Application for Approval to Use the California Chemistry Diagnostic Test (CCDT) as a Locally Managed Second-Party Instrument

LAS POSITAS COLLEGE
Chemistry Faculty
Student Services Division, Assessment Center
Office of Institutional Research and Planning

Contents

Evidence for Approval to use the
California Chemistry Diagnostic Test (CCDT)
as a Locally Managed Second-Party Instrument

Background

In the late 1990's, the Las Positas College Chemistry Department began to do validity research on the use of the California Chemistry Diagnostic Test (CCDT) for placement/assessment purposes into Chemistry 1A, the General College Chemistry course. In 1997, the Las Positas College was one of the original group of six colleges that collected evidence to place the test on the Chancellor's list of approved assessment instruments using the "critical mass" method. The CCDT was approved for use for placement/assessment in this way in Fall 1997 and again in Fall 2003.

At the time of the renewal date in 2010, there was not a critical mass of colleges using the same version to renew the CCDT's approval via the critical mass method. As a result, colleges had to individually submit applications to renew approval to use the test. Unfortunately, due to changes in key staff who were responsible for leading the Chemistry assessment test validation research at Las Positas College, the college was unaware that the CDDT was no longer approved for use at the college. Las Positas College became aware of the need to conduct a Chemistry assessment test validation study in Fall 2015 and immediately began the work required to renew the use of the CCDT. This application seeks the approval to renew the CCDT. The CCDT is seen by the college as an essential tool for advancing student success.

Currently, within the California community colleges, at least four colleges have been approved to use the same version of the CCDT instrument to place students into appropriate Chemistry courses; the colleges are Chabot (our sister college within the district), Diablo Valley, Glendale, and Mt. San Antonio.

Current Application

Las Positas College is applying for **full approval status** of the CCDT, Version 1997, because this is our first time applying independently. This application provides evidence to show that for Las Positas students, the CCDT continues to be valid in both content and cut scores, free from bias and disproportionate impact, and have appropriate ADA accommodations.

According to the *Standards, Policies, and Procedures for the Evaluation of Assessment Instruments Used in California Community Colleges* (*4th Edition, revised March 2001)*, if a college is using a locally managed 2nd party test not on the CO Approved list and wants full approval status, evidence must be presented that the college meets the standards in the following areas:

Area	***Standard***
• Content validity	High overlap of course prerequisite skills and skills tested
• Test Bias	Diverse panel finds no gender/cultural/age bias in test
• Reliability	Test for reliability is not required for test renewals
• Cut Score Validation	Consequential validity studies show cut score is valid
• Disproportionate Impact	Lack of disproportionate impact or explanation for it
• ADA Accommodations	Statement of accommodations provided

Content Validity Evidence

Purpose of study

Content-related validity studies are designed to provide evidence of the appropriateness of an assessment instrument for course placement based on the overlap of knowledge and skills measured by the test instrument and the specific knowledge/skills required as prerequisites for the course.

Methodology

In order to evaluate the degree of overlap between the specific skill content measured by the California Chemistry Diagnostic Test instrument and the pre-course skill requirements for Chemistry 1A, Las Positas Chemistry faculty completed a content review study based on an item-by-item analysis of the test in Fall 2015. Six Las Positas College Chemistry instructors participated in the content review analysis.

The Chemistry faculty did the following:

1) Reviewed each test item on the assessment instrument and indicated their expert judgment regarding their relevance to the prerequisite skills required for Chemistry 1A as documented in the course outline. More specifically, they identified prerequisite skills that are "measured" by each test item.
2) Provided their expert opinion regarding how important or relevant the academic knowledge or skill measured by each test item was for successful acquisition of course material to be presented in Chemistry 1A, using the following rating scale:

   Importance Scale: 5 = Critical
   4 = Important
   3 = Moderately Important
   2 = Slightly Important
   1 = Not Important

3) If a test item had relevance to a skill required for success in Chemistry 1A that did not appear on the list of prerequisite skills derived from the course outline, they described the skill and provided an importance rating
4) Faculty also attempted to identify test items which assessed skills or knowledge that were not explicitly pre-course skill level expectations.

Table 1 presents the list of Chemistry 1A course prerequisite Chemistry and math skills that were used in the content validity review process. The list of skills was derived from latest course outlines for Chemistry 1A and Chemistry 31 (the prerequisite course to Chemistry 1A).

