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Research Report

July 26, 2006

Introduction

Imperial Valley College, represented by Norma Nunez, requested research to establish cut scores for the ACCUPLACER® assessment system. A contract was developed for Gordon Associates to visit the campus to provide guidance for faculty in selecting multiple measures criteria and in understanding the cut score research. The visit took place May 11, 2006. The contract calls for Gordon Associates to recommend cut scores, and build a multiple measures placement system using the ACCUPLACER® system. This report covers the cut score research.

Placement Accuracy

The purpose of any placement examination is to place students into the course appropriate for their level of academic skill in the discipline. Placement Accuracy is defined for these purposes as the ratio of students who are deemed by faculty and the students themselves to be adequately prepared for the course into which they are placed, to the total number of students placed into the course by the placement examination. Here, all students were tested, so there is no discrimination between those who have taken a prerequisite course and those admitted directly. The California Matriculation program requires that 75% of students be rated adequately prepared. Most colleges, including Imperial Valley, exceed that.

There are three distinct advantages to using this method to set cut scores over using end-of-course grades. First, a placement examination measures only academic skill within a discipline. It does not assess any of the other factors which influence course grades. Research has shown that academic skill, as measured by a placement examination accounts for less than 20% of the variance in course grades. Most researchers found that faculty grading variances accounted for much more. Using the survey method narrows the field and assesses only how well the student is placed, and is not influenced by family responsibilities, job duties, health, or any of the other factors that influence grades. The table below illustrates the Placement Accuracy Model.

Second, the surveys are conducted early in the term, before most of the students who will eventually drop the course do so. Using grades, it is inaccurate to use the “W” grades as failures, because many of the students who drop a course do so for reasons other than failure. However, we know that a significant number of them do drop because they are failing, but we cannot identify them from the others. So, the “W” grades are discarded, thus skewing the data by removing a disproportionate number of failing students.
Third, and perhaps most important, we are able to identify those students who are placed below their capabilities. No placement system is entirely accurate. There are errors at both ends of the

curve. It stands to reason that if a test places some students higher than they should be placed, it also will err on the other side and place students lower than they should be. Using the survey method, we are able to identify those students and account for them in determining where the cut score should be.

Enrollment ⇒ Placement ⇓	At Placement Level	Above Placement Level
Accurate	Adequately Prepared	Under-Prepared
Inaccurate	Under-Prepared Over-Prepared	Adequately Prepared Over-Prepared

The Process

Students in the target reading and mathematics courses were asked to take the appropriate ACCUPLACER® tests at the beginning of the term. At that time, English faculty did not consider using ACCUPLACER® for composition placement. Students were tested over the first weeks of the term.

Using survey forms provided by Gordon Associates, students and faculty were surveyed to determine whether each student was capable of learning the material being presented at the required pace. The survey forms were returned to Gordon Associates along with the testing data. By combining the input survey data with the electronically supplied test data, a file was compiled from which to associate survey results with test scores. The following is the result of that research.

Disproportionate Impact

It is important that placement tests do not discriminate against cultural groups, or by race, gender, or disability. Although Hispanics and Native American students scored significantly lower on the tests than did Caucasian and Asian students, the resulting placement, according to the survey data, was accurate. Therefore, the tests are accurately measuring students' academic skills and placing them appropriately without bias. It is the students' prior academic preparation that causes them to score lower. The following table illustrates the average test scores and

placement accuracy for the students surveyed. The variance in placement accuracy appears to be random, and is not related to test bias.

Disproportionate Impact Analysis						
	Mean Score				Placement Accuracy	
	RC	Arith	Alg	CLM	Reading	Math
Asian	61	64	63	54	88%	86%
Black	68	46	44	33	86%	85%
Caucasian	64	53	48	41	84%	86%
Hispanic	58	41	39	34	87%	87%
Native American	59	41	36	N/A	84%	84%

The Methodology

In the surveys, students could be under-prepared, adequately prepared, or over-prepared. Tests were conducted to determine how well faculty and student responses were correlated. As a policy, course sections in which faculty and student responses are correlated at less than R = .6 are analyzed separately. If the correlation is .6 or greater, the faculty and student responses are combined using the following formula:

((Fac1*2)+(Fac2*2)+Stu1+Stu2)/6, rounded to nearest whole number.

No sections in this survey showed less than .6 correlation, so all survey results were combined as shown, adding double weight to the faculty response.

Students who were rated Over-Prepared in the weighted variable were assigned to the next course level, because by definition, that is the course into which they should have been placed. This allows analysis of them in consideration of the minimum score for that level. The cut score should include as many of them as possible without significantly compromising placement accuracy. This, of course, may allow more under-prepared students into the course as well.

Data from each course level were used to determine score frequency distributions according to the three possible survey responses as weighted above. Cut scores are set at the point with a high Adequately Prepared percentage, but before the Over-Prepared percentage starts to increase significantly. The tables below illustrate the accuracy rate, as well as the percentage of Over-Prepared students eliminated and the percentage of Under-Prepared students admitted. The percentages are of each group, and do not add to 100%

Findings

In general, cut scores can be recommended for all the levels in which surveys were conducted. Imperial Valley College should achieve about 86% placement accuracy with the recommended cut scores. That does not mean that all the students in the course will pass, nor does it mean that every student will be prepared to learn at the required pace. Many students, particularly in the higher levels, will have arrived in the course by means of taking prerequisite courses. The Placement Accuracy Rate does not include them. Only students who are placed into the course by the placement system are considered in the Placement Accuracy Rate.

