

# Research Notes

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## Validity and Fairness of CLEP® Exams

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The College-Level Examination Program® (CLEP®) consists of a battery of 34 tests covering courses in which entering college students often enroll. CLEP exams are tools that help accredited colleges and universities provide course requirement exemptions to students who have gained outside-the-classroom knowledge of certain subjects. Students may utilize course exemptions, which they earn through CLEP scores that are acceptable to the accredited college or university of their choice, in shortening the path to their graduation. An exemption could also allow students to take other courses in the place of a requirement that the CLEP exam is used to fulfill; this course may be a more advanced course in the same field of study or possibly a course in another area of particular interest to the student. The purpose of this paper is to evaluate the validity of CLEP score use.

### Test Score Validity

Test score validity is typically defined by the suggestion that score interpretations are appropriate. This very straightforward statement hides a broad landscape of evidence that may be necessary to conclude that a test score is valid for a particular use. One type of evidence that may be collected in support of test score validity and which will be of importance for this study is consequential validity. According to Messick (1989, 1994) the use of a test has consequences. Some students or groups of students earn high scores and others earn low scores. These score differences may determine scholarships, awards, or entry into a desirable program. Whatever the outcome is, it should be consistent with what scores mean in respect to the content being assessed. It is important to ensure that the test *includes* all skills in the content area being assessed and *excludes* skills not relevant to such content

area. It is always necessary to ensure that outcomes reflect an examinee's knowledge of the content being assessed and are not biased due to factors extraneous to the content area, such as gender or race/ethnicity. In addition, ensuring that outcomes remain appropriate for students using test-preparation materials or for students taking a particular exam for a second time might be of interest.

### Goals for This Study

In this study, the performance of CLEP students in courses subsequent to their exempted course, in the same discipline, was investigated. The study was done in order to provide support for the consequential validity of CLEP scores for use in course exemptions. The data, which were used in the study, were collected between July 2001 and April 2003.

The questions posed were:

- (1) Are exempted CLEP students successful in subsequent courses in the same discipline where a CLEP exemption was provided?
- (2) Do exempted CLEP students perform at least as well as other students in subsequent courses in the same discipline where an exemption was provided?
- (3) If exempted CLEP students perform at least as well as other students in subsequent courses, how different are their course grades likely to be?

### Data Collection

Colleges and universities exempting students (i.e., awarding course credit and/or removing a requirement from a student's

curriculum requirements) through the CLEP program were contacted by either e-mail or phone, and were asked to participate in the study. Those agreeing to participate extracted course grade information from existing school records for students reporting CLEP scores to the schools. Data were only included in this study for students responding affirmatively to a CLEP exam question and agreeing to the use of their test data for research purposes.

## Exams Included in the Study

The CLEP College Algebra and Freshman College Composition exams were used in this study. The College Algebra exam consists of 60 multiple-choice questions administered in 90 minutes. The Freshman College Composition exam consists of 90 multiple-choice questions also administered in 90 minutes. The exemption score for both exams is 50 at the C level and 54 at the B level for each exam.<sup>1</sup> Schools have the option of administering an essay along with the multiple-choice questions for Freshman College Composition, but essay scores were not evaluated here since they are not consistently used and the institutions scoring them are not required to use a specific scoring method.

The College Algebra and Freshman College Composition exams were selected for this study for several reasons. First, both disciplines are widely popular and widely used, which makes them of great interest to many schools. In addition, English and mathematics curricula tend to have hierarchical course structures in that a previous course is necessary before beginning a subsequent one, while some other disciplines that are more loosely related around a particular principle may not be as highly related from lower- to higher-level courses. Also, many colleges and universities require two courses in English composition and two courses in mathematics, making it more likely that students will enroll in subsequent courses of these two disciplines.