Table 1
Content-Related Validity Study
List of Chemistry 1A Course Prerequisite Skills

Prerequisite Skills: Chemistry	Prerequisite Skills: Math
1. Define matter and energy	1. Determine whether or not an equation, table or graph represents a function
2. Classify states of matter and describe phase changes using the kinetic molecular theory	2. Sketch the graphs of linear, absolute value, quadratic, rational, radical, exponential and logarithmic functions
3. Distinguish between elements/compounds/mixtures; physical/chemical, intensive/extensive, endothermic/exothermic changes and/or properties	3. Solve absolute value equations and inequalities and, where appropriate, sketch the graph of the solution and use set or interval notation to express the solution
4. Solve conversion problems, including metric system and metric to English, and density problems, using dimensional analysis	4. Simplify, add, subtract, multiply and divide rational expressions
5. Convert between the three temperature scales	5. Solve rational equations
6. Solve mathematical problems using significant figures correctly	6. Write radical expressions with rational exponents
7. Describe basic atomic structure using simple quantum theory	7. Simplify, add, subtract, multiply and divide radical expressions
8. Write electron configurations and orbital diagrams for the first twenty elements	8. Simplify, add, subtract, multiply and divide expressions with rational exponents
9. Write electron configurations for main group elements and state their relationship to placement of the elements on the periodic table	9. Solve equations involving radicals
10. Name common salts, acids, and molecular compounds by both systematic and common methods	10. Solve quadratic equations using either factoring, the square root property, completing the square, or the quadratic formula

Prerequisite Skills: Chemistry	Prerequisite Skills: Math
11. Describe the mole concept and use it in various calculations such as percent composition or determination of empirical/molecular formulas when given percent composition	11. Discuss the possible solutions of a quadratic equation and find complex roots
12. Perform all levels of stoichiometric calculations (mass, gas and solution) including limiting reagent problems	12. Solve exponential equations
13. Perform calculations using the gas laws	13. Use properties of logarithms to simplify logarithmic expressions and solve logarithmic equations
14. Define ionic and covalent bonds and give properties of each	14. Use the relationships between exponential and logarithmic functions to solve equations
15. Draw Lewis structures for simple covalent formulas	15. Solve non-linear systems of equations and inequalities
16. Classify chemical reactions by type and predict products (such as single and double replacement, combination, decomposition and combustion)	16. Develop and use equations or function models to analyze and solve applied problems involving linear, quadratic, rational, radical, exponential or logarithmic expressions
17. Perform calculations involving molarity and percent concentration for solutions	
18. Classify solutes and write net ionic equations to determine if reaction has occurred	
19. Define acids and bases by Arrhenius and Bronsted-Lowry theories	
20. Perform pH calculations involving integer values of pH	
21. Satisfactorily perform the following laboratory procedures and techniques	
22. Safely handle chemicals in the laboratory	
23. Weigh chemicals to 0.001 g using a top-loading balance	
24. Quantitatively transfer solid and liquid chemicals from one container to another	
25. Correctly use a gas burner	
26. Accurately measure liquids using analytical volumetric glassware such as graduated cylinders, pipettes, and burettes	
27. Perform gravity filtrations quantitatively	
28. Perform an acid/base titration using known and unknown samples	
29. Measure temperature and barometric pressure	

Prerequisite Skills: Chemistry	Prerequisite Skills: Math
30. Accurately and comprehensively observe chemical and physical changes, and record such information in a scientifically correct form	
31. Correctly plot data and determine the slope of any resulting straight line	
32. Construct models of simple molecules using model kits and Lewis structures	
33. Determine the conductivity of a variety of chemicals in solution	
34. Maintain laboratory records in proper form and detail	
35. Health and Safety: Describe and follow self-protection procedures	
36. Health and Safety: Describe and follow basic laboratory safety rules	
37. Health and Safety: describe and follow procedures for safe handling of chemicals and glassware	

Results

Table 2 presents cumulative data and tabulations from the Chemistry faculty item-by-item evaluation of the California Chemistry Diagnostic Test for content-related validity. Data are presented that link Chemistry and math prerequisite skills with specific test items. Also included are the percentage levels of agreement among faculty evaluators about the relationship between each skill and test item and the average degree of importance of the knowledge/skill measured by each test item to success in Chemistry 1A. Item importance ratings were based on a five-point response scale ranging from "not important" (1) through "critical" (5).

