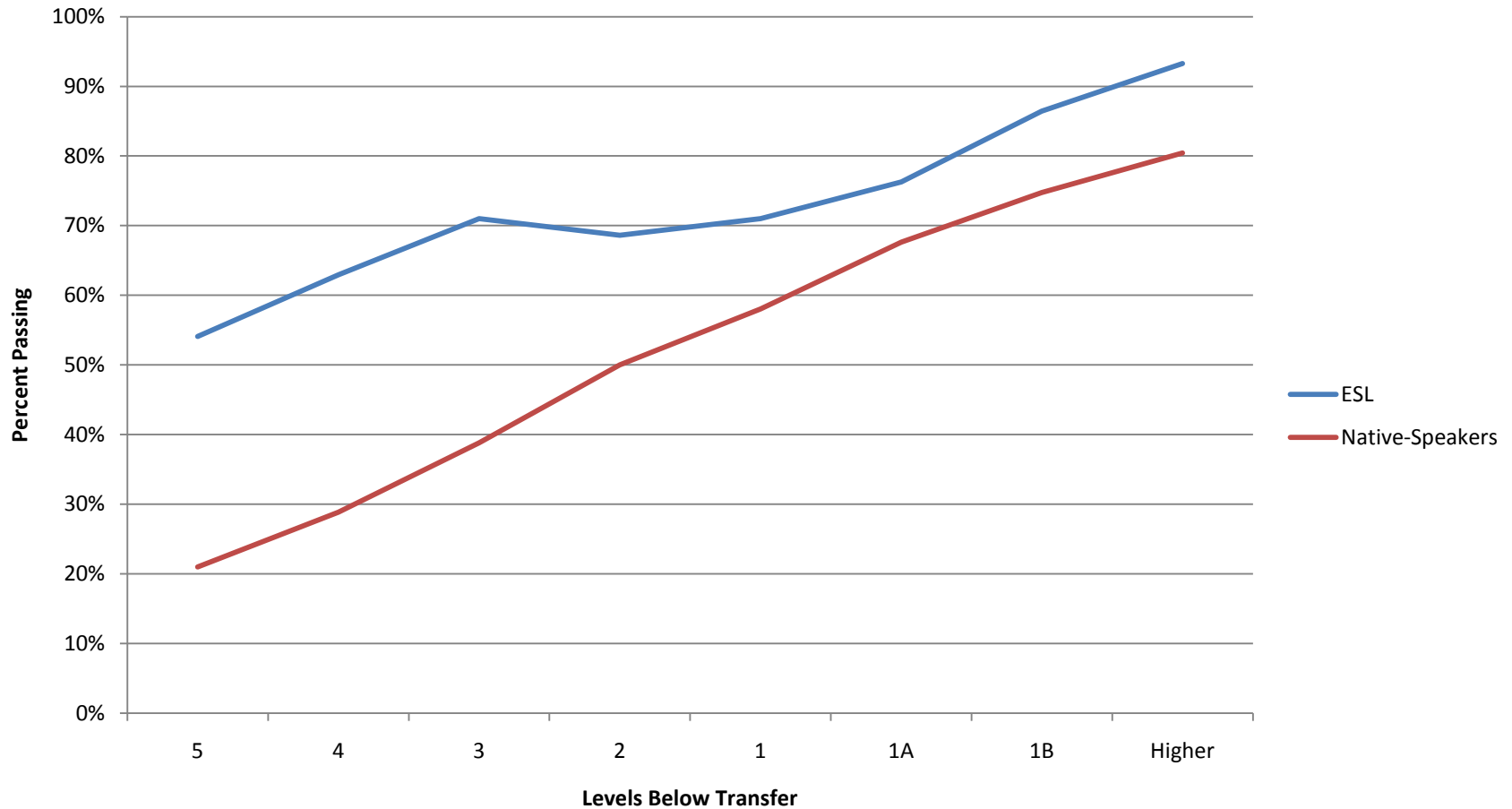
The Reality

What would the average success and re-enrollment rate have to be to equal the current success rate?

