CollegeBoard

ACES (ADMITTED CLASS EVALUATION SERVICE™)

ACCUPLACER® Placement Validity Study for Sample University

Data in this report are not representative of any institution. All data are hypothetical and were generated for the sole purpose of creating this sample report.

HYPOTHETICAL DATA

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Introduction

The purpose of this ACCUPLACER® Placement Validity Study is to assist you in using academic measures to identify the course level that is most appropriate for a student's ability level. This report will enable you to use these measures to predict the probability that the student will succeed in a particular course. This report will also help you decide which measures to use to predict that success.

Admitted Class Evaluation Services™ (ACES) studies often mention the terms *predictor variables* and *criterion*. Predictor variables include such things as scores from standardized tests, as well as specific campus measures. A criterion is a course outcome of success. An example of a criterion is the final grade in the course.

In addition to Placement Validity studies, ACES makes available Admission Validity studies to examine relationships between College Board exam scores and college success and Year-over-Year studies to explore these relationships across entering cohort and year in college. The ACES system now offers Retention and Completion Validity studies to examine relationships between College Board exam scores and student retention and graduation.

ACCUPLACER Placement Validity studies are organized by course and contain several sections:

- *Description of the Study Design for Your Institution* presents the overall study options selected and the variables included in the analyses.
- *Course Title Course Code* (results appear in the following three sections for each course in your study):
  - *Section 1: Characteristics of Students* presents descriptive statistics (number of valid observations (N), mean, standard deviation, minimum, and maximum) for your student data on each of the predictor variables included in the analyses.
  - *Section 2: Strength of Prediction* assesses the strength of the relationship between placement predictor measure(s) and the course grade, and between the placement predictor measure(s) and the course success criterion outcome measure you selected. If there are multiple placement predictor measures for the course, the strength of relationship with the course success criterion is presented for predictor measures individually and in combination. These results appear in table and graph form and provide insight into which predictors are likely to be most useful for placement decisions.
  - *Section 3: Deciding What Probability of Success to Require for the Course* includes reference tables that present, for each course and course success criterion, the predictor cut scores associated with different predicted probabilities of success in the course, which are useful in determining the cut score to use for course placement decisions.
- *Following Up on Your Placement Decisions* presents additional considerations in making placement decisions and provides references and sources of support.

A supplementary interactive graph file for this placement study can be downloaded from the ACES website. It contains dynamic versions of the tables and graphs in this study that can be viewed, manipulated, and exported using a browser. Instances in which the dynamic version of a table or graph contains more information than the version appearing in this study document are noted in the text.

Some limitations and considerations concerning this information

ACCUPLACER Placement Validity studies are useful when your primary concern is predicting a student's success in a course on the basis of that student's score on a specific test. In certain cases, a student's predicted success may not be the only consideration in making placement decisions. For some courses, prerequisite knowledge of other subjects may be desired.

This report assumes that the predictor variables (test scores, for example) were collected before the students had taken the course in which you are trying to predict success, with no intervening course taken in this subject other than the course in the analysis.

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Description of the study design for Sample University

When requesting this report you indicated that you wished to study placement in 2 courses.

- You chose to study the following as a predictor of success in Math102: ACCUPLACER Next-Gen Arithmetic. Using final course grade as the criterion for this course, your report provides predictions for the following success level(s): C or better and B or better.
- You chose to study the following as a predictor of success in Eng110: ACCUPLACER Next-Gen Reading and Essay Score. Using final course grade as the criterion for this course, your report provides predictions for the following success level(s): C or better.

Further information

The complete statistical output for this report is available upon request by contacting ACES.

- Visit: http://aces.collegeboard.org/
- Call: 800-439-8309
- Email: aces-collegeboard@norc.org

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Business Math / Math102

Section 1: Characteristics of students in Math102

In your report, the sample is the group of students for whom you have scores on the predictor variables(s) and on the criterion. Using the data derived from the sample of students used to generate this report, you will generalize to a larger population of students. That is, using the same predictor variable(s), you can use this report to predict the probability of success for future students. Predictors are more likely to be accurate if the sample of students used to generate the report is similar to the group of students whose success you want to predict. It is important that the sample be similar to the population for which you will be making predictions in ways that are and are not measured by the predictors. Some examples of these characteristics that are not measured by the predictors are gender balance, ethnic/racial make-up, and age range.

Institutions frequently ask, "How large a sample is large enough?" In general, the larger the sample, the more accurate the prediction formulas resulting from your study. The minimum number of students required for a study depends on the number of predictors used. If one to three predictors are used, a minimum of 30 students is required; for four predictors, a minimum of 40 students; and for five predictors, a minimum of 50 students.

Summary statistics are not displayed for subgroups with fewer than 15 students. For example, for a course with 30 students a bar chart presenting mean course grade broken down by ACCUPLACER test score quartiles (four approximately equal-sized groups ordered by the test score) would not be presented since each quartile group would have fewer than 15 students.

This section presents descriptive summaries of the measures in your study of Math102.

The table below displays the mean, standard deviation (SD), minimum, and maximum of each individual placement predictor selected for your study of Math102, and the number of students (N) with information available on each measure. Some measures may be available for all or nearly all of your students. Others may only be available for smaller groups of students.

Statistical summaries of study measures for Math102

Type	Measure Name	N	Mean (SD)	Minimum	Maximum
Course Outcome	Math102	936	2.04 (1.35)	0.0	4.0
ACCUPLACER Test Score	ACCUPLACER Next-Gen Arithmetic	936	234 (23)	200	300

Next, several graphs and tables are presented that examine the relationship between placement predictors in your study and course grade. If there are fewer than 60 students with an ACCUPLACER test score and course grade, then a bar chart displaying mean course grade by ACCUPLACER test score quartiles will not appear.

Next, for each ACCUPLACER predictor, there is a bar chart displaying the mean course grade of your students for different ACCUPLACER test score ranges.

The bar chart below shows Math102 grade by ACCUPLACER Next-Gen Arithmetic score quartile (quartiles of ACCUPLACER test scores) for your students.