Table 2
Faculty Content Review: California Chemistry Diagnostic Test
Item-by-Item Evaluation

Test Item	Chemistry Skills Skill	Pct	Math Skills Skill	Pct	Importance Rating (Avg.)	Other Skills
#1	Chemistry #3 Chemistry #10 Chemistry #11 Chemistry #12	50% 17% 33% 33%	Math #4	17%	5.0	Chemistry: understand chemistry Formulas (17%)
#2	Chemistry #10 Chemistry #12 Chemistry #14 Chemistry #16	67% 17% 17% 17%	Math #4	33%	4.8	Chemistry: write correct chemistry formulas (17%)
#3	Chemistry #11 Chemistry #12	100% 17%	Math #4	50%	4.7	

Test Item	Chemistry Skills Skill	Pct	Math Skills Skill	Pct	Importance Rating (Avg.)	Other Skills
#4	Chemistry #4	17%	Math #4	50%	5.0	
	Chemistry #6	17%				
	Chemistry #11	100%				
	Chemistry #12	33%				
#5	Chemistry #10	83%	Math #4	17%	4.7	Chemistry: write correct chemistry formulas (33%)
#6	Chemistry #1	17%	Math #4	17%	4.2	Chemistry: Intermolecular forces (17%)
	Chemistry #2	50%				
	Chemistry #3	33%				
	Chemistry #14	17%				
#7	Chemistry #3	17%	Math #4	50%	4.0	
	Chemistry #13	83%	Math #5	17%		
#8	Chemistry #1	17%	Math #1	17%	3.5	Math: read, understand graphs (17%)
	Chemistry #2	100%				
	Chemistry #3	33%				
#9	Chemistry #12	83%	Math #4	17%	4.8	Chemistry: Balancing chemical equations (17%)
#10	Chemistry #11	17%	Math #4	17%	4.7	
	Chemistry #12	100%	Math #5	17%		
#11	Chemistry #16	100%			4.5	
	Chemistry #19	17%				
#12	Chemistry #12	17%			4.2	
	Chemistry #16	67%				
#13	Chemistry #6	17%	Math #4	17%	4.7	
	Chemistry #11	17%				
	Chemistry #12	100%				
#14	Chemistry #1	33%			4.8	
	Chemistry #7	83%				
#15	Chemistry #15	100%			4.5	Chemistry: molecular geometry (17%)
	Chemistry #32	17%				
#16	Chemistry #1	33%	Math #8	17%	4.7	
	Chemistry #7	83%				
#17	Chemistry #15	100%			4.7	Chemistry: molecular geometry (17%)
	Chemistry #32	33%				
#18	Chemistry #1	17%			4.8	
	Chemistry #7	83%				
	Chemistry #8	17%				
	Chemistry #9	17%				
	Chemistry #14	17%				
#19	Chemistry #9	17%			4.5	Chemistry: periodic trends (17%)
	Chemistry #14	50%				Chemistry: understand Polarity (17%)
	Chemistry #15	50%				
#20	Chemistry #1	17%			4.5	Chemistry: understand the periodic table (17%)
	Chemistry #3	17%				
	Chemistry #7	33%				
	Chemistry #8	17%				
	Chemistry #9	50%				
	Chemistry #12	17%				
#21	Chemistry #9	33%			4.7	

