STATISTICAL REPORT OF THE 2010 IBLCE EXAMINATION

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In July 2010, the International Board of Lactation Consultant Examiners (IBLCE) administered its 26th annual credentialing examination in lactation consulting. The test was administered in 14 languages to 4,133 candidates in 157 locations across 46 countries and territories representing all continents.

This candidate population for the 2010 administration was the largest in the test's history, 3% higher than the prior record in 2009. This marks the fourth administration in the past five, inclusive, in which the candidate population exceeded the prior record. The population was also larger than the first eight test administrations combined; more than ten times the size of each of the first five administrations; more than twice the size of each of the first 16 administrations; and the second consecutive administration with more than 4,000 candidates. Across the 26 annual administrations, more than 45,000 candidates have sat for the test.

The 2010 candidate population continues a significant trend regarding its composition. For the first 14 years of the program (1985-1998), the United States alone accounted for the majority of the candidates. For nine of the ten most recent years, including 2010, the United States accounted for less than half of the candidates. Similarly, for the first eight years of the program (1985-1992), candidates from countries *other* than the United States, Canada, and Australia accounted for less than 10% of the candidates. The 2010 administration is the eleventh consecutive year in which candidates from these other countries have accounted for more than 30% of the candidates, and the fourth in which this constituency has reached or exceeded 40%.

These statistics underscore that the IBLCE credential is the global standard of competence assessment in lactation consulting. Table 1 displays for each country the number of test centers and candidates tested.

As the program matures, a significant number of candidates take the test for recertification. For this administration, 1,033 (25%) of the candidates sat for recertification.

Table 1: Number of Test Centers and Candidates

Region and Country	*Number of Test Centers*	*Number of Candidates*
North America		
Canada	11	200
United States	62	1986
Virgin Islands	1	1
Central and South America		
El Salvador	1	1
Guatemala	1	1
Mexico	1	3
Brazil	4	18
Chile	1	1
Peru	1	21
Europe		
Austria	2	63
Belgium	1	44
Croatia	1	12
Denmark	1	34
Finland	1	9
France	2	142
Germany	6	242
Greece	1	11
Ireland	1	29
Italy	2	21
Netherlands	1	65
Norway	1	6
Poland	1	18
Portugal	1	3
Slovenia	1	8
Spain	1	13
Switzerland	1	58
United Kingdom	3	87
Middle East		
Egypt	1	49
Israel	1	39
Jordan	1	1
Kuwait	1	5
Lebanon	1	3
Saudi Arabia	1	6
United Arab Emirates	3	69
Africa		
South Africa	3	6
Australasia		
Australia	19	293
China	1	19
India	1	19
Indonesia	1	18
Japan	3	86
Korea	1	308
Malaysia	1	6
New Zealand	4	49
Philippines	1	1
Singapore	1	5
Taiwan	1	54

This was the sixth administration in which candidates sat for the examination at the 20-year recertification interval, and the first in which a candidate sat for the examination at the 25-year recertification period. Overall, number and percentage of candidates who sat for the test to recertify were at unprecedentedly high levels. In short, the 2010 examination marked a continuation of important trends in the candidate population composition.

The test was administered in English (both American and British), Croatian, Dutch, French, German, Indonesian, Italian, Japanese, Korean, Polish, Portuguese, Slovenian, Spanish, and Taiwanese. A total of 1,236 candidates sat for one of the 13 translated forms of

the test. Although there were no culturally adapted versions of the test, the English version was linguistically adapted to British English for most English-speaking candidates in countries outside North America, and for candidates in countries in which English is a secondary language but the test was not translated into the primary language. The IBLCE examination has now been administered in 19 languages (Arabic, Croatian, Dutch, English, French, German, Hebrew, Hungarian, Icelandic, Indonesian, Italian, Japanese, Korean, Polish, Portuguese, Slovenian, Spanish, Swedish, and Taiwanese) in more than 50 countries across all major continents, offering unparalleled geographical, cultural, and linguistic access.