- For Students 5 Levels below transfer:
- $.25 = .69p^{10}$
- $.25/.69 = p^{10}$
- $p = (.25/.69)^{(1/10)}$
- $p = .956$
- **In order for students who take history at 5 levels below English 1A eligibility to be as successful as they are currently (a 25% success rate), they would have to have an average success and enrollment rate of 95.6% in the English sequence!**

And Bias in the Recommendation?

Course completion Rate in any History Class by Level and whether students are ESL or Native-Speaker



Disproportionate Impact on Incoming SFUSD High School Students (Fall 2009 Placement)

Ethnicity	Percent of Students			Number Total
	Basic Skills	Upper Pre-collegiate	College Level	
African American/Non Hispanic	90%	8%	2%	97
American Indian/Alaskan Native	100%	0%	0%	1
Asian (excluding Southeast)	73%	17%	10%	492
Filipino	83%	15%	2%	105
Hispanic/Latino	80%	16%	4%	214
Other Non White	33%	67%	0%	3
Pacific Islander	100%	0%	0%	8
SouthEast Asian	83%	8%	8%	36
Unknown/No Response	77%	15%	7%	136
White Non Hispanic	56%	23%	21%	66
Grand Total	77%	16%	8%	1158

Conclusions – Do setting prerequisites help or harm students?

- (Nancy Schulock, September 2010 “**Regarding Prerequisite Policy in the California Community Colleges**”:
- This issue cannot be resolved on the basis of available data
- **I am supportive of the proposed policy change to allow for content review as a basis for colleges to set prerequisites.**

It replaces problematic statistical processes with purposeful alignment of course content, in line with what the leading reform states are doing and consistent with a new report by two leading national policy centers on improving college readiness by aligning competency expectations and assessing proficiencies.

Nancy Schulock Continued

- Achieve a balance between permissiveness and restrictiveness with respect to access to college-level courses by under-prepared students by:
 - allowing students into college-level courses concurrent with their remedial enrollments as long as the course does not require skills related to those that need remediation (the key being reading—states generally do not allow students who are not proficient in reading to take college-level courses)
 - requiring students to begin and complete remediation early by setting limits, for example, on the number of credits students may earn before completing remediation