Test Item	Chemistry Skills Skill	Pct	Math Skills Skill	Pct	Importance Rating (Avg.)	Other Skills
	Chemistry #10	33%				
	Chemistry #11	17%				
	Chemistry #14	50%				
	Chemistry #16	33%				
#22	Chemistry #1	17%			4.5	Chemistry: understand the Periodic Table (17%)
	Chemistry #2	17%				
	Chemistry #3	17%				
	Chemistry #9	50%				
#23	Chemistry #7	33%			4.2	Chemistry: understand the Periodic Table (33%)
	Chemistry #9	33%				
	Chemistry #14	17%				
#24	Chemistry #7	17%			4.7	
	Chemistry #8	17%				
	Chemistry #9	50%				
	Chemistry #14	17%				
	Chemistry #15	67%				
#25	Chemistry #10	17%			4.0	
	Chemistry #14	17%				
	Chemistry #19	100%				
#26	Chemistry #2	67%			4.2	
	Chemistry #17	17%				
	Chemistry #18	17%				
	Chemistry #30	33%				
#27	Chemistry #12	17%			4.5	
	Chemistry #14	33%				
	Chemistry #16	17%				
	Chemistry #18	50%				
	Chemistry #30	17%				
	Chemistry #33	17%				
#28	Chemistry #19	83%	Math #8	17%	4.3	
	Chemistry #20	50%	Math #13	17%		
#29	Chemistry #10	17%			4.5	
	Chemistry #16	67%				
	Chemistry #18	33%				
	Chemistry #19	67%				
#30	Chemistry #6	17%	Math #4	17%	4.7	
	Chemistry #11	17%	Math #6	17%		
	Chemistry #17	83%				
#31	Chemistry #11	17%	Math #12	17%	4.3	
	Chemistry #12	67%				
	Chemistry #17	67%				
	Chemistry #18	17%				
	Chemistry #19	17%				
#32	Chemistry #2	67%			3.7	Chemistry: collision theory (17%) Chemistry: rates of reaction (33%)
#33	Chemistry #2	33%	Math #4	17%	3.5	Chemistry: Collision theory (17%)
	Chemistry #11	17%	Math #8	17%		Chemistry: Equilibrium (17%)
	Chemistry #17	17%				

Test Item	Chemistry Skills Skill	Pct	Math Skills Skill	Pct	Importance Rating (Avg.)	Other Skills
#34	Chemistry #6	50%	Math #1	17%	4.7	
	Chemistry #21	17%				
	Chemistry #23	50%				
	Chemistry #31	17%				
#35	Chemistry #31	100%	Math #1	50%	4.8	
			Math #2	67%		
#36	Chemistry #1	17%	Math #1	17%	4.7	
	Chemistry #3	17%	Math #5	17%		
	Chemistry #4	67%				
	Chemistry #31	17%				
#37	Chemistry #3	17%	Math #4	17%	4.2	
	Chemistry #4	50%				
	Chemistry #6	17%				
	Chemistry #11	17%				
	Chemistry #21	17%				
	Chemistry #26	17%				
#38	Chemistry #4	17%	Math #3	17%	3.7	Math: solving simultaneous equations (17%)
			Math #4	33%		
			Math #5	83%		
			Math #16	17%		
#39	Chemistry #4	17%	Math #2	17%	3.2	
	Chemistry #12	17%	Math #3	17%		
			Math #5	33%		
#40	Chemistry #6	33%	Math #4	17%	4.3	Chemistry: scientific notation (17%)
			Math #5	17%		
			Math #6	17%		
			Math #7	17%		
			Math #8	33%		
			Math #12	17%		
#41	Chemistry #6	33%	Math #4	33%	4.3	Chemistry: scientific notation (17%)
			Math #5	17%		
			Math #6	17%		
			Math #7	17%		
			Math #8	50%		
			Math #12	17%		
#42	Chemistry #4	67%	Math #4	50%	4.3	
	Chemistry #6	17%	Math #5	17%		
			Math #6	17%		
#43	Chemistry #15	33%			3.8	
	Chemistry #32	33%				
#44	Chemistry #13	100%	Math #4	17%	4.7	Chemistry: 3D reasoning (33%)

Findings/Discussion

The content-related validity evidence presented in Table 2 provides strong support for the usefulness of the California Chemistry Diagnostic Test as a tool for determining student enrollment eligibility for Chemistry 1A. Chemistry faculty content review evaluations indicate that all 44 items on the California Chemistry Diagnostic Test can be linked to one or more Chemistry prerequisite skills. On average, three prerequisite Chemistry skills were linked to each test item. In addition, a majority (59%) of test items can be linked to one or more math prerequisite skills. Moreover, 19 prerequisite Chemistry skills and two math prerequisite skills that were not on course outlines were linked to test items.

Faculty rated the importance of the academic knowledge or skill measured by each test item. This knowledge or skill is important for students to have in order to be prepared for the course material presented in Chemistry 1A. Average importance ratings show that 86% of test items were judged to range from “important” to “critical.” In addition, 14% of test items were judged to range from “moderately important” to "important". Based on the range of skills measured by the test instrument, the Chemistry faculty have a high level of confidence with respect to the usefulness and appropriateness of the test for determining course placement into Chemistry 1A at Las Positas College.