## Participating Schools

The 11 schools included in this report were recruited to participate in this study in spring 2003. Four of the 11 investigated schools were community colleges and 7 were four-year institutions. Whenever possible, schools were selected to represent different locales throughout the United States. Schools receiving more CLEP exam scores were favored over

those with lesser test use, both to improve statistical accuracy and to perform investigations at institutions where results would be of most interest. Of the 11 participating schools, 6 participated in both the CLEP College Algebra and the CLEP Freshman College Composition studies, for a total of 9 schools participating in the College Algebra study and 8 participating in the Freshman College Composition study. The 9 schools participating in the College Algebra study included 2 community colleges and 7 four-year institutions. The participants in the Freshman College Composition study included 2 community colleges and 6 four-year institutions.

## Participating Students

For each student, an *initial* or *subsequent grade* was obtained for a course in the same discipline immediately following the CLEP exemption. A student was designated as *exempted* if his or her CLEP score was above the published CLEP multiple-choice score for the school attended. A *subsequent grade* was awarded for a different course in the same discipline that is at the same level or at a higher level than the course for which an exemption was sought. An *initial grade* was awarded for the course for which an exemption was sought.

*Immediately following* was defined as the next course in the same discipline as the CLEP exam that was enrolled in by the student. *Next* was defined in terms of time, and not in terms of the curricular hierarchy. For example, if after earning an exemption through Freshman College Composition, a student enrolled in an advanced English course the next semester and an intermediate English course a semester later, the advanced course grade was included in this study. In addition, no limit was placed on latency between CLEP exemption and next course enrollment. Courses completed more than a semester after an exemption through CLEP were characterized as *immediately following* if the course was the first taken in the field of study. For each CLEP student, course grades were also obtained for all of the other students in his or her classroom in order to provide a basis for gauging that CLEP student's performance.

## Are Exempted CLEP Students Successful in Subsequent Courses?

While comparative information is necessary to suggest that CLEP students perform at least as well as other students, simple counts of subsequent-course grades respond to the question of whether CLEP students are successful in later

<sup>1</sup> CLEP examination scores are reported on a scale of 20–80.

**Table 1**

Subsequent English Course Grades— Exempted CLEP Students						
<i>Number of Students</i>	<i>Total</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>F</i>
CLEP	612	325	207	53	13	14
Classmates	11,218	4,447	4,005	1,639	435	692
<i>Percentage of Students</i>						
CLEP	612	53	34	9	2	2
Classmates	11,218	40	36	15	4	6
CLEP (with discrepant school removed)	403	65	27	7	1	0
Classmates (with discrepant school removed)	8,768	43	34	14	4	5
<i>Difference in Percentage of Students</i>						
CLEP-Classmates		+13	-2	-6	-2	-4

courses. Overall counts of subsequent course grades are presented in the first rows of Tables 1 and 2 for CLEP Freshman College Composition and CLEP College Algebra students who earned exemptions. Grades are presented as A through F. Grades such as A+, A, and A- are all presented as A. Any student dropping, withdrawing from, receiving a grade of incomplete, receiving a grade of pass, or receiving a grade of fail (when the course was graded pass/fail) was excluded from the study. Any student who should have been enrolled in a subsequent course after being exempted through CLEP, but instead enrolled in the initial course was also excluded from these tables.

Counts of student grades treated as percentages are presented in the third rows of Tables 1 and 2. These counts suggest that CLEP students are much more likely to earn

**Table 2**

Subsequent Mathematics Course Grades— Exempted CLEP Students						
<i>Number of Students</i>	<i>Total</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>F</i>
CLEP	151	76	49	14	7	5
Classmates	7,095	2,103	1,993	1,495	789	715
<i>Percentage of Students</i>						
CLEP	151	50	32	9	5	3
Classmates	7,095	30	28	21	11	10
<i>Difference in Percentage of Students</i>						
CLEP-Classmates		+21	+4	-12	-6	-7

**Note:** Differences may not correspond exactly to the results of subtracting one percentage from the other due to rounding.

Two schools for English and one school for mathematics did not provide classmate grades. If the CLEP student grades for these schools had been excluded, the percentages would have been 54, 34, 7, 2, and 3 for English and 50, 34, 9, 4, and 4 for mathematics.