The 2010 administration was the 20th in which IBCLCs (International Board Certified Lactation Consultants) chose to recertify by examination. Recertification is required every five years. By IBLCE policy, the first 5-year recertification requirement may be satisfied by either continuing education recognition points (CERPs) or by examination. When certificants are recertified by CERPs, the next 5-year recertification must be fulfilled by examination.

Historically, the vast majority of certificants has recertified at the 5-year point by CERPs, with small numbers of certificants recertifying initially by examination. As noted earlier, of the 4,133 candidates, 1,033 sat for the test for recertification. An analysis of the recertification candidate performance is given in Table 5 and Figure 2 later in this report.

Examination Development and Structure

The IBLCE examination is based on a 3-dimensional content outline, or test blueprint. This document was derived from a practice analysis by the Board, in conjunction with its Examination Committee members and a Representative Panel of Experts (RPE). On the basis of this study, the Board arranged the examination content according to scientific disciplines, developmental stages, and taxonomy levels. The latter category indicates whether an item measures recall of knowledge (level 1) or application of knowledge (level 2).

As the end of its first ten years approached, the Board commissioned a study of the blueprint for possible updating. A panel of experts was assembled for this purpose, and it developed a survey of certificants to provide an empirical basis for any modifications deemed to be necessary.

On the basis of this study, the underlying structure of the blueprint remained the same, but numerous secondary revisions were recommended. These included changing the two major classification dimensions from scientific disciplines and developmental stages to disciplines and chronological periods, respectively. In addition, greater detail was provided for each of the disciplines, and the chronological periods were restructured. The relative emphasis (i.e., range of items) of most of these categories also changed, but most of these changes were relatively slight. Finally, the number of disciplines increased from 12 to 13. The examination blueprint appears in its entirety on the IBLCE website (www.iblce.org).

With the exception of the first test administration in 1985, the examination has consisted of 200 multiple-choice items. A large minority of these items have referenced an image as the focus of the question. In recent years, 75 of the 200 items were in this visual, or image-based format.

This image is usually in the form of a color photograph depicting an aspect of breastfeeding, or breast anatomy or pathology that the candidates must resolve. These test items have a particularly high degree of clinical relevance, and because most of the question is contained in the graphic, potential linguistic issues are minimized.

In 2009, IBLCE made a decision to restructure the examination by reducing its length and shifting its presentation balance. The examination was shortened from 200 to 175 items and shifted from a distribution of 125:75 items (text-based : image-based) to a distribution of 75:100. The Exam Blueprint and proportion of items in each content area remained the same, and at 175 items, the examination was deemed to have retained a sufficient length for adequate levels of internal consistency and decision-related (i.e., pass-fail) reliability.

The new examination structure was implemented with 2010 administration. This was the first examination in the 26-administration history of the program in which the majority of items referenced an image. The examination restructure was intended to achieve several objectives. First, with an intermediate- to long-term goal of computer-based testing (CBT), it was imperative to reduce the number of examination administration sessions from two to one. Even if the examination were to remain in a paper-and-pencil format, a single session would be less costly and cumbersome, while being more secure.

To successfully merge the two sessions, a shorter overall time limit was necessary. The greater time efficiency would be achieved by administering 25 fewer items, as well as shorter text and reading time associated with a higher proportion of image-based items. An additional consideration was the greater ease of translating image items, as these items contain fewer sentences and words, which would reduce the time and complexity of translation.

Following standard operating procedures, the 2010 examination was developed by a 7-person examination committee that prepares, reviews, edits, and selects test items. The Examination Committee includes broad representation, with the objective of including the following types of subject matter experts.

- at least one physician who is a pediatrician
- the highest scorer from the previous year's examination
- a hospital-based IBCLC
- an IBCLC in private practice
- an educator in lactation management
- an IBCLC who received her training primarily through the mother-support system
- an IBCLC who received her training primarily through the traditional health professions
- at least two members from outside the US
- a midwife
- a dietician
- a Ph.D.- level researcher in lactation
- at least one member from the Australasian region
- at least one member from Europe
- a Canadian

The Committee also includes the Executive Director and the IBLCE psychometrician. Additional staff participate in the meeting to monitor test item revisions and check item references. Since there are fewer committee members than constituencies, one member usually represents more than one constituency. If a second physician serves on the Committee, he or she is typically an obstetrician.