The content-related validity evidence presented in this study demonstrates an extensive degree of overlap between the required course prerequisite skills and those skills/abilities measured by the California Chemistry Diagnostic Test. This finding directly supports the conclusion that the assessment instrument will yield appropriate course placements and provide an accurate diagnosis of students' Chemistry skill level required for success in college-level Chemistry 1A.

Reliability Evidence

This application is for renewal of a previously approved test; as a result, according to the *Standards, Policies, and Procedures for the Evaluation of Assessment Instruments Used in California Community Colleges (4th Edition, revised March 2001)*, this application does not require a reliability study/evidence.

Test Bias Evidence

A faculty bias study was conducted during the Fall 2015 semester. This study consisted of input from six Chemistry faculty members at Las Positas College. Of the six Chemistry members who participated in the study, four were female and two were male. The ethnicity breakdown for the faculty was as follows: African American (1), Asian (1), and Caucasian (4). In addition, the faculty had numerous years of teaching Chemistry—one had 1 to 2 years, two had 5 to 10 years, and three had more than 10 years.

The faculty members were asked to rate each CCDT item for test bias. The survey instrument given to the faculty members consisted of a matrix with 44 rows (one for each CCDT item) and three columns (evidence of bias for gender; evidence of bias for race-ethnicity/culture; and evidence of bias for age). The results of the survey showed that all six Chemistry faculty members found no evidence of test bias based on gender, race-ethnicity/culture, or age.

Cut Score Validation

Consequential validity

The current cut scores were initially set by judgmental criteria and predictive validity studies. Cut scores above existing cut scores can be examined to see if the optimal cut score is higher than the current cut score. However, there is no way to conduct a predictive validity study to determine whether they should be lower. The only way to evaluate them is to examine the consequential validity of the current cut scores. This was done in three ways: 1) success rates of students who were assessed into the course versus those who took the prerequisite, 2) student surveys to ask whether the students thought they were prepared for Chemistry 1A or 31, and 3) faculty surveys that ask faculty whether or not they thought the students in their class were prepared for Chemistry 1A or 31.

1. Success Rates

Table 3 shows Chemistry 1A success rates for students who were assessed into Chemistry 1A versus those who entered via the prerequisite course (Chemistry 31) between Spring 2012 and Spring 2015 (seven primary semesters). The results indicate that the average success rate in Chemistry 1A was 71%. Students who assessed into Chemistry 1A had a higher success rate (74%) than those who took the prerequisite course (65%-70%). This demonstrates that the test and the current cut score are slightly better indicators than the prerequisite course for determining preparedness for the Chemistry 1A. It should be noted, compared to the average success rates, Chemistry 1A success rates were slightly lower for students who were originally assessed into Chemistry 31; however, the total sample size for this population was 20; if one additional student from this group would have succeeded in Chemistry 1A, then the success rate for the group would be near the average. Nevertheless, we will continue to monitor these student to ensure equitable opportunities for student success.

Table 3.
Success Rates in Chemistry 1A by Entry Method: Spring 2012 through Spring 2015

Entry Method	Success		Non-success		Withdrawal		Total	
	Num	Pct	Num	Pct	Num	Pct	Num	Pct
Assessed into Chemistry 1A	118	74%	13	8%	29	18%	160	100%
Assessed into Chemistry 31	13	65%	4	20%	3	15%	20	100%
Did not take Chemistry Test	211	70%	39	13%	50	17%	300	100%
Total	**342**	**71%**	**56**	**12%**	**82**	**17%**	**480**	**100%**

Note: Success is a grade of 'A', 'B', or 'C'. Non-Success is a grade of 'D' or 'F'.

Table 4 shows Chemistry 31 success rates by entry method between Spring 2012 and Spring 2015 (seven primary semesters). The sole prerequisite for entry into Chemistry 31 is Intermediate Algebra. However, Table 4 shows the success rates of students in Chemistry 31 by those who went straight into the Chemistry 31 or took the CCDT and were either assessed into Chemistry 31 or 1A. Overall, 93% of Chemistry 31 students enrolled in the course without first taking the CCDT; seven percent of students who took the CCDT were assessed into Chemistry 31 (5% overall) or Chemistry 1A (2% overall). The students who were assessed into Chemistry 1A decided to take the lower level course (Chemistry 31) instead.