**Table 3**

Initial English Course Grades— Nonexempted CLEP Students						
<i>Number of Students</i>	<i>Total</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>F</i>
Nonexempted CLEP	11	2	6	3	0	0
Classmates	458	127	179	90	22	40
<i>Percentage of Students</i>						
Nonexempted CLEP	11	18	55	27	0	0
Classmates	458	28	39	20	5	9
<i>Difference in Percentage of Students</i>						
CLEP-Classmates		-10	+15	+8	-5	-9

an A or B compared to any other course grade. In fact, 532 of 612 Freshman College Composition students (87 percent) and 125 of 151 College Algebra students (83 percent) earned grades of A or B in the subsequent course. Results for individual schools were very similar to the overall result for College Algebra. One school included in the Freshman College Composition analyses was unlike the others, contributing 20 of the 27 grades of D and F. A dissimilar outcome is not a sufficient reason to remove this school's data from the study, but the breakdown of course grades is presented again in Table 1 without this school in the interest of clarity.

Counts of initial course grades are presented in the top rows of Tables 3 and 4 for CLEP students who *did not* earn an exemption. Any student whose immediately following course should have been initial but was instead subsequent was excluded. All other classification and exclusion rules are the same as for Tables 1 and 2. These results suggest that nonexempt CLEP Freshman College Composition stu-

**Table 4**

Initial Mathematics Course Grades— Nonexempted CLEP Students						
<i>Number of Students</i>	<i>Total</i>	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>F</i>
Nonexempted CLEP	37	12	12	5	2	6
Classmates	3,150	688	841	736	441	444
<i>Percentage of Students</i>						
Nonexempted CLEP	37	32	32	14	5	16
Classmates	3,150	22	27	23	14	14
<i>Difference in Percentage of Students</i>						
CLEP-Classmates		+11	+6	-10	-9	+2

**Note:** Differences reported may not correspond exactly to the results of subtracting one percentage from the other due to rounding.

Nonexempted student sample sizes are very small. Results should be treated as likely to change to some degree with larger numbers of students.

Two schools for English and one school for mathematics did not provide classmate grades. If the CLEP student grades for these schools had been excluded, the percentages would have been the same for English and 34, 34, 14, 3, and 14 for mathematics.

dents perform adequately, never earning a grade less than C. Nonexempt CLEP College Algebra students' grades varied, with grades of C or better most likely but failing grades were also present. The somewhat smaller number of nonexempt students was expected since unqualified test-takers may hesitate to take the exam knowing that they would have to pay a fee for its administration. The records for a few schools did not include nonexempt students. Since reducing the size of the study to only the schools that reported data for nonexempt students does not change the outcome, nonexempt student results are reported along with analyses of exempted students. This is done despite the fact that the results of exempt and nonexempt students are based on data from different schools.

### Do Exempted CLEP Students Perform At Least As Well As Other Students?

CLEP students will not necessarily enroll in a single English or mathematics course title after earning an exemption through CLEP. This may mean that looking at CLEP students' grades may not be sensible in that some courses will be more demanding than others. It is also a concern that many courses have various sections that students might be allowed to take and which differ in meeting time, instructor, and textbook, among other possibilities. If sections of a subsequent course are not equivalent in terms of difficulty, counting course grades is likely to be even more of a concern since a fairly small number of CLEP students will enroll in each individual subsequent course. However, it is possible to ameliorate the possibility of variation in the difficulty of courses and their sections by investigating CLEP students' performance relative to the performance of other students in their classes.

In the second row of Tables 1 and 2 are the numbers of students in the CLEP students' classes who earned each course grade. These are the classmates of students who earned exemptions through a CLEP test score. In the third rows are the percentages of CLEP students who earned each course grade. In the fourth row are the percentages of students in the CLEP students' classrooms who earned each course grade. Table 1 also presents these percentages for both CLEP students and their classmates when the discrepant school, which assigned an atypical number of grades below C, is removed. Finally, in the last row of Tables 1 and 2 are differences in the percentages of exempted CLEP students as compared to students in their classrooms who earned each course grade. Values greater than zero indicate that CLEP students earned proportionally more of those grades than other students in their classrooms.