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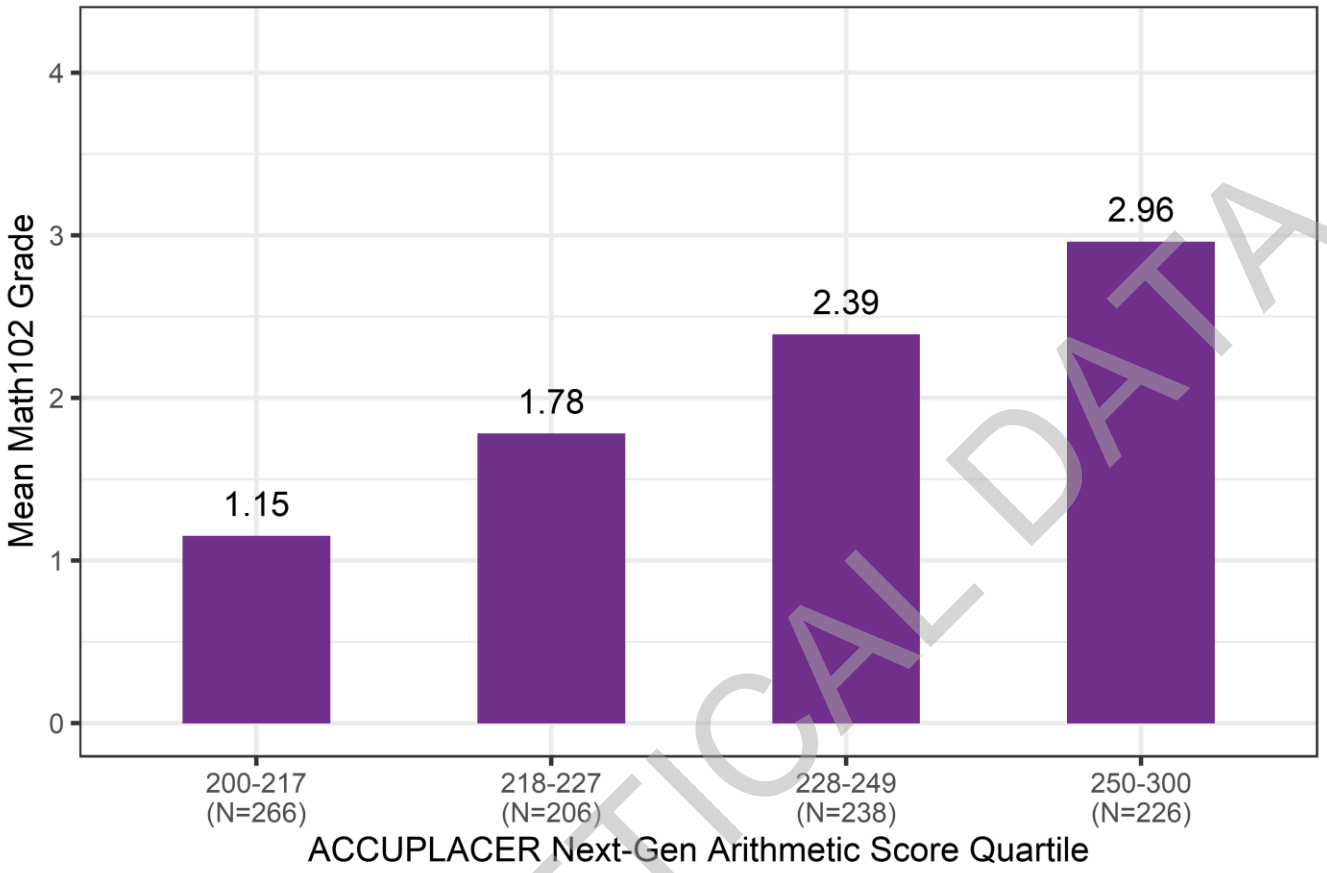
Mean Math102 Grade by ACCUPLACER Next-Gen Arithmetic Score Quartile



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Notes:

- Quartiles place students into four groups of approximately equal size based on the predictor variable. When ties are present, the highest value is used as a cut-off point for the quartile. Depending on the distribution of your students on the measure (e.g., no students with low measure values or a gap in the distribution of measure values), the quartiles in the graph may not cover the full possible range of the measure and there may be gaps in values between the quartile bands.
- Means are not displayed for groups with fewer than 15 students. Also, if there is a high concentration of students at particular test score values, there may be fewer than four quartile groups. For these reasons, fewer than four bars may appear in the graph.

Section 2: Strength of prediction in Math102

If you chose to analyze data for more than one predictor variable, you will need to decide which predictor or combination of predictors to use in making placement decisions. You will want to examine the strength of the relationship between each predictor and the criterion and, also, when submitting multiple predictor variables, the strength of the relationship between all combinations of predictor variables and the criterion measure. The predictors or combinations of predictors that correlate most highly with success in the course are the best measures to use in deciding whether or not to place a student into a course.

If you selected more than one success criterion for Math102, strength of prediction results will be presented for each.