The average success rate in Chemistry 31 was 74%. The results show that students who took the assessment test succeeded at higher rates (82% to 87%) than the average rate. The students who did not take the CCDT had a success rate of 73%. The higher success rates for those who took the CCDT could indicate that the current cut score for the CCDT could be lowered slightly in order to allow more students into Chemistry 1A. On the other hand, the 11 students who assessed into Chemistry 1A but took Chemistry 31 instead, indicates that the current cut score for CCDT may be too low. The college will continue to gather data on Chemistry 31 students who took the CCDT.

Table 4.
Success Rates in Chemistry 31 by Entry Method: Spring 2012 through Spring 2015

Entry Method	Success		Non-success		Withdrawal		Total	
	Num	Pct	Num	Pct	Num	Pct	Num	Pct
Assessed into Chemistry 1A	9	82%	2	18%	0	0%	11	100%
Assessed into Chemistry 31	27	87%	3	10%	1	3%	31	100%
Did not take Chemistry Test	399	73%	58	11%	91	17%	548	100%
Total	**435**	**74%**	**63**	**11%**	**92**	**16%**	**590**	**100%**

Note: Success is a grade of 'A', 'B', or 'C'. Non-Success is a grade of 'D' or 'F'.

2. Student Surveys

Student surveys were administered in all Chemistry 1A and Chemistry 31 classes in Fall 2015. The responses to the surveys were anonymous (students were not asked to identify themeselves) to encourage honest responses from students.

With regard to the Chemistry 1A survey, students were asked a number of questions, including whether they took the Chemistry assessment test, where they were originally placed if they took the Chemistry assessment test, and how they felt about the placement.

Seventy-eight (78) Chemistry 1A students filled out the survey. Of the 78 students who completed the survey, 36 had taken the Chemistry assessment test; as displayed in Table 5, 27 were originally assessed into Chemistry 1A and nine were originally assessed into Chemistry 31.

Of the 27 assessed into Chemistry 1A, 23 (or 85%) felt their course placement was correct (Table 6). Of the nine who were originally assessed into Chemistry 31, eight (or 89%) felt their course was correct (Table 7). The aforementioned data support the CCDT is accurately placing students. However, Las Positas College will continue to collect more data to increase the sample size.

Table 5.
Chemistry Assessment Test Status of Chemistry 1A Students

Sources	Number	Percent
Took the Chemistry Assessment test; original placement was Chemistry 1A	27	35%
Took the Chemistry Assessment test; original placement was Chemistry 31	9	12%
Did not take Chemistry Assessment Test	42	54%
Total	**78**	**100%**

Table 6.
Preparedness: Chemistry 1A students with Chemistry 1A assessment

Level of Preparedness	Assessed into Chemistry 1A	
	Number	Percent
Chemistry 1A course is about the right level of difficulty; course placement was correct	23	85%
Chemistry 1A course is too difficult; I needed to be placed in a lower level course (Chemistry 31)	4	15%
Total	**27**	**100%**

Table 7.
Preparedness: Assessed Chemistry 1A students with Chemistry 31 recommendation

Level of Preparedness	Assessed into Chemistry 1A	
	Number	Percent
Chemistry 31 course was about the right level of difficulty; course placement was correct	8	89%
Chemistry 1A course is too easy; I needed to be placed in a higher level course (Chemistry 1A)	1	11%
Total	**9**	**100%**

With regard to the Chemistry 31 survey, all students enrolled in Chemistry 31 were asked to fill it out. Similar to the Chemistry 1A survey, students were asked a number of questions, including whether they took the Chemistry assessment test, where they were placed if they took the Chemistry assessment test, and how they felt about the placement.

Seventy-three (73) Chemistry 31 students filled out the survey. Of the 73 students who completed the survey, only four (or 5%) had taken the Chemistry assessment test as displayed in Table 8. Moreover, all four students were placed into Chemistry 31. Of the four students placed in Chemistry 31, all (or 100%) were felt Chemistry 31 was the correct placement as shown in Table 9. These data support the CCDT is accurately placing students, but the college will continue to collect more data.