These results suggest that exempted CLEP students earn proportionally more A and B grades and fewer grades of C or less as compared to students in their classrooms.

Corresponding information is presented in Tables 3 and 4 for students not exempted through CLEP. These results are somewhat mixed and should be considered tentatively as sample sizes for the groups are very small.

### How Much Better Are Exempt CLEP Students' Grades?

Comparing proportions of students earning each course grade suggests that exempted CLEP students tend to earn proportionally a larger number of high grades and proportionally fewer low grades. Differences in the course grades of each CLEP student to the average course grades of students in his or her classroom were calculated. Grades of A through F were assigned values of 4 through 0. Each CLEP student's value was subtracted from the average value for all other students in his or her classroom. For an individual CLEP student, a difference larger than zero means that the CLEP student performed better than his or her classmates. A difference smaller than zero indicates the CLEP student performed more poorly than his or her classmates. A one-point difference corresponds to a difference of one letter grade. For example, a difference of one meant that a CLEP student earned one letter grade higher than was typical for his or her class as a whole.

Average grades for exempted CLEP students completing the subsequent course are presented in the top entry of the bottom right panels of Tables 5 and 6. On

**Table 5**

English Course Grades						
	Earned CLEP Score Below Exemption			Earned CLEP Score Above Exemption		
	N	Mean	SD	N	Mean	SD
<i>Initial Course</i>						
CLEP Students	11	2.9	0.7	134	3.4	0.8
Difference	11	0.2	0.4	134	0.7	0.8
Male	5	0.3	0.5	53	0.5	0.9
Female	6	0.1	0.3	81	0.8	0.7
<i>Subsequent Course</i>						
CLEP Students	30	2.8	1.0	547	3.3	0.9
Difference	30	0.1	1.0	547	0.4	0.9
Male	21	0.0	1.0	242	0.3	0.9
Female	9	0.5	1.0	304	0.5	0.8

**Note:** Of the exempted CLEP students enrolling in an initial English course, 116 came from a single school. No difference was found in mean grade differences for that school and the other schools combined.

**Table 6**

Mathematics Course Grades						
	Earned CLEP Score Below Exemption			Earned CLEP Score Above Exemption		
	N	Mean	SD	N	Mean	SD
<i>Initial Course</i>						
CLEP Students	35	2.7	1.4	2	3.0	-
Difference	35	0.5	1.3	2	1.8	-
Male	11	0.3	1.2	2	1.8	-
Female	24	0.6	1.3	-	-	-
<i>Subsequent Course</i>						
CLEP Students	32	2.8	1.2	141	3.2	1.0
Difference	32	0.2	1.0	141	0.6	1.0
Male	17	-0.1	1.1	63	0.4	1.2
Female	15	0.4	0.8	78	0.8	0.9

average, both Freshman College Composition and College Algebra students earned grades higher than B (i.e., a value greater than 3). The second entries in the same panels are the average of the differences in course grade suggesting that exempted CLEP students' grades earn about a half grade point higher than other students in their classrooms. A one-sample *t*-test of mean differences in course grades is consistent with the finding that exempted CLEP students tend to earn higher course grades than do other students in their classrooms [ $t(546)=10.58$ ,  $p<.0001$  for Freshman College Composition;  $t(140)=6.85$ ,  $p<.0001$  for College Algebra].

A further evaluation of exempted CLEP students' grades in subsequent courses was conducted to ensure that outcomes were independent of ethnicity/race. An analysis of covariance was conducted for Freshman College Composition and another for College Algebra predicting course grade coded as described above using class mean grade, ethnicity/race, and CLEP score. These analyses evaluate whether differences were present in course grades once differences in course difficulty and content area skill as reflected in the CLEP score were conditioned out or taken into consideration. The presence of differences could suggest that CLEP exemption scores are inappropriate for one or several ethnic/racial groups. The evaluation, however, showed that there were no significant differences associated with ethnicity/race in these analyses.

