

Job Analysis Survey Report for the National Board of Examiners in Optometry

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June 17, 2016



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Purpose

As part of its test development and maintenance process, in 2015 the National Board of Examiners in Optometry (NBEO) began a job analysis to review the content representation of four of its primary examinations:

- Part I (Applied Basic Science),
- Part II (Patient Assessment and Management),
- Part III (Clinical Skills), and
- Continued Professional Development in Optometry Examination (CPDO)

Test development should follow a series of inter-related processes that revolve around the central concept of validity (AERA, APA, & NCME, 2014). Two foundational elements of best practice include (1) sampling of the content domain and (2) definition of the content to include in test items (Downing, 2006). These elements are captured by analyzing the content domain and then developing a test blueprint. The knowledge, skills, and abilities identified throughout these steps provide the content specification for the NBEO examinations. Both of these steps were considered critical to the process of developing a valid interpretation of test scores.

The purpose of this report is to describe and document the job analysis, which used a blueprint validation survey methodology to evaluate and inform the content specification and blueprint development process. These results are intended to provide the NBEO evidence upon which to develop its examinations.

There are four appendices included in this report. Appendix A includes information about the current content of NBEO exams. Appendix B includes a copy of the job analysis survey e-mails and the survey itself. Appendix C includes results of the demographic analysis of the survey respondents and a comparison of recent graduates with other optometrists. Appendix D includes respondent-provided comments from the survey.

Exam Background

Parts I, II, and III

The Parts I, II, and III of the standard “National Boards” are designed primarily for different stages of a candidate's optometric education and training. The three comprehensive examination Parts are designed as a complete set of examinations to assess the cognitive, psychomotor, affective, and communication skills that are essential for entry-level optometric practice.

Each examination Part is developed by a broad geographic cross-section of the optometric community, which includes faculty members, state board members, and practitioners. These subject-matter experts comprise test development committees that are responsible for developing a specific portion or section of an examination. For written examinations, this activity consists of reviewing, editing, and selecting test items written by the NBEO's team of consultant item writers and case authors. All test items are scrutinized for accuracy, conformance to the specific test content outline, and appropriateness for entry-level difficulty.

Each examination development committee has representatives on one of the three examination councils. Additionally, each committee and council has representation by a liaison member from the Board of Directors. Every council is responsible for the integration of the component sections of one of the Parts. Throughout this process, the examination councils are responsible for monitoring and maintaining the entry-level appropriateness of all test content.

Each examination council also directs and reviews the scoring of the corresponding examination Part. This process includes the identification of flawed test items that should be deleted from scoring and any irregularities that might exert either a random or systematic deleterious effect on the scoring. The councils are accountable to the Board of Directors, which is ultimately responsible for the validity of the examinations, and the reliability of the examination results.

Part I and Part II are administered twice each year. Both administrations of the respective Parts are designed to be alike with respect to content, difficulty, and pass-fail cutoff scores. As these examinations are integrated tests, they each have one overall pass-fail standard that must be met. This allows candidates to compensate for areas of relative subject-matter weakness by other areas of

relative strength. However, candidates who fail the overall Part must repeat the entire Part. Part III is administered throughout the year. The content matrices (prior to this job analysis) for the three exams in aggregate—and each individual exam—is included in Appendix A.

CPDO

The subject matter included within the CPDO examination is intended to assess practice-level knowledge and experience in ocular disease and related systemic conditions. CPDO candidates have completed their formal academic education and have been out in the professional world for a wide variety of time intervals. Ideally, they have been practicing all facets of current scope-of-practice optometry as they consistently have updated their knowledge bases through continuing education activities.

However, CPDO candidates may practice at different levels across all areas of ‘life and sight’ optometry. Therefore, the incidence and prevalence of the case ocular conditions, as well as the subtlety of the clinical findings, are of varied difficulty levels to accommodate the different professional experiences.

Since the CPDO examination is designed for seasoned clinicians, some relatively infrequently encountered disease subject matter topics are presented in this examination. Conversely, cases involving common, straightforward ocular disease conditions are equally valuable to the assessment to provide a wide range of exam material sophistication. A list of subject matter covered by the CPDO exam is included in Appendix A. Although all CPDO subject matter is listed, any individual administration of the CPDO exam incorporates only a subset of the topics on the list.

The questions on this examination primarily focus on the diagnosis and treatment of ocular disease. Some items may touch upon related systemic conditions (e.g., diabetes, hypertension, Graves disease) that affect the eye. Other items involve the clinical correlation of basic science principles.