Table 8.
Chemistry Assessment Test Status of Chemistry 31 Students

Sources	Number	Percent
Took the Chemistry assessment test; original placement was Chemistry 1A	0	0%
Took the Chemistry assessment test; original placement was Chemistry 31	4	5%
Did not take Chemistry assessment test	69	95%
Total	**73**	**100%**

Table 9.
Preparedness: Assessed Chemistry 31 students with Chemistry 31 recommendation

Level of Preparedness	Recommended into Chemistry 1A	
	Number	Percent
Chemistry 31 is too easy, I needed to be placed in a higher level course (Chemistry 1A)	0	0%
Chemistry 31 course is about the right level of difficulty (correct course placement)	4	100%
Chemistry 31 course is too hard.	0	0%
Total	**4**	**100%**

3. Faculty Surveys

All faculty teaching Chemistry 1A and Chemistry 31 in Fall 2015 were given lists of their students, and asked to rate them based on how prepared they were for Chemistry 1A or Chemistry 31.

Faculty teaching Chemistry 1A were asked to rate 108 students. Faculty indicated that they were able to judge preparedness levels for 97 students. The faculty did not know whether they had taken the Chemistry assessment test or not. These ratings were then combined with institutional research assessment data to identify which students had been recommended into Chemistry 1A or Chemistry 31 by the assessment process.

Of the 24 students who were assessed into Chemistry 1A, faculty indicated that 92% of them were prepared, which was similar to the 91% of the 67 non-assessed students (Table 10). In addition, of the 6 students who were assessed into Chemistry 31 and worked their way into Chemistry 1A, faculty felt all six students were prepared for Chemistry 1A (Table 10).

Table 10.
Faculty assessment of the preparedness of Chemistry 1A students by entry method

Level of Preparedness	Assessed into Chemistry 1A		Assessed into Chemistry 31		Did Not Take Assessment Test		Total	
	Num	Pct	Num	Pct	Num	Pct	Num	Pct
Prepared*	22	92%	6	100%	61	91%	89	92%
Unprepared	2	8%	0	0%	6	9%	8	8%
Total	**24**	**100%**	**6**	**100%**	**67**	**100%**	**97**	**100%**

Notes: * Prepared students were rated as "adequately prepared", "Well-Prepared", or "Over-Prepared".
Chemistry 1A students who were originally assessed into Chemistry 31 had to first pass Chemistry 31 before taking Chemistry 1A.

Faculty teaching Chemistry 31 were asked to rate 101 students. Similar to the faculty teaching Chemistry 1A, Chemistry 31 faculty did not know whether students had taken the Chemistry Assessment test or not. These ratings were then combined with institutional research assessment data to identify which students had been recommended into Chemistry 1A or Chemistry 31 by the assessment process. The results, which are in Table 11, indicate that only two students who were recommended to Chemistry 31 and the faculty thought both were prepared for Chemistry 31. No students who were originally assessed into Chemistry 1A took Chemistry 31 this semester.

Table 11.
Faculty assessment of the preparedness of Chemistry 31 students by entry method

Level of Preparedness	Recommended into Chemistry 1A		Recommended into Chemistry 31		Did Not Take Assessment Test		Total	
	Num	Pct	Num	Pct	Num	Pct	Num	Pct
Prepared*	0	0%	2	100%	84	85%	86	85%
Unprepared	0	0%	0	0%	15	15%	15	15%
Total	0	0%	2	100%	100	100%	101	100%

Notes: * Prepared students were rated as "adequately prepared", "Well-Prepared", or "Over-Prepared".

Discussion of consequential validity

Based on the results from the success rates and survey analyses, Las Positas College Chemistry faculty determined that the cut score was correct. Chemistry 1A success rates indicate that students who assessed into Chemistry 1A had slightly higher success rates than students who took the prerequisite course (Chemistry 31).

Success rates in Chemistry 31 show that students who assessed into Chemistry 1A or Chemistry 31 had higher success rates that those who did not take the Chemistry assessment test; this could indicate that the cut score could be lowered to allow more students to enter Chemistry 1A. However, 11 students who were taking Chemistry 31 assessed into Chemistry 1A—this indicates that cut score may be too high. However, based on Las Positas College institutional research data that were not previously stated in this report, most students (85%) who assessed into Chemistry 1A took Chemistry 1A instead of Chemistry 31; this indicates that the vast majority of students felt their Chemistry placement was correct.