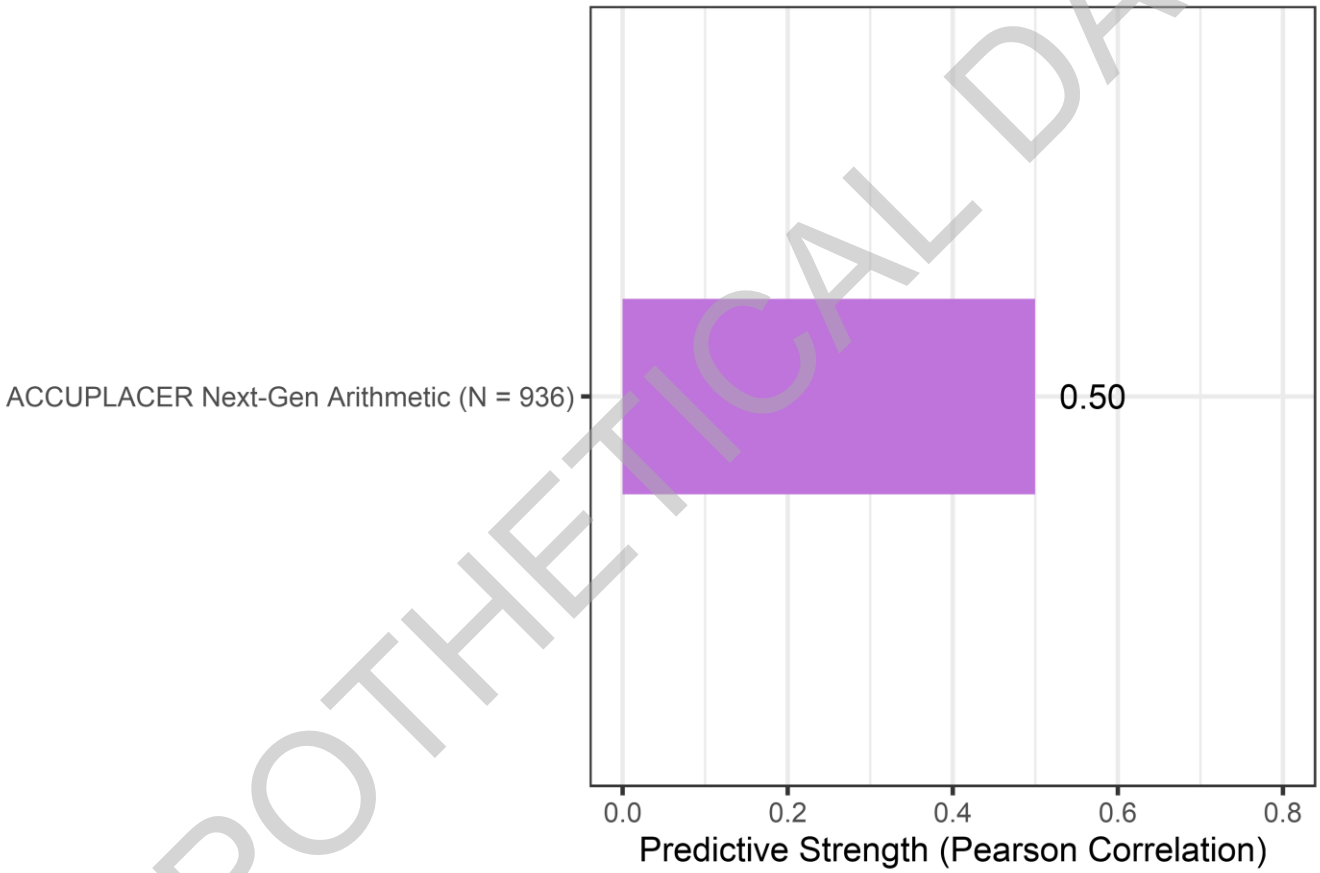
Correlation coefficient

A common method for measuring the strength of the relationship between a predictor and a criterion is the correlation coefficient. The correlation coefficient indicates the extent to which scores on the criterion can be predicted from scores on the predictor variable. For example, in this study, scores on ACCUPLACER Next-Gen Arithmetic were used to predict final course grades in Math102. The sign and size of the correlation denote the direction and degree of relationship between two variables.

Correlation coefficients always have a value between -1 and 1. If there is no relationship between two variables, their correlation will be close to 0.00. A positive correlation coefficient indicates that high scores on the predictor variable are associated with high scores on the criterion, and low scores on the predictor variable are associated with low values on the criterion (e.g., high ACCUPLACER Next-Gen Arithmetic scores with high course grades, and low ACCUPLACER Next-Gen Arithmetic scores with low course grades). A negative correlation indicates that high scores on the predictor variable are associated with low values on the criterion, and low scores on the predictor variable are associated with high values on the criterion (e.g., high ACCUPLACER Next-Gen Arithmetic scores with low course grades, and low ACCUPLACER Next-Gen Arithmetic scores with high course grades).

Two forms of correlations are presented: first the correlations between placement predictor variables and course grade (Pearson correlations), then correlations between placement predictor variables and success in the course–e.g., whether or not a student succeeds in the course based on the course success criterion (biserial or logistic biserial correlations).

Strength of predictors of course grade in Math102



Note:

In the case that a correlation is negative, the bar won't appear but the value of the correlation will be presented.

Percent correctly placed

Another way to measure the strength of prediction is to estimate the percentage of students "correctly placed" by the predictor. A student is considered to be "correctly placed" by the predictor if either: 1) it was predicted that the student would succeed, and he or she did succeed (e.g., the student earned a course grade of C or higher when C or higher was defined as a level of success), or 2) it was predicted that the student would not succeed, and he or she did not succeed (e.g., the student earned a course grade of D or lower). The analyses reported here predict that a student will succeed if the student's estimated probability of success is 0.50 or higher. Notice, however, that when nearly all of the students in the class succeed, a predictor can have a high success rate even if it correlates very poorly with the criterion. For example, if 95 percent of the students succeed in the course, and the predictor simply predicts that all students will succeed, the "% Correctly Placed" will be 95.

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Composite predictor

Predictor variables do not have to be used individually. Two or more predictors can be used together to form a composite predictor that may be stronger than either of the individual predictor variables alone. A composite predictor is reported when the total number of students who have scores on all the predictors is at least 10 times the total number of predictors but not less than 30.

If you elected to use more than one predictor variable for a course, the composite predictor is calculated by multiplying each individual predictor by a number that indicates its weight, or strength, in the prediction. The weighted predictors are added together. The resulting number is then added to another number, called the "constant", to put all the composite predictors on the same number scale, which results in composite predictor scores between approximately -3 and + 3.

Important points

The main tables presented in this section show the correlations between the course success criterion and the individual predictor variables and the percentage of students "correctly placed". When more than one predictor variable was analyzed, the correlations between the course success criterion and composite predictors and the percentage of students correctly placed may also be shown. Comparing these measures in the tables will help you decide which individual or composite predictor to use for placement purposes. In making this decision, you should avoid comparing statistics from groups of students that are very different from each other.

In deciding which predictors to use, you have to balance the increase in accuracy that results from using an additional predictor against the cost of obtaining that information. Here are factors to keep in mind when making that decision:

- If the number of students in your sample (the class) is small, the correlation between a predictor variable and the criterion in the sample may be quite different from what it would be in another group of students, whether or not the number of students is the same or greater.
- The estimates of students "correctly placed" shown are for the decisions that would be made if the only students placed in the course are those whose predicted probability of success on the criterion is at least 0.50.
- If there are insufficient data for a predictor variable, then the corresponding cells in the Section 1 statistical summaries table will be blank, and that predictor variable will be left out of subsequent tables.
- If all students with values for a predictor variable succeed in the course (receive a grade at or above the course success criterion, which by default is a C grade), or if all students with values on a predictor variable do not succeed in the course, then that predictor cannot be analyzed and will be dropped from the remaining tables in the course analysis.
- Some predictor variables may be highly correlated with each other. If two predictors are highly correlated with each other, using them together may be only slightly better than using either of them individually.
- *A note about possible consequences of predictor variables which have been constructed from two or more variables that are highly correlated:* The ACES user should exercise caution when interpreting ACES study results that include highly correlated predictor variables (multicollinearity). The analyses performed by ACES are made with the assumption that the predictor variables are independent (uncorrelated); violating this assumption may result in less reliable model estimates. A typical situation where correlation of the predictor variables exists is when a constructed variable, such as an average or a sum of other predictors, is used as a predictor in the same analysis where any of the individual predictors comprising the constructed variable are also used.