As noted earlier, the test was translated into 13 languages. This marks the 24th consecutive year in which the examination has been translated. The opportunities provided by the translated test were made possible by the development of policies and standard operating procedures to govern the translation process. These policies and procedures were adopted and evaluated for the administration and analysis in 1986 of a Spanish "mini-test," consisting of a 25% sample representative of the content and difficulty of the overall 200-item test. A full explanation of the procedures used in developing this test, and an analysis of the comparative results, are contained in a published journal article and available on request.

On the basis of the procedures developed and implemented for this pilot test, IBLCE began offering a complete translated version of the examination in any language based on the Roman alphabet in 1987. Translations using non-Roman alphabets began in 1994. The criterion for translation is the documentation of sufficient number of candidates to support the requisite effort and costs.

Examination Results

The results of the 26th administration of the IBLCE examination are displayed in Table 2. These statistics are based on the total population of 4,133 certification and recertification candidates. The data in Table 2 are presented in percentages only, as the multiple linguistic versions of the test differed slightly in the number of scored items. These differences preclude any meaningful raw score comparisons.

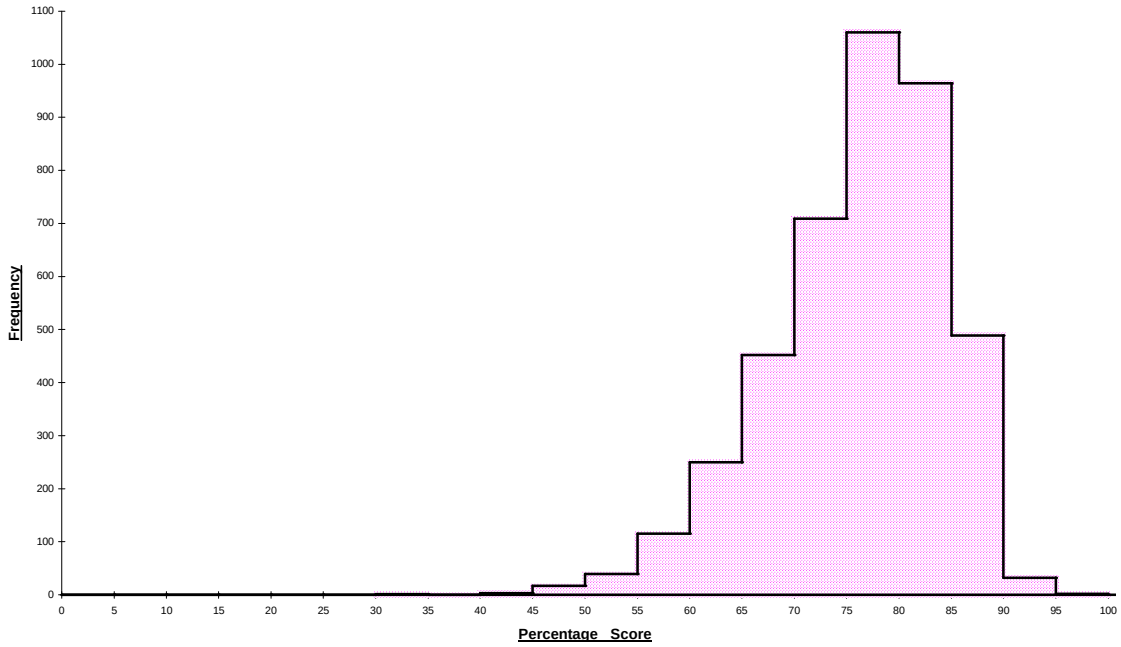
The final statistics are based on the combined written and visual portions. A graph of the total test scores, in percentages, is displayed in Figure 1. The statistics are presented for the overall test rather than for the two subtests because the examination was designed and intended to be *one* comprehensive test.