The survey results also support the current cut score. The results of the student surveys show that a vast majority (85% to 100%) of students felt that their place into Chemistry 1A or Chemistry 31 was appropriate. In addition, the faculty survey results show that faculty determined that a vast majority (92% to 100%) of students were prepared for the Chemistry course to which they were assessed.

Disproportionate Impact

A disproportionate impact analysis was conducted on students who took the CCDT between January of 2012 through August of 2015. Table 12 shows the results of the disproportionate impact analysis by gender, race-ethnicity, age, and disability. The reference groups for the disproportionate impact analysis were male, White, ages 19 or younger, and non-disabled students.

As indicated in Table 12, no disproportionate impact was found by gender, age, or disability. While there is a possibility that there is disproportionate impact for African Americans, the sample size is too small—only eight African American students over more than three and a half year period took the CCDT. Nevertheless, the college will collect more data on this group. In addition, the college will continue to collect more data to increase the samples sizes for Filipino students and students with disabilities.

Table 12.
Chemistry Assessment Test Results: Test taken between 1/1/2012 and 8/31/15

	Total Number Tested	Number Rec'd to Chem 31	**Pct. w/this Recmd**	Number Rec'd to Chem 1A	**Pct. w/this recmd**	**80% Rule Not Met (*)**
Total/Average:	**335**	**83**	**24.8%**	**252**	**75.2%**	
Gender						
Female	119	33	**27.7%**	86	**72.3%**	
Male	214	49	**22.9%**	165	**77.1%**	
Reference Group = Male; Using 80% rule, we get 61.7% as cut off (77.1% x 80% = 61.7%)						
Race-ethnicity						
African American	8	5	**62.5%**	3	**37.5%**	*
Asian American	97	25	**25.8%**	72	**74.2%**	
Filipino	15	4	**26.7%**	11	**73.3%**	
Latino	48	15	**31.3%**	33	**68.8%**	
White	132	25	**18.9%**	107	**81.1%**	
Multiracial	27	7	**25.9%**	20	**74.1%**	
Reference Group = White; Using 80% rule, we get 64.8% as cut off (81.1% x 80% = 64.8%)						
Age						
19 yrs. or less	234	53	**22.6%**	181	**77.4%**	
20-21 yrs.	46	13	**28.3%**	33	**71.7%**	
22-24 yrs.	27	7	**25.9%**	20	**74.1%**	
25 yrs. or over	28	10	**35.7%**	18	**64.3%**	
Reference Group = 19 yrs or less; Using 80% rule, we get 61.9% as cut off (81.1% x 80% = 61.9%)						

Disability						
Disabled	18	5	**27.8%**	13	**72.2%**	
Not disabled	317	78	**24.6%**	239	**75.4%**	
Reference Group = Not disabled; Using 80% rule, we get 60.3% as cut off (75.4% x 80% = 60.3%)						

Notes: Unknown gender and race-ethnicity data are not shown. Shaded area means sample size was too small for analysis.	
Pct. w/this recmd:	This percentage is calculated by dividing the number of students in that row who were given that recommendation by the total number of tested students in that row.
80% rule:	Pct/ shown indicates 80% of reference group's percentage. Reference Group is average.
* Indicates potential disproportionate results: under 80% of reference group percentage.	

ADA Accommodations

In accordance with the 1990 Americans with Disabilities Act (ADA) legislation, Las Positas College Assessment Center offers examinations in a place or manner accessible to persons with disabilities and as often and in as timely a manner as other examinations.

The Assessment Center offers nonstandard test administrations to student who have emotional, hearing, learning, and physical or visual disabilities and who cannot perform to the best of their abilities under standard testing conditions. Modifications of standard testing environments and auxiliary aids may include the following:

- Interpreters, qualified readers, or transcribers
- Screen display enlargement
- Use of a calculator
- Other effective methods of making orally delivered materials available to individuals with hearing impairments
- ADA accessible desks and computers.

Students with disabilities are required to provide advance notice and appropriate documentation of their disability and any modifications or aids that would be required during testing. Any student with a disability can contact the Disabled Students Programs and Services (DSPS) Center for initial counseling, which includes scheduling for orientation and testing.