Examining predictor relationships with success on the criterion C or better in Math102

Predictor Type	Predictor Variable(s)	N	Logistic Biserial Correlation*	Percent Correctly Placed
Individual	ACCUPLACER Next-Gen Arithmetic	936	0.51	71

*The logistic biserial correlation is a measure of the strength of association. It is related to a biserial correlation but has been modified to be consistent with logistic regression and has been adapted to single and multiple predictors.

Technical notes:

- A biserial correlation is a measure of the association between a dichotomous variable (one with only two possible values) and a variable with many possible values, such as a test score. For example, the dichotomous variable

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might be earning (or not earning) a course grade of at least C. The biserial correlation assumes that the dichotomous variable is a perfect indicator of some underlying continuous variable that is not measured directly. In this example, the underlying continuous variable would be the quality of performance in the course. The biserial correlation is an estimate of the correlation of the many-valued variable (the test score) with that underlying continuous variable (quality of performance in the course).

- Biserial correlations computed from the scores of a small group of students or a group that includes very few students who did not succeed on the criterion (or very few who succeeded) often will not generalize beyond that particular group of students.
- A logistic biserial correlation is a type of biserial correlation that has been modified to be consistent with logistic regression. It can also be used with multiple predictors; in that case, it is an estimate of the measures of association between the predictors (e.g., scores on two or more tests) and the underlying continuous variable (quality of performance in the course) indicated by the dichotomous variable (e.g., a grade of C or better).

Examining predictor relationships with success on the criterion B or better in Math102

Predictor Type	Predictor Variable(s)	N	Logistic Biserial Correlation*	Percent Correctly Placed
Individual	ACCUPLACER Next-Gen Arithmetic	936	0.59	70

*The logistic biserial correlation is a measure of the strength of association. It is related to a biserial correlation but has been modified to be consistent with logistic regression and has been adapted to single and multiple predictors.

Technical notes:

- A biserial correlation is a measure of the association between a dichotomous variable (one with only two possible values) and a variable with many possible values, such as a test score. For example, the dichotomous variable might be earning (or not earning) a course grade of at least C. The biserial correlation assumes that the dichotomous variable is a perfect indicator of some underlying continuous variable that is not measured directly. In this example, the underlying continuous variable would be the quality of performance in the course. The biserial correlation is an estimate of the correlation of the many-valued variable (the test score) with that underlying continuous variable (quality of performance in the course).
- Biserial correlations computed from the scores of a small group of students or a group that includes very few students who did not succeed on the criterion (or very few who succeeded) often will not generalize beyond that particular group of students.
- A logistic biserial correlation is a type of biserial correlation that has been modified to be consistent with logistic regression. It can also be used with multiple predictors; in that case, it is an estimate of the measures of association between the predictors (e.g., scores on two or more tests) and the underlying continuous variable (quality of performance in the course) indicated by the dichotomous variable (e.g., a grade of C or better).

Section 3: Deciding what probability of success to require for placement in Math102

In determining whether to place a student into a course, there are two types of correct decisions:

- Placing a student into a course where the student eventually succeeds, or
- Denying placement into a course to a student who would not have succeeded.

Similarly, there are two types of incorrect decisions:

- Placing a student who will not succeed into a course, or
- Denying placement into a course to a student who would have succeeded.

If you wish to make as many correct placement decisions and as few incorrect decisions as possible, there is a simple way to achieve this goal: place into a course all those students, and only those students, whose estimated probability of success is 0.50 or higher. However, this simple solution may not be the best choice for all placement situations. In some cases, it may be wise to tolerate more incorrect decisions of one type in order to make fewer incorrect decisions of the other type.

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For example, if a course is expensive in terms of resources required by each student, you may want to place only those students whose probability of success is substantially higher than 0.50. In these situations, you may want to require a probability of success of at least 0.67 (two out of three students placed into the course are likely to succeed) or 0.75 (three out of four students placed are likely to succeed) or possibly higher.

In situations where the consequences of not being successful in the course (as defined in this report) are not severe, you may want to place into the course some students with a lower probability of success. For example, a first-year English composition course may be of substantial benefit even to students who do not earn a grade that is considered successful. In these cases, you may want to place students whose estimated probability of success is somewhat lower than 0.50.

Predictions involve uncertainty. In this section, the probability estimates and cut scores presented in the tables show you how much uncertainty there is for various cut scores. If the probability of success is very low or very high, there is little uncertainty in the decision. A probability of success near 0.50 carries a great deal of uncertainty, particularly when sample sizes are small. Remember that there will always be some level of uncertainty in predicting student's success in college courses. Using the information in this report will improve your predictions but will not enable you to predict correctly for all students.

Tables in this section contain the probability of success associated with various cut scores for Math102. Each row of a table corresponds to a specific probability of success on the criterion. If more than one criterion of course success was requested for Math102 then there will be one table for each success criterion.

The tables contain a column for each individual predictor variable with sufficient data and each column represents an individual model. If you elected to use more than one predictor variable for a course, the tables may also contain additional column(s) for composite predictor(s). Cut scores in the composite predictor column(s) fall in the range of 0 to +3, representing success probabilities of 0.50 to 0.95. The formula(s) for the composite predictor(s) is (are) listed below the table. Which predictor(s) you use to make a prediction for an individual student will depend upon which of the student's scores you decide to use after reviewing Section 2: Strength of Prediction for Math102 in the report.

Blank areas or blank individual cells in the table indicate success probabilities that correspond to scores above the maximum possible score or below the minimum possible score for that predictor. If the table cell for 0.95 is blank, even a student with the highest possible score on the predictor would have less than a 0.95 probability of success. If the table cell for 0.50 is blank, even the student with the lowest possible score on the predictor would have more than a 0.50 probability of success. If the probability that you are interested in has a blank cut score value, then use the closest probability with a valid (non-blank) cut score.

Technical note:

A large number of blank cells, particularly around the probability in which you are interested, or an entire column of blank cells indicates incompatibilities between your data and the statistical methods used in ACCUPLACER Placement Validity studies. This may result from the statistical model fitting your data poorly. Such an outcome can occur for many reasons; some of the more common ones include a lack of sufficient number of grades above or below the specified level of success indicated in the table, and a small overall number of students in a course. In particular, an entire column of blank cells indicates that the model for the predictor produced cut scores outside the valid range of the ACCUPLACER predictor or that the relationship between the ACCUPLACER predictor and course success was null or slightly negative. For help in interpreting the results of your study, please contact the ACES staff at aces-collegeboard@norc.org.