Similarly, a corresponding evaluation of exempted CLEP students' grades in subsequent courses was conducted to ensure that outcomes were independent of gender. An analysis of covariance was conducted for both Freshman College Composition and College Algebra predicting

course grade coded as described above using class mean grade, gender, and CLEP score. For Freshman College Composition, results suggesting gender differences were marginal, indicating that there were small differences in the mean outcomes, with exempted female students doing slightly better than exempted male students. However, these results were not statistically significant and may have been the result of chance. For College Algebra, results were very similar but statistically reliable, suggesting that exempted female students with similar CLEP scores to those of male students enrolled in subsequent courses of similar difficulty performed better than male students,  $b=0.48$ ;  $t(1)=2.9$ ,  $p<0.01$ . These results are presented in Tables 5 and 6.

Nonexempt College Algebra students entering the initial course performed better than other students in their classrooms,  $t(34)=2.22$ ,  $p<0.05$ . Nonexempt CLEP Freshman College Composition students who entered the initial course performed no differently than other students in their classrooms, while exempted Freshman College Composition students entering the initial course earned higher course grades than did other students in their classrooms,  $t(133)=9.9$ ,  $p<0.0001$ . The number of students making up the latter group of Freshman College Composition students is to a large degree (116 students out of 134) the result of a single school's use of essay scores, but the mean grades for that school were not different from those of the other schools.

## Limitations of the Study

### Applicability to a Single Course Title

Although subsequent courses were not the same for all students within a school, nor were they the same from one school to another, comparing differences in grades collapsed across course title and school is appropriate since the comparison reflects the rate at which CLEP students enter different subsequent courses. However, looking at counts of course grades that include several different titles will not help a school currently using CLEP in evaluating whether the test is appropriate for a particular course title. If CLEP students' subsequent course grades differ depending on the particular English or mathematics course taken, one would need to look at CLEP student performance for the individual courses. A study through the Admitted Class Evaluation Service™ (ACES™) program can be a good means for doing this.

## Self-Selection

The course grades summarized here are only available for CLEP students choosing to take a course after earning an exemption through CLEP. If less prepared students do not take a subsequent course, it is reasonable to believe that the performance of CLEP students described in this paper is not indicative of the skills of CLEP students as a whole. Scammacca (2003) found no evidence to suggest differences in subsequent course enrollment for CLEP students. Even so, this study sought to minimize such effects by investigating Freshman College Composition—an exam associated with a two-course sequence in English writing required at each of the schools included in this study. A two-course mathematics requirement is also common, leading to the selection of College Algebra. However, this possibility cannot be completely eliminated.

## Specific Skills for CLEP Students

It cannot be concluded from this study that CLEP students perform more capably in subsequent courses *as a result of* specific skills identified by a CLEP exam. Motivation must play some role. One could argue that students not well prepared in the specific skills provided by a course would have difficulty in subsequent courses in the same domain irrespective of motivation. For adequately prepared students, motivation over an academic semester might be expected to dominate over any indicator of initial skill obtained before the course began. Past studies have suggested that CLEP students generally earned higher high school grades (College Board, 1990) and they also earn higher college grades (Scammacca, 2003) than their classmates, which may suggest that CLEP examinees are highly motivated students. Motivation very likely influenced the grades observed in this study. Fortunately, this possibility is irrelevant to the purpose of this study—to ensure that exempted CLEP students perform well in subsequent courses comparing favorably with their classmates.

## Discussion and Conclusion

This study provides information supporting the use of CLEP exam scores for the purpose of course exemption. The results were uniformly supportive by providing consequential validity evidence for the use of the exams. Course grades suggested that exempt CLEP students performed extremely well in the courses in which they enrolled. Course grades of A and B were far more likely than any other grade for exempted CLEP College Algebra and Freshman College Composition students. In addition, course grades of exempted CLEP students compared very well with the grades of students in their classrooms, and CLEP students earned proportionally more grades of A or B and fewer grades of D or F than their classmates. The differences in grades corresponded to exempted CLEP students outperforming other students in their classrooms by approximately one-half of a grade point, on average.

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