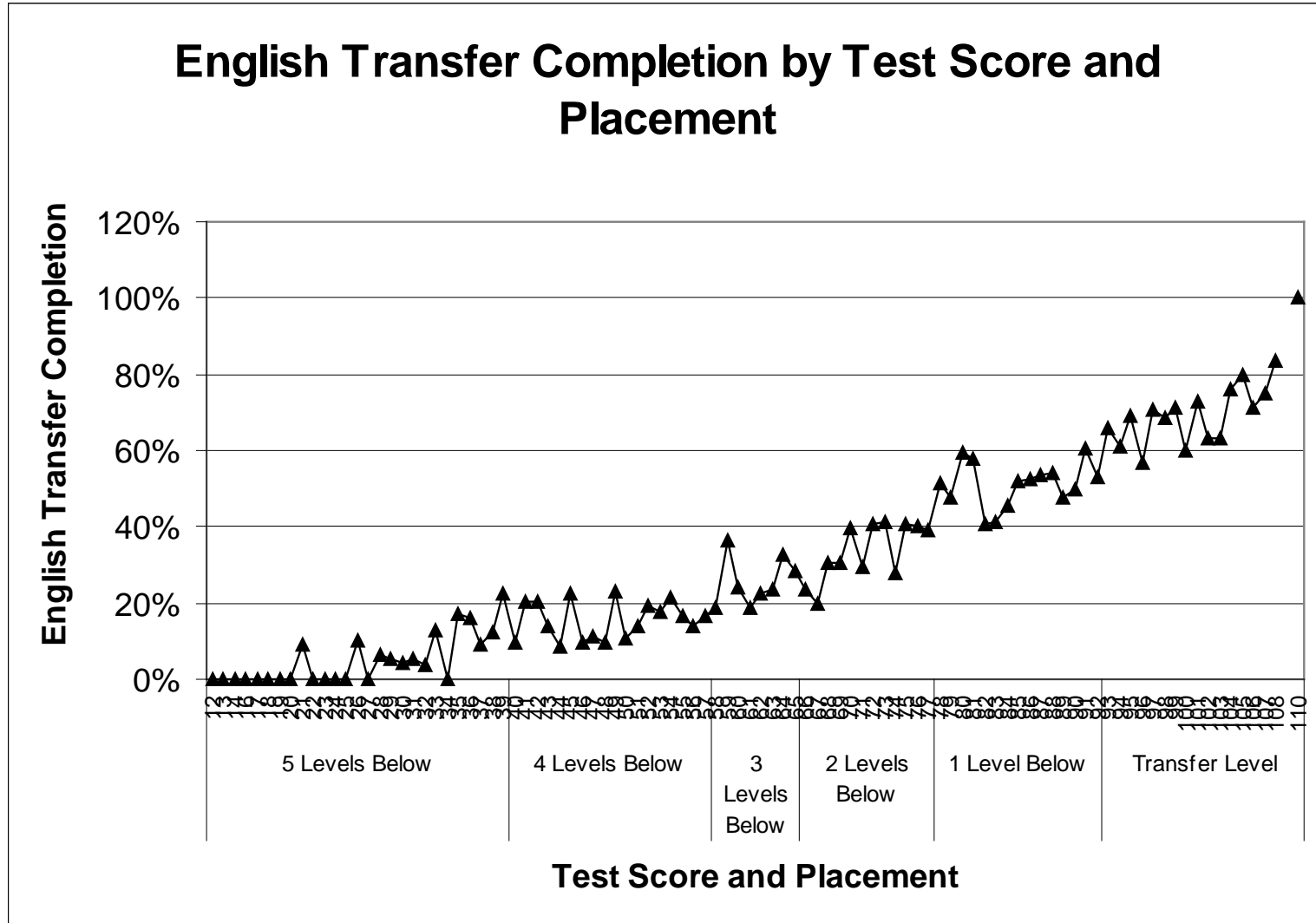
And My Conclusion

- Show me the money:
 - The Criteria: The benefits of remediation outweigh the costs.
 - As a whole group, do students who receive remediation succeed in greater percentages than those who do not after taking into account the attrition that occurs?
 - Use Statistical analysis (Oops, we no longer need to.)
 - Model the process mathematically so that we aren't merely jumping from one statistic to the next.

Addendums

Table 2

Completion of a Transfer Level by Spring 2009 as a function of both Test Score and Placement for 4,251 Students who Tested in 2003 or 2004 and then started an English Sequence class



Does Placement (i.e. remediation) help or hurt?