The statistics are not based on the 175 items that were administered. Some items were deleted from scoring on the basis of a flaw that is typically revealed by a computerized procedure known as an item analysis.

One of the functions of the Board's psychometrician is to "flag" or identify all test items with questionable performance for review by the Examination Review Committee of the Board. These individuals receive a copy of the statistical analysis and hold a meeting with one of the psychometricians.

The Examination Review Committee reviews all flagged items, and items that candidates have critiqued during the test administration. Items determined to have been defective are deleted, and items identified as having been initially miskeyed are rekeyed.

Figure 1: Distribution of Overall Test Scores



Subsequent to this meeting, the examinations are rescored. This review of test and item statistics and candidate critiques, and subsequent rescoring, are quality control procedures routinely performed by most credentialing boards to promote reliability, validity, and fairness.

Additional quality control procedures are applied to assess the adequacy of the translated versions of the test. These quantitative and qualitative procedures are designed to identify any items for which the translation was inadequate, and resulted in a significant performance decrement. When this occurrence is confirmed, the item is deleted selectively. This procedure is applied *only* to the affected linguistic version. For the 2010 examination, six items were deleted from the examination, overall, for psychometric reasons. Due to linguistic flaws, additional items were deleted from several of the translated versions.

Table 2: Summary Statistics of Overall Test Scores*

Descriptive Data	
Score Range	34-95
Mean Score**	75.67
Median	77.00
Standard Deviation	8.14
Reliability Data* **	
KR-20 Reliability	0.87
Kappa Reliability	0.61
Standard Error of Measurement	
of all scores	2.95
at the pass-fail cutoff score	4.56
Pass-Fail Data	
Pass-Fail Score	65
Candidates Passing	89.72
Candidates Failing	10.28

** Statistics are based on percentage scores for all 4,133 candidates.*

*** Subtest means are 73.13 for the text-only portion, and 77.51 for the image-based portion.*

**** Reliability data are based on the 169-scored-item version of the test.*

The examination score data display the score range, the mean and median scores, and the standard deviation, in percentage scores. The score range indicates the lowest and highest scores on each test, the mean is the arithmetic average, and the median is the middle score in the distribution, or 50th percentile, determined by placing all test scores in numeric order and selecting the middle score. The standard deviation describes the variability of the test score distribution. Approximately 68% of the test scores lie between plus-and-minus one standard deviation from the mean, and approximately 95% lie between plus-and-minus two standard deviations.

The reliability data contain four statistics. The KR-20 reliability statistic quantifies the internal consistency or replicability of the test results. In short, if the same test could be administered to the same candidates under the same conditions, a high level of agreement would be expected for the results to be considered replicated (i.e., reliable). The KR-20 statistic provides an estimate of this hypothetical situation.

The kappa index is similar to the KR-20 statistic. Both statistics quantify the degree of agreement that results from the hypothetical readministration of the same test to the same

candidates. However, while KR-20 reliability is concerned with agreement among scores, kappa focuses on the agreement between the resulting pass-fail decisions. Kappa is interpreted in a manner similar to KR-20, although kappa is typically lower than KR-20 for the same test results.

The standard error of measurement is used to identify the score range within which a candidate's "true score" would be if the test had a perfect level of reliability. Two types of standard errors are reported: one for all scores and one at the pass-fail cutoff score.

The last portion of the statistical table displays the pass-fail data for the examination, which includes the raw and percentage pass-fail score, and the number (raw) and percentage of candidates passing and failing the examination. The pass-fail cutoff score was determined using a form of the Nedelsky procedure, a criterion-referenced technique. Applying this procedure, a performance standard or index is determined for each test item (known as a minimum pass index, or MPI) on the basis of its perceived level of difficulty. The examination pass-fail standard is then computed as the average of each of the item performance indices.