Suppose you want to set the probability of success (considering your criterion is a grade of C or better) in Math102 at 0.50. That is, you will place a student in Math102 if a student's value(s) on available predictors is (are) at or above the cut-point(s) corresponding to a success of 0.50. If the only academic measure you have for a student is the ACCUPLACER Next-Gen Arithmetic score, you would place that student into Math102 if the student scored 225 or greater on ACCUPLACER Next-Gen Arithmetic.

The following table(s) of cut scores and associated predicted probabilities of success in Math102 can be used to derive an estimated probability of success for students in the course and level of success indicated in the table(s). A version of this table with more detail can be found in the interactive graph file.

Cut scores associated with predicted probability of success criterion C or better in Math102

Probability of Success	ACCUPLACER Next-Gen Arithmetic Model
0.95	289
0.90	273
0.85	262

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Probability of Success	ACCUPLACER Next-Gen Arithmetic Model
0.80	255
0.75	249
0.70	243
0.65	238
0.60	233
0.55	229
0.50	225

Cut scores associated with predicted probability of success criterion B or better in Math102

Probability of Success	ACCUPLACER Next-Gen Arithmetic Model
0.95	
0.90	291
0.85	281
0.80	274
0.75	267
0.70	262
0.65	257
0.60	253
0.55	248
0.50	244

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English Composition / Eng110

Section 1: Characteristics of students in Eng110

In your report, the sample is the group of students for whom you have scores on the predictor variables(s) and on the criterion. Using the data derived from the sample of students used to generate this report, you will generalize to a larger population of students. That is, using the same predictor variable(s), you can use this report to predict the probability of success for future students. Predictors are more likely to be accurate if the sample of students used to generate the report is similar to the group of students whose success you want to predict. It is important that the sample be similar to the population for which you will be making predictions in ways that are and are not measured by the predictors. Some examples of these characteristics that are not measured by the predictors are gender balance, ethnic/racial make-up, and age range.

Institutions frequently ask, "How large a sample is large enough?" In general, the larger the sample, the more accurate the prediction formulas resulting from your study. The minimum number of students required for a study depends on the number of predictors used. If one to three predictors are used, a minimum of 30 students is required; for four predictors, a minimum of 40 students; and for five predictors, a minimum of 50 students.

Summary statistics are not displayed for subgroups with fewer than 15 students. For example, for a course with 30 students a bar chart presenting mean course grade broken down by ACCUPLACER test score quartiles (four approximately equal-sized groups ordered by the test score) would not be presented since each quartile group would have fewer than 15 students.

This section presents descriptive summaries of the measures in your study of Eng110.

The table below displays the mean, standard deviation (SD), minimum, and maximum of each individual placement predictor selected for your study of Eng110, and the number of students (N) with information available on each measure. Some measures may be available for all or nearly all of your students. Others may only be available for smaller groups of students.

Statistical summaries of study measures for Eng110

Type	Measure Name	N	Mean (SD)	Minimum	Maximum
Course Outcome	Eng110	2,161	2.09 (1.35)	0.0	4.0
ACCUPLACER Test Score	ACCUPLACER Next-Gen Reading	2,003	262 (15)	208	300
Add. Predictor	Essay Score	2,045	6.65 (1.56)	0.0	10.0

Next, several graphs and tables are presented that examine the relationship between placement predictors in your study and course grade. If there are fewer than 60 students with an ACCUPLACER test score and course grade, then a bar chart displaying mean course grade by ACCUPLACER test score quartiles will not appear.

Next, for each ACCUPLACER predictor, there is a bar chart displaying the mean course grade of your students for different ACCUPLACER test score ranges.

The bar chart below shows Eng110 grade by ACCUPLACER Next-Gen Reading score quartile (quartiles of ACCUPLACER test scores) for your students.

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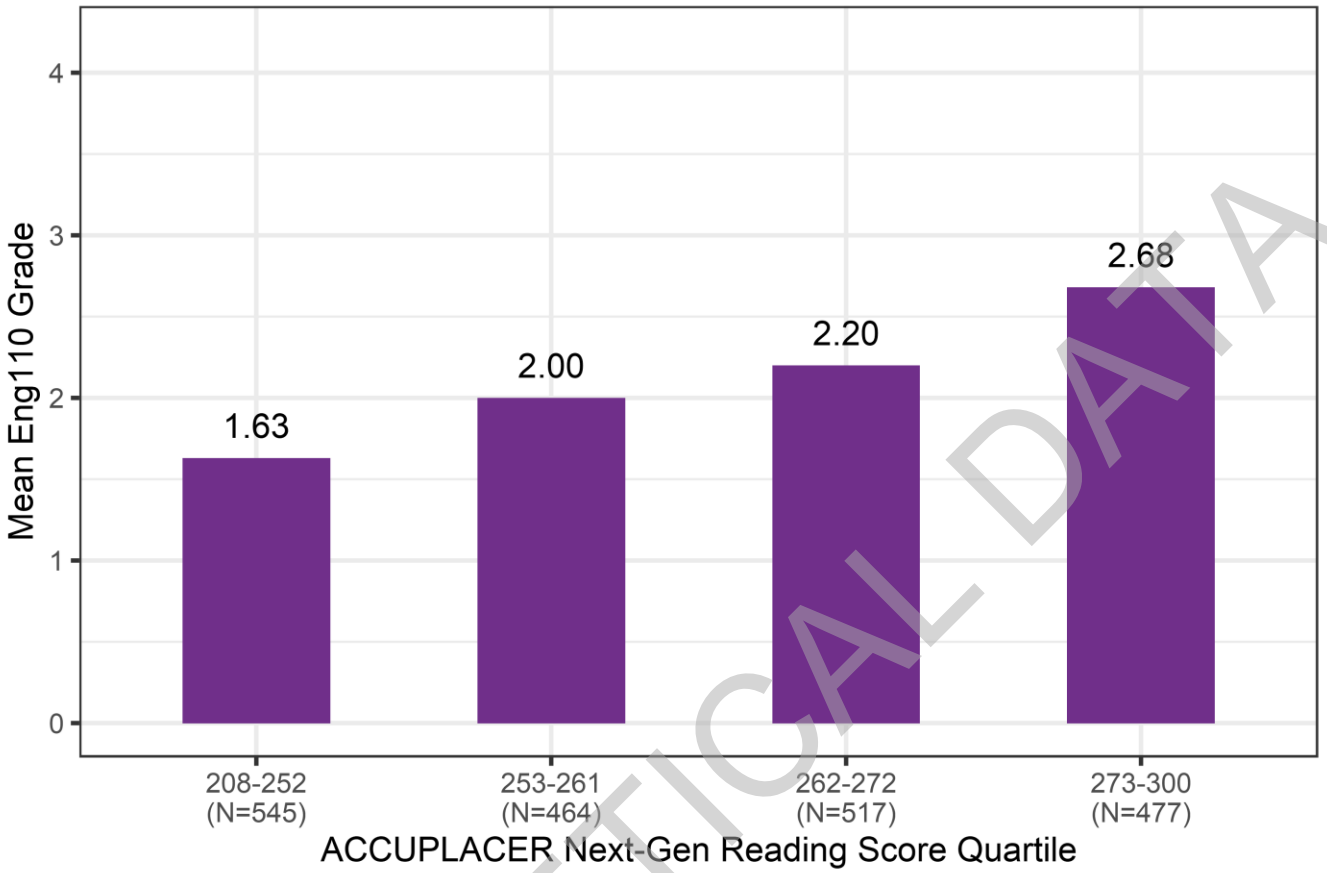
Mean Eng110 Grade by ACCUPLACER Next-Gen Reading Score Quartile