Maximum Likelihood Analysis of Variance

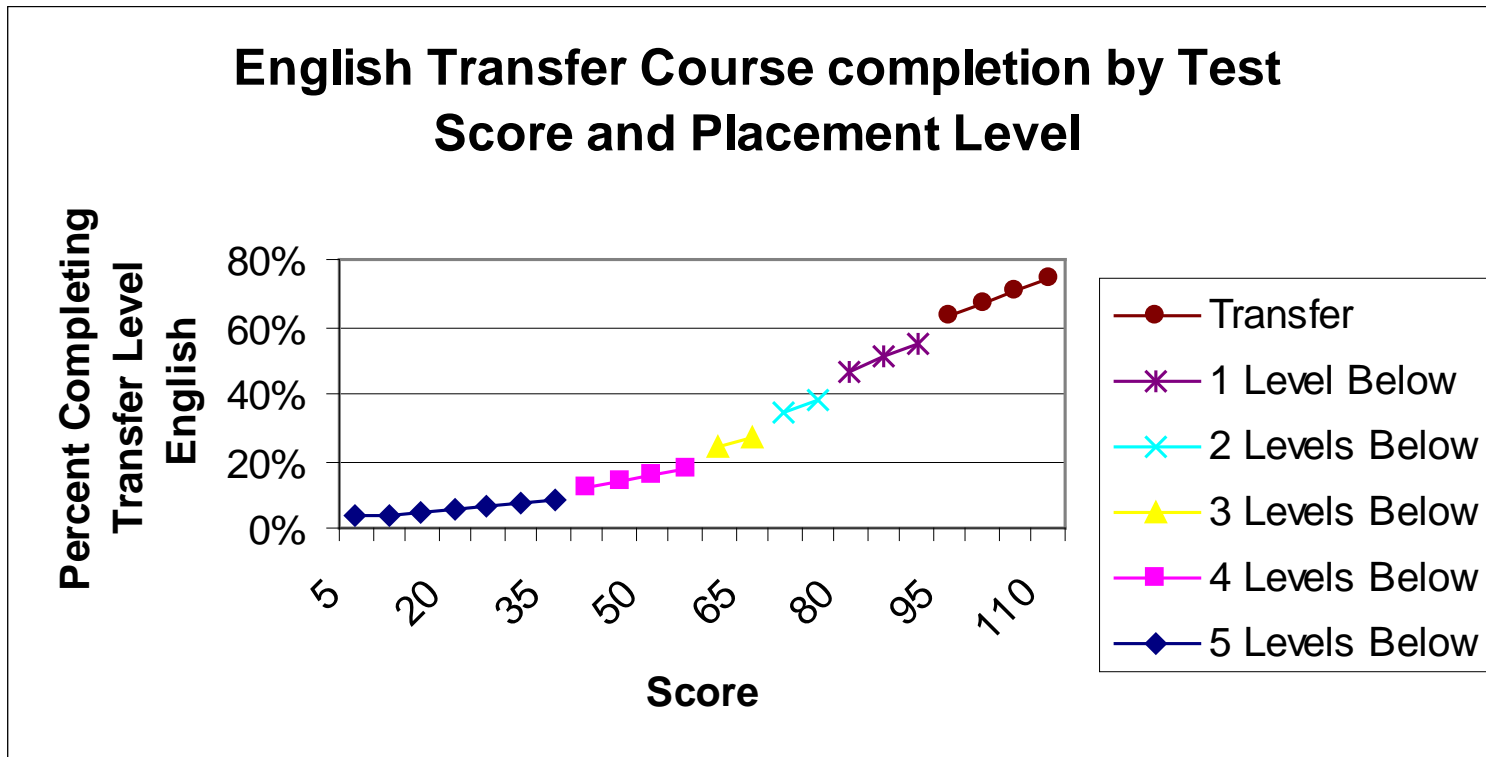
Source	DF	Chi-Square	Pr > ChiSq
Intercept	1	78.66	<.0001
SCORE	1	10.17	0.0014
SCORE*placement	1	3.89	0.0487
Likelihood Ratio	95	104.95	0.2277

Analysis of Maximum Likelihood Estimates

Parameter	Estimate	Standard Error	Chi-Square	Pr > ChiSq
Intercept	-3.3307	0.3755	78.66	<.0001
SCORE	0.0296	0.00928	10.17	0.0014
SCORE*placement	0.00196	0.000994	3.89	0.0487

Plot the estimates in Excel to see how things look.

$$\text{Percent Passing} = \frac{\text{EXP}(-3.3307+0.0296*\text{Score}+0.00196*(\text{Score}*\text{Placement}))}{(1+\text{EXP}(-3.3307+0.0296*\text{Score} +0.00196*(\text{Score}*\text{Placement})))}$$



Examine Success Within and Between Each Cut Score Range

English Placement	Score Range
Transfer Level	93 - 110
One Level Below	78 - 92
Two Levels Below	66 - 77
Three Levels Below	58 - 65
Four Levels Below	40 - 57
Five Levels Below	0 - 39

English 1A Completion by Level Placement and Score

Score	Level					English 1A
	5 Levels Below	4	3	2	1	
5	4%					
10	5%					
15	5%					
20	6%					
25	7%					
30	8%					
35	10%					
40		12%				
45		14%				
50		16%				
55		18%				
60						
65			26%			
70				33%		
75				37%		
80					46%	
85					50%	
90					55%	
95						65%
100						69%
105						73%
110						77%

The Success Gap between +/- 3 Score Points of Each Cut Score

Cut Score Focus	Below	Above	Gap
Transfer- 1 Level Below	54%	66%	11%
One Below - Two Below	40%	53%	13%
Two Below - Three Below	28%	24%	-4%
Three Below - Four Below	16%	27%	11%
Four Below - Five Below	15%	18%	3%