The unique consideration of the Nedelsky technique is that it treats item difficulty as a function of the degree to which the wrong answers (i.e., distractors), approximate the correct response, and are therefore too difficult for the minimally competent candidate to eliminate. Items with a greater number of these difficult or "sophisticated" distractors are considered to be more difficult to answer correctly and thus, have a lower standard or performance expectation than items determined to be easier on the basis of having fewer, if any, "sophisticated" distractors. This standard setting methodology is applied by the Board *before* the test is administered, thus eliminating "grading on the curve" or inappropriate competition among candidates for acceptable scores.

A study of this process was conducted for the initial administration of the IBLCE examination and indicated that the standard setting technique yields a valid pass-fail score. With the exception of the few items with a relatively low standard for which candidate performance was relatively high, the anticipated relationship between item standard and item performance was attained. Specifically, as the number of sophisticated distractors in an item increased, the percentage of correct responses decreased. Thus, the Board's *a priori* assessment of item difficulty was deemed to be a valid basis for setting performance standards. This analysis is replicated for each examination and continues to support the findings of the cutoff score validation study.

Table 3 displays the relationship between the standard setting indices and actual performance indices for each of the 169 scored items. This table includes the standard setting indices for two items, which were modified as part of the post administration quality control review.

Table 3: Comparison of Indices for Item Standard Setting and Performance

MPI Values	*Number of Items*	*Mean P-Values*
90	42	86.1
60	104	75.1
45	18	59.4
36	5	57.8
30	0	---
	169	75.6

Table 3 indicates that the majority of items (104) had an MPI of 60, and few items had an MPI below 45. The relationship between expected performance, as determined by the MPI, and actual performance, is evident. Items with a high level of expected performance (90) exhibit the highest mean score (86.1%), while items with diminished levels of expected performance display diminished levels of actual performance. This relationship indicates the reasonableness of the pass-fail standard that the Examination Committee exhibited in assigning item MPIs.

For this 26th administration of the IBLCE examination, the overall rounded pass-fail cutoff score was 65%. As the pass-fail scores are determined on an item-by-item basis, the deletion of additional items in the translated versions of the test does not necessarily affect the percentage pass-fail score. Certainly, the additional deleted items do not make the pass-fail cutoff score more difficult to attain. This is because when items are deleted from computing the candidate scores, the deleted item MPIs are deleted from the passing-score computation also. The rounded pass-fail cutoff score for all translated versions of the 2010 test was the same (i.e., 65%), despite variance in the number of items.

The pass-fail cutoff score of 65% was in the middle of its historic range. The rounded mean score of 76% was the lowest since the 2002 administration, a reflection of an intended gradual increase in the difficulty of the exam. After seven consecutive administrations with a pass rate exceeding 90%, the 2010 administration was the second consecutive one with a pass rate just below 90%.

Routine equating analyses were conducted to evaluate the consistency of the test's difficulty and cutoff score relative to prior administrations. The results indicated that the test was more difficult in comparison with prior tests. As the level of candidate preparedness was similar to that of prior candidate populations and the cutoff score was mid range, the pass rate was fractionally below 90%.

Candidates whose overall score was at or above the pass-fail cutoff score received the IBCLC credential as an International Board Certified Lactation Consultant if they were taking the test for initial certification. If they were vying for recertification, a passing score allowed them to retain their IBCLC status. Any candidates whose overall score was below

the cutoff score are eligible for re-examination; however, if they were recertification candidates, their certification status was terminated.

All candidates, regardless of whether they passed or failed the examination, received a supplementary diagnostic performance report that indicated their number of correct responses for each discipline and chronological period. For failing candidates, this report is useful in identifying subject matter strengths and weaknesses, which may be particularly valuable in preparing for a subsequent examination. For passing candidates, this report may identify subject matter areas where continuing education is likely to be most useful.

The aggregate performance for each content discipline and chronological period is shown in Tables 4 and 5, respectively. These tables indicate the number of items scored for each of the disciplines and periods, and the average percentage of correct responses.