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Notes:

- Quartiles place students into four groups of approximately equal size based on the predictor variable. When ties are present, the highest value is used as a cut-off point for the quartile. Depending on the distribution of your students on the measure (e.g., no students with low measure values or a gap in the distribution of measure values), the quartiles in the graph may not cover the full possible range of the measure and there may be gaps in values between the quartile bands.
- Means are not displayed for groups with fewer than 15 students. Also, if there is a high concentration of students at particular test score values, there may be fewer than four quartile groups. For these reasons, fewer than four bars may appear in the graph.

Section 2: Strength of prediction in Eng110

If you chose to analyze data for more than one predictor variable, you will need to decide which predictor or combination of predictors to use in making placement decisions. You will want to examine the strength of the relationship between each predictor and the criterion and, also, when submitting multiple predictor variables, the strength of the relationship between all combinations of predictor variables and the criterion measure. The predictors or combinations of predictors that correlate most highly with success in the course are the best measures to use in deciding whether or not to place a student into a course.

If you selected more than one success criterion for Eng110, strength of prediction results will be presented for each.

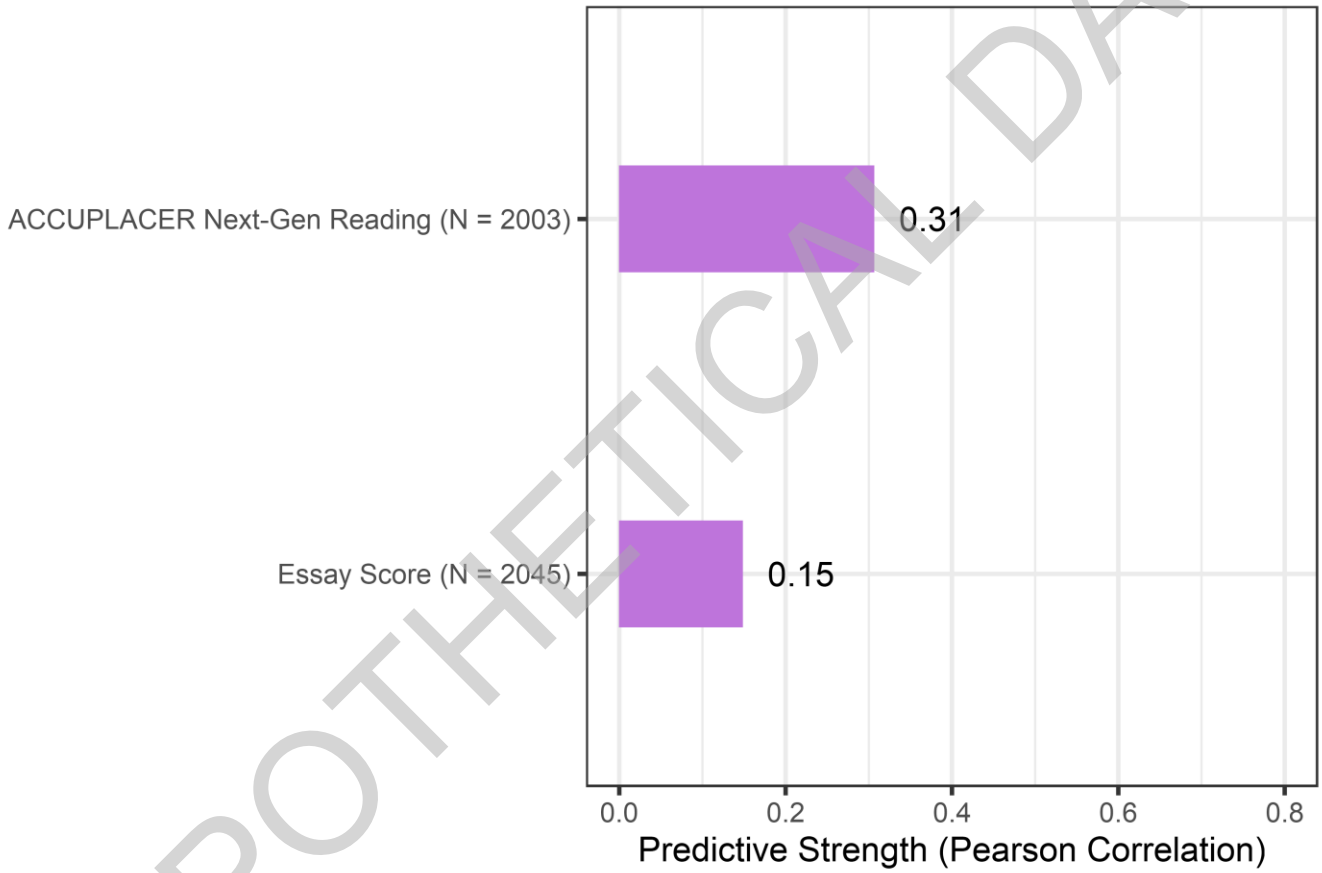
Correlation coefficient

A common method for measuring the strength of the relationship between a predictor and a criterion is the correlation coefficient. The correlation coefficient indicates the extent to which scores on the criterion can be predicted from scores on the predictor variable. For example, in this study, scores on ACCUPLACER Next-Gen Reading were used to predict final course grades in Eng110. The sign and size of the correlation denote the direction and degree of relationship between two variables.