Development of Current Test Blueprints

The current content matrices (i.e., test blueprints) for the NBEO exams are based on the previous job analysis study conducted in 2004 (see [Soroka, Krumholz, Bennet, and the National Board of Examiners Conditions Domain Task Force, 2006](#)). The examination development committees and councils described above serve as monitors for the continued relevance and appropriateness of the exam content. On a yearly basis, these groups review the content and weights that make up the blueprint for each exam. From time to time, these groups recommend minor changes be made to the content or weights to help ensure that the exams align with current professional expectations.

The Part I and II content matrices are two dimensional, focusing on a set of Disciplines and Conditions. The Conditions are grouped into two overarching Condition Areas. The Part III exam focuses on a set of specific Skills¹. CPDO content is organized into Domains and related to a large set of conditions. The current content matrices are included in Appendix A. The breakdown of the current weights assigned to Disciplines (Parts I & II, and CPDO), Condition Areas (all exams), and Skills (Part III only) is shown in Table 1. The current weights for the specific Conditions targeted in Parts I and II are included in Table 2.

¹ Part III is also loosely related to the Conditions covered in Parts I and II, as well as four broad Disciplines, but is primary Skill-related.

Table 1. Current Weights for Condition Areas, Disciplines, and Skills

		Current Weight
Condition Areas	Pt1: Refractive Status, Sensory Processes, and Oculomotor Processes	35%
	Pt1: Normal Health, Disease, and Trauma	65%
Disciplines	Pt1: Anatomy (Gross, Neuroanatomy, Histology, Development)	12 - 18%
	Pt1: Biochemistry/Physiology	10 - 14%
	Pt1: Immunology/Microbiology/Pathology	22 - 30%
	Pt1: Optics (Geometrical, Physical, Ophthalmic, Physiological)	31 - 35%
	Pt1: Pharmacology	11 - 17%
Condition Areas	Pt2: Refractive Status, Sensory Processes, and Oculomotor Processes	32%
	Pt2: Normal Health, Disease, and Trauma	68%
Disciplines	Pt2: Clinical Correlation of Basic Science Principles	11 - 17%
	Pt2: Diagnosis	26 - 34%
	Pt2: Treatment/Management	40 - 57%
	Pt2: Legal Issues/Ethics/Public Health	4 - 10%
Condition Areas	Pt3: Refractive Status, Sensory Processes, and Oculomotor Processes	38%
	Pt3: Normal Health, Disease, and Trauma	62%
Skills	Pt3: Case History/Patient Communication	7.6%
	Pt3: Patient Education	4.9%
	Pt3: Binocular Extraocular Muscle Motility Evaluation	3.0%
	Pt3: Static Peripheral Confrontation Visual Fields	2.9%
	Pt3: Near Cover Test and Near Point of Convergence	2.7%
	Pt3: Pupil Testing	4.6%
	Pt3: Blood Pressure Measurement	3.4%
	Pt3: Ophthalmic Lens Evaluation	3.5%
	Pt3: Biomicroscopy	8.0%
	Pt3: Goldmann Applanation Tonometry	6.2%
	Pt3: 3-Mirror Gonioscopy	5.1%
	Pt3: Collagen Implant Insertion and Removal	3.3%
	Pt3: Soft and GP Contact Lens Insertion, Evaluation, and Removal	5.7%
	Pt3: Retinoscopy	5.4%
	Pt3: Distance Subjective Refraction	7.3%
	Pt3: Heterophoria and Vergence Testing at Distance	2.7%
	Pt3: Accommodation Testing	2.4%
	Pt3: Binocular Indirect Ophthalmoscopy	7.4%
	Pt3: Dilated Biomicroscopy and Non-Contact Fundus Lens Evaluation	7.6%
Pt3: Injections	4.7%	
Condition Areas	CPDO: Refractive Status, Sensory Processes, and Oculomotor Processes	0%
	CPDO: Normal Health, Disease, and Trauma	100%
Disciplines	CPDO: Diagnosis	25-38%
	CPDO: Clinical Correlation of Basic Science Principles	17-31%
	CPDO: Treatment/Management	22-53%

Table 2. Current Condition Weights (Parts I and II)