For the content disciplines, the highest performance level was in discipline L (Techniques), with a mean score of 82.2%. The lowest performance level was in discipline H (Growth Parameters and Developmental Milestones), with a mean score of 64.0%. For the chronological periods, the highest performance level was in period 3 (Labor/Birth), with a mean score of 83.0%. Period 7 (15-28 Days) had the lowest performance level, with a mean score of 62.3%.

Table 4: Aggregate Performance on Content Disciplines

Discipline	*Number of Items Scored**	*Mean % of Items Correct*
A. Maternal and Infant Anatomy	18	75.7
B. Maternal and Infant Normal Physiology and Endocrinology	20	77.0
C. Maternal and Infant Normal Nutrition and Biochemistry	9	73.3
D. Maternal and Infant Immunology and Infectious Disease	9	76.6
E. Maternal and Infant Pathology	26	73.9
F. Maternal and Infant Pharmacology and Toxicology	12	73.3
G. Psychology, Sociology, and Anthropology	14	75.6
H. Growth Parameters and Developmental Milestones	10	64.0
I. Interpretation of Research	4	64.5
J. Ethical and Legal Issues	6	73.8
K. Breastfeeding Equipment and Technology	8	69.7
L. Techniques	27	82.2
M. Public Health	6	74.7

* *Based on items deleted selectively from scoring on translated versions because of linguistic flaws, the number of items within some disciplines is lower for some translated versions of the test.*

Table 6 displays the candidate means and pass rates based on candidate certification status. In this table, performance is compared for candidates taking the test for initial certification, and for recertification at 5-, 10-, 15-, and 20-year periods. The one candidate taking the test at the 25-year period is included with the 20-year recertification candidates.

The performance of the candidates sitting for recertification was excellent. Each of the four recertification groups exhibited a higher mean and pass rate than the candidates sitting for initial certification. In addition, there was a linear progression in the mean performance among three of the four recertification groups. There was little distinction

between the mean performance of candidates sitting for recertification at 15- and 20-year intervals; candidates in both groups exhibited excellent performance.

Table 5: Aggregate Performance on Chronological Periods

Chronological Period	*Number of Items Scored**	*Mean % of Items Correct*
1. Preconception	5	68.7
2. Prenatal	9	77.9
3. Labor/Birth (Perinatal)	11	83.0
4. Prematurity	10	69.9
5. 0-2 Days	20	81.1
6. 3-14 Days	24	82.4
7. 15-28 Days	18	62.3
8. 1-3 Months	12	80.3
9. 4-6 Months	12	75.7
10. 7-12 Months	5	62.4
11. Beyond 12 Months	5	80.3
12. General Principles	38	71.0

* *Based on items deleted selectively from scoring on translated versions because of linguistic flaws, the number of items within some chronological periods is lower for some translated versions of the test.*

Generally, progressively longer recertification periods represent candidates with a longer career as a lactation consultant, and a commitment to continued competence and credential maintenance. Of the total 1,033 recertification candidates, 97.5% passed; this replicates a pattern of superior performance by recertification candidates on prior examinations.

The 26th administration of the IBLCE examination for certifying lactation consultants was very successful, and the Board congratulates all candidates who sat for the examination, both for initial and continued certification. Regardless of whether they passed or failed, these candidates had the courage and fortitude to accept the challenge of the examination. The Board is also grateful to the members of the Examination Committee and to the many professionals who contributed test items for the examination.

Table 6: Comparative Performance by Certification Status

Candidate Certification Status	*Number of Candidates*	*Mean % Correct*	*% Pass Rate*
Initial Certification	3100	74.4	87.1
Recertification by Exam at 5 Years	173	76.5	90.2
Recertification by Exam at 10 Years	652	79.7	99.1
Recertification by Exam at 15 Years	88	79.1	96.6
Recertification by Exam at 20-25 Years	120	81.6	100.0
Recertification Total	1033	79.3	97.5

The next administration of the IBLCE examination will be in July 2011.