Correlation coefficients always have a value between -1 and 1. If there is no relationship between two variables, their correlation will be close to 0.00. A positive correlation coefficient indicates that high scores on the predictor variable are associated with high scores on the criterion, and low scores on the predictor variable are associated with low values on the criterion (e.g., high ACCUPLACER Next-Gen Reading scores with high course grades, and low ACCUPLACER Next-Gen Reading scores with low course grades). A negative correlation indicates that high scores on the predictor variable are associated with low values on the criterion, and low scores on the predictor variable are associated with high values on the criterion (e.g., high ACCUPLACER Next-Gen Reading scores with low course grades, and low ACCUPLACER Next-Gen Reading scores with high course grades).

Two forms of correlations are presented: first the correlations between placement predictor variables and course grade (Pearson correlations), then correlations between placement predictor variables and success in the course–e.g., whether or not a student succeeds in the course based on the course success criterion (biserial or logistic biserial correlations).

Strength of predictors of course grade in Eng110



Note:

In the case that a correlation is negative, the bar won't appear but the value of the correlation will be presented.

Percent correctly placed

Another way to measure the strength of prediction is to estimate the percentage of students "correctly placed" by the predictor. A student is considered to be "correctly placed" by the predictor if either: 1) it was predicted that the student would succeed, and he or she did succeed (e.g., the student earned a course grade of C or higher when C or higher was defined as a level of success), or 2) it was predicted that the student would not succeed, and he or she did not succeed (e.g., the student earned a course grade of D or lower). The analyses reported here predict that a student will succeed if the student's estimated probability of success is 0.50 or higher. Notice, however, that when nearly all of the students in the class succeed, a predictor can have a high success rate even if it correlates very poorly with the criterion. For example, if 95 percent of the students succeed in the course, and the predictor simply predicts that all students will succeed, the "% Correctly Placed" will be 95.

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Composite predictor

Predictor variables do not have to be used individually. Two or more predictors can be used together to form a composite predictor that may be stronger than either of the individual predictor variables alone. A composite predictor is reported when the total number of students who have scores on all the predictors is at least 10 times the total number of predictors but not less than 30.

If you elected to use more than one predictor variable for a course, the composite predictor is calculated by multiplying each individual predictor by a number that indicates its weight, or strength, in the prediction. The weighted predictors are added together. The resulting number is then added to another number, called the "constant", to put all the composite predictors on the same number scale, which results in composite predictor scores between approximately -3 and + 3.

Important points

The main tables presented in this section show the correlations between the course success criterion and the individual predictor variables and the percentage of students "correctly placed". When more than one predictor variable was analyzed, the correlations between the course success criterion and composite predictors and the percentage of students correctly placed may also be shown. Comparing these measures in the tables will help you decide which individual or composite predictor to use for placement purposes. In making this decision, you should avoid comparing statistics from groups of students that are very different from each other.

In deciding which predictors to use, you have to balance the increase in accuracy that results from using an additional predictor against the cost of obtaining that information. Here are factors to keep in mind when making that decision:

- If the number of students in your sample (the class) is small, the correlation between a predictor variable and the criterion in the sample may be quite different from what it would be in another group of students, whether or not the number of students is the same or greater.
- The estimates of students "correctly placed" shown are for the decisions that would be made if the only students placed in the course are those whose predicted probability of success on the criterion is at least 0.50.
- If there are insufficient data for a predictor variable, then the corresponding cells in the Section 1 statistical summaries table will be blank, and that predictor variable will be left out of subsequent tables.
- If all students with values for a predictor variable succeed in the course (receive a grade at or above the course success criterion, which by default is a C grade), or if all students with values on a predictor variable do not succeed in the course, then that predictor cannot be analyzed and will be dropped from the remaining tables in the course analysis.
- Some predictor variables may be highly correlated with each other. If two predictors are highly correlated with each other, using them together may be only slightly better than using either of them individually.
- *A note about possible consequences of predictor variables which have been constructed from two or more variables that are highly correlated:* The ACES user should exercise caution when interpreting ACES study results that include highly correlated predictor variables (multicollinearity). The analyses performed by ACES are made with the assumption that the predictor variables are independent (uncorrelated); violating this assumption may result in less reliable model estimates. A typical situation where correlation of the predictor variables exists is when a constructed variable, such as an average or a sum of other predictors, is used as a predictor in the same analysis where any of the individual predictors comprising the constructed variable are also used.

The table below shows the correlations between predictor variables for this course.

Correlations between predictors of success in Eng110

Predictor Variables	ACCUPLACER Next-Gen Reading	Essay Score
ACCUPLACER Next-Gen Reading	1.00	0.38
Essay Score	0.38	1.00

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Examining predictor relationships with success on the criterion C or better in Eng110

Predictor Type	Predictor Variable(s)	N	Logistic Biserial Correlation*	Percent Correctly Placed
Individual	ACCUPLACER Next-Gen Reading	2003	0.32	68
Individual	Essay Score	2045	0.19	67
Composite	Model 1	1892	0.33	67

*The logistic biserial correlation is a measure of the strength of association. It is related to a biserial correlation but has been modified to be consistent with logistic regression and has been adapted to single and multiple predictors.

Model 1 includes ACCUPLACER Next-Gen Reading + Essay Score

Technical notes:

- A biserial correlation is a measure of the association between a dichotomous variable (one with only two possible values) and a variable with many possible values, such as a test score. For example, the dichotomous variable might be earning (or not earning) a course grade of at least C. The biserial correlation assumes that the dichotomous variable is a perfect indicator of some underlying continuous variable that is not measured directly. In this example, the underlying continuous variable would be the quality of performance in the course. The biserial correlation is an estimate of the correlation of the many-valued variable (the test score) with that underlying continuous variable (quality of performance in the course).
- Biserial correlations computed from the scores of a small group of students or a group that includes very few students who did not succeed on the criterion (or very few who succeeded) often will not generalize beyond that particular group of students.
- A logistic biserial correlation is a type of biserial correlation that has been modified to be consistent with logistic regression. It can also be used with multiple predictors; in that case, it is an estimate of the measures of association between the predictors (e.g., scores on two or more tests) and the underlying continuous variable (quality of performance in the course) indicated by the dichotomous variable (e.g., a grade of C or better).

Section 3: Deciding what probability of success to require for placement in Eng110

In determining whether to place a student into a course, there are two types of correct decisions:

- Placing a student into a course where the student eventually succeeds, or
- Denying placement into a course to a student who would not have succeeded.