Reading Placement

Five reading courses were surveyed. The recommended cut scores are specified in the table below, along with the related findings. The data from reading courses was unusually clear, providing the means to recommend accurate cut scores. Frequently, reading courses provide data with skewed or irregular distributions, making cut score selection difficult. That was not the case here. Overall placement accuracy in reading is approximately 86%.

Reading Placement					
Course ÷	**086**	**087**	**088**	**089**	**111**
Cut Score	< 46	46 - 58	59 - 70	71 - 82	83 and up***
Accuracy	85%	86%	88%	86%	84%
Over Eliminated*	N/A	6%	4%	5%	6%
Under Admitted**	100%	9%	11%	12%	8%

Notes: * The percentage of those students rated over-prepared in the lower class who still would not be admitted to this level.

**The percentage of those students rated under-prepared in this course who still would be admitted.

***Many colleges use this cut score as the point at which reading competency for graduation is met.

Math Placement

Surveys were collected from 10 mathematics courses. Sufficient data were collected in each course to establish cut scores, except that scores could not be set in Calculus II and Calculus III. The CLM test is capable of assessing beginning-level calculus skills, but does not discriminate

beyond the beginning level. Seven placement levels are identified from the data. The cut scores for Math 110 and Math 120 are identical, so those courses are included at the same level. The survey data in math courses was well distributed with reasonably high correlations. Overall math placement accuracy is approximately 87%. The table below identifies the math cut score ranges as well as the accuracy percentages.

Math Placement							
Course ÷	070[1]	080	090	110/120	190[2]	124[2]	192
Cut Score Arith	<71	72 & up					
Algebra		48 - 66	67 & up				
CLM				62 - 74	75 - 87	88 - 102	103 & up
Accuracy Arith	72%	84%					
Algebra		88%	85%				
CLM				83%	87%	88%	91%
Over Eliminated*	N/A	4%					
Algebra		5%	6%				
CLM				7%	4%	5%	4%
Under Admitted**	100%	9%					
Algebra		7%	9%				
CLM				12%	9%	10%	4%

Notes:

*** The percentage of those students rated over-prepared in the lower class who still would not be admitted to this level.**

**** The percentage of those students rated under-prepared in this course who still would be admitted.**

[1] There is a high rate of under-prepared responses in Math 070 (approximately 28% of those admitted to the course). This could be an indication that a preparatory course is needed.

[2] Although Math 124 and Math 190 have the same prerequisite course, the data indicate that they are significantly different in terms of skill requirements. A review of the course outlines seems to bear out what the data showed. The score recommendations are taken directly from the data in small, but valid samples.

There are some indications that an additional course is needed at the basic arithmetic level, as a prerequisite for Math 070. If a developmental course exists outside the Math Department, it should be included in the placement system. The data indicate that a cut score of about 50 would improve placement accuracy in Math 070 to about 84%.

English Composition Placement

No survey data were collected from English composition classes. However, English faculty have requested advice to establish cut scores using a combination of the Reading Comprehension and Sentence Skills tests. More than 20 community colleges in California currently use ACCUPLACER® for English placement. Based on that experience, a review of the course outlines, and the data collected in the reading courses, the table below shows the recommended cut scores. Faculty should review the recommendations and make adjustments if necessary based on their professional expertise with the curriculum. The recommendations below should provide a Placement Accuracy rate near 85% or higher, based on comparable curricula in other colleges.

Five levels of English placement are identified, ending with English 101, the first transferable course. The recommended cut scores are based on using 50% of the Reading Comprehension score plus 50% of the Sentence Skills score. Upon further research for validation, it is possible that a different combination ratio would prove to be more effective.

English Composition Placement					
Course ÷	096	097	098	100	101
Score range	< 54	54 - 68	69 - 80	81 - 92	93 & up
Note: The scores above are based on .5 * Reading Comprehension score plus .5 * Sentence Skills score. These are recommendations based on experience with the tests in a 5-level placement system, and on comparison with the 5-level reading placement system. Faculty should review these recommendations and make necessary adjustments, or accept the recommendations, based on their expertise with their curriculum. Validation research should be conducted within the next year.					

Ability to Benefit

The ACCUPLACER® Reading Comprehension, Sentence Skills, and Arithmetic tests are approved for use as an Ability to Benefit test for federal financial aid. Acceptable scores are: RC - 55, SS - 60, and AR - 34. These scores are established by the publisher under federal guidelines, and enforced by the federal Department of Education. Students who do not have a high school diploma must demonstrate their ability to benefit by achieving a minimum score on an approved test instrument. Minimum scores are set one standard deviation below the mean of a population of recent high school graduates who have taken the test.

Conclusions and Recommendations

The data collected was clean and well distributed across the ranges. The resulting cut score recommendations should provide exceptional placement accuracy, so long as the curriculum

remains relatively stable. An overall Placement Accuracy Rate of more than 85% can be expected.

The disproportionate impact analysis indicates that Imperial Valley College can expect to create an unbiased placement system that will function with equal accuracy for all ethnic groups in its student population. The ACCUPLACER® system has passed several linguistic bias reviews with very little adjustment.

The English cut score recommendations should be validated by empirical research within the next year. All cut scores should be reviewed within the next three years. The Ability to Benefit scores are fixed and not subject to institutional review.