Similarly, there are two types of incorrect decisions:

- Placing a student who will not succeed into a course, or
- Denying placement into a course to a student who would have succeeded.

If you wish to make as many correct placement decisions and as few incorrect decisions as possible, there is a simple way to achieve this goal: place into a course all those students, and only those students, whose estimated probability of success is 0.50 or higher. However, this simple solution may not be the best choice for all placement situations. In some cases, it may be wise to tolerate more incorrect decisions of one type in order to make fewer incorrect decisions of the other type.

For example, if a course is expensive in terms of resources required by each student, you may want to place only those students whose probability of success is substantially higher than 0.50. In these situations, you may want to require a probability of success of at least 0.67 (two out of three students placed into the course are likely to succeed) or 0.75 (three out of four students placed are likely to succeed) or possibly higher.

In situations where the consequences of not being successful in the course (as defined in this report) are not severe, you may want to place into the course some students with a lower probability of success. For example, a first-year English composition

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course may be of substantial benefit even to students who do not earn a grade that is considered successful. In these cases, you may want to place students whose estimated probability of success is somewhat lower than 0.50.

Predictions involve uncertainty. In this section, the probability estimates and cut scores presented in the tables show you how much uncertainty there is for various cut scores. If the probability of success is very low or very high, there is little uncertainty in the decision. A probability of success near 0.50 carries a great deal of uncertainty, particularly when sample sizes are small. Remember that there will always be some level of uncertainty in predicting student's success in college courses. Using the information in this report will improve your predictions but will not enable you to predict correctly for all students.

Tables in this section contain the probability of success associated with various cut scores for Eng110. Each row of a table corresponds to a specific probability of success on the criterion. If more than one criterion of course success was requested for Eng110 then there will be one table for each success criterion.

The tables contain a column for each individual predictor variable with sufficient data and each column represents an individual model. If you elected to use more than one predictor variable for a course, the tables may also contain additional column(s) for composite predictor(s). Cut scores in the composite predictor column(s) fall in the range of 0 to +3, representing success probabilities of 0.50 to 0.95. The formula(s) for the composite predictor(s) is (are) listed below the table. Which predictor(s) you use to make a prediction for an individual student will depend upon which of the student's scores you decide to use after reviewing Section 2: Strength of Prediction for Eng110 in the report.

Blank areas or blank individual cells in the table indicate success probabilities that correspond to scores above the maximum possible score or below the minimum possible score for that predictor. If the table cell for 0.95 is blank, even a student with the highest possible score on the predictor would have less than a 0.95 probability of success. If the table cell for 0.50 is blank, even the student with the lowest possible score on the predictor would have more than a 0.50 probability of success. If the probability that you are interested in has a blank cut score value, then use the closest probability with a valid (non-blank) cut score.

Technical note:

A large number of blank cells, particularly around the probability in which you are interested, or an entire column of blank cells indicates incompatibilities between your data and the statistical methods used in ACCUPLACER Placement Validity studies. This may result from the statistical model fitting your data poorly. Such an outcome can occur for many reasons; some of the more common ones include a lack of sufficient number of grades above or below the specified level of success indicated in the table, and a small overall number of students in a course. In particular, an entire column of blank cells indicates that the model for the predictor produced cut scores outside the valid range of the ACCUPLACER predictor or that the relationship between the ACCUPLACER predictor and course success was null or slightly negative. For help in interpreting the results of your study, please contact the ACES staff at aces-collegeboard@norc.org.

Suppose you want to set the probability of success (considering your criterion is a grade of C or better) in Eng110 at 0.50. That is, you will place a student in Eng110 if a student's value(s) on available predictors is (are) at or above the cut-point(s) corresponding to a success of 0.50. If the only academic measure you have for a student is the ACCUPLACER Next-Gen Reading score, you would place that student into Eng110 if the student scored 243 or greater on ACCUPLACER Next-Gen Reading.

If ACCUPLACER Next-Gen Reading and Essay Score are available and you are interested in using all tests for placement, you could calculate the composite predictor for those students and place the student into Eng110 if they have a calculated composite score of 0.00 or higher.

The following table(s) of cut scores and associated predicted probabilities of success in Eng110 can be used to derive an estimated probability of success for students in the course and level of success indicated in the table(s). A version of this table with more detail can be found in the interactive graph file.

Cut scores associated with predicted probability of success criterion C or better in Eng110

Probability of Success	ACCUPLACER Next-Gen Reading Model	Essay Score Model	*Composite Predictor Model(s)
0.95		18.10	2.94
0.90		14.36	2.20
0.85	289	12.05	1.73
0.80	280	10.30	1.39

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Probability of Success	ACCUPLACER Next-Gen Reading Model	Essay Score Model	*Composite Predictor Model(s)
0.75	273	8.86	1.10
0.70	266	7.61	0.85
0.65	260	6.46	0.62
0.60	254	5.39	0.41
0.55	249	4.37	0.20
0.50	243	3.37	0.00

*Model Number 1 (composite predictor) = -9.1691 + (0.03486) * ACCUPLACER Next-Gen Reading + (0.10846) * Essay Score

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Following up on your placement decisions

It is important to review the results of your placement decisions. *The Code of Fair Testing Practices in Education*, prepared by the Joint Council on Testing Practices, asks that test users follow up such decisions with two actions:

- Explain how passing scores were set
- Gather evidence to support the appropriateness of the cut scores

Copies of *The Code of Fair Testing Practices in Education* can be downloaded from the National Council on Measurement in Education:

https://www.ncme.org/resources-publications/professional-learning/library

This study provides much of the documentation needed to explain how the cut scores were set. It is important, however, to document the decisions required when interpreting the report and making the final cut score decision. Your documentation should explain the criterion used for the predicted probability of success tables.

While every attempt has been made to give accurate and complete information, the decisions made at each step of the process, such as the ability of the results to be generalized, the set of predictor variables used, and so on, can only be made with the information available. Sometimes the results of a placement study, despite the best intentions of all parties involved, have unintended or unexpected results. It is important to collect information on the effects of your placement decisions so that any unexpected consequences can be identified and remedied. Such information might include the proportion of test takers who pass the course, the characteristics of students who take placement tests as opposed to entering the course after the prerequisite course(s), and pass/fail results for selected groups of test takers.

The ACES staff is available to assist you with any questions you may have about your study. In addition, the complete statistical output is available on request. To contact the ACES staff:

- Call: 800-439-8309
- E-mail: aces-collegeboard@norc.org

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