	Part I		Part II		Combined	
	Min.	Max.	Min.	Max.	Min.	Max.
REFRACTIVE STATUS/ SENSORY PROCESSES/ OCULOMOTOR PROCESSES	35.0%	35.0%	30.0%	40.0%	32.5%	37.5%
Ametropia	8.2%	11.4%	3.1%	6.3%	5.7%	8.8%
Ophthalmic Optics / Spectacles	4.8%	7.6%	1.7%	4.9%	3.3%	6.2%
Contact Lenses	2.4%	3.6%	4.9%	8.0%	3.6%	5.8%
Low Vision	1.6%	2.4%	1.7%	4.9%	1.7%	3.6%
Accommodation / Vergence / Oculomotor Function	3.0%	5.0%	5.7%	7.1%	4.4%	6.1%
Amblyopia / Strabismus	2.6%	4.6%	1.7%	4.9%	2.2%	4.7%
Perceptual Function / Color Vision	3.0%	5.0%	1.7%	4.9%	2.4%	4.9%
Visual and Human Development	1.8%	3.0%	0.0%	1.7%	0.9%	2.4%
NORMAL HEALTH / DISEASE / TRAUMA	65.0%	65.0%	60.0%	70.0%	62.5%	67.5%
Lids / Lashes / Lacrimal System / Ocular Adnexa / Orbit	5.6%	8.0%	3.1%	6.3%	4.4%	7.1%
Conjunctiva / Cornea / Refractive Surgery	9.6%	14.4%	9.4%	12.6%	9.5%	13.5%
Lens / Cataract / IOL / Pre- and Post-Operative Care	2.2%	3.4%	4.9%	8.0%	3.5%	5.7%
Episclera / Sclera / Anterior Uvea	4.6%	6.6%	3.1%	6.3%	3.9%	6.4%
Retina / Choroid / Vitreous	4.8%	7.2%	9.4%	12.6%	7.1%	9.9%
Optic Nerve / Neuro-Ophthalmic Pathways	4.2%	6.2%	8.0%	10.9%	6.1%	8.5%
Glaucoma	4.0%	6.0%	4.6%	7.7%	4.3%	6.9%
Emergencies / Trauma	2.4%	3.6%	3.1%	6.3%	2.8%	4.9%
Systemic Health	15.6%	21.6%	3.1%	6.3%	9.4%	13.9%

*Estimated weighing Parts I and II equally

Study Approach

Through the continued monitoring by the examination development committees and councils, the NBEO has confidence that the content of its exams remains current and the distribution of this content remains appropriate. However, in keeping with professional standards (e.g., AERA, APA, & NCME, 2014) and other recommendations from the psychometric literature (e.g., Knapp & Knapp, 1995), NBEO believes that it is essential to regularly seek input from a larger sample of the profession. As such, in 2015 NBEO began a new job analysis process. This process was assisted by NBEO’s internal psychometrician with external support from Alpine Testing Solutions (Alpine).

NBEO leadership felt that, because of the ongoing monitoring by the examination development committees and councils, that the current blueprint did not require a from-scratch redevelopment. Rather the goals of the job analysis were as follows:

1. summarize the current Conditions, Condition Areas, Disciplines and Skills,
2. obtain updated weights for Conditions, Condition Areas, Disciplines and Skills, and
3. identify any Conditions, Condition Areas, Disciplines or Skills that should be added or removed

With these goals in mind, it was determined that a large-scale blueprint validation survey that solicited input from a broad sample of the population of licensed optometrists would be an appropriate job analysis methodology because it will help support and provide evidence of a close link between test content and the requirements of the profession (as specified in Standard 11.3, AERA, APA, & NCME, 2014). Many job analyses begin with a focus group of SMEs developing a content outline that serves as a basis of the survey.

Because the NBEO examination development committees and councils already monitor and update the content of the current content matrices, this step was omitted and the current content matrices were used as the basis for the survey.

Blueprint Validation Survey

Creation, Review, and Finalization of Survey

NBEO used the current exam content matrices as the basis for the survey. Current Conditions, Condition Areas, Disciplines and Skills, along with their weights, were used in creating the survey structure and content. The survey was developed by NBEO staff with the support of their internal psychometrician as well as an Alpine psychometrician. The survey was reviewed internally, and shared with an Alpine psychometrician. On May 2015, the NBEO Board of Directors gave final approval for the administration of the survey.

Description of the Survey

The survey invitation explained the purpose regarding the future content of the NBEO examinations. Survey participants were advised that feedback is important in ensuring that the NBEO exams remain relevant to the contemporary scope of practice within optometry. Participants were presented with a series of questions related to demographic and background information. Next, the survey questions related to the Conditions covered on the current exams. In the survey, respondents were asked to answer questions related to frequency and importance for each Condition. The questions and rating scales provided were the following:

In order to practice safely and effectively, **how important is it for ENTRY-LEVEL OPTOMETRISTS to have knowledge and understanding of each of the following condition areas?**

- Very Important (4)
- Somewhat Important (3)
- Not Very Important (2)
- Not at All Important (1)

Use the scale below to indicate how often you make diagnoses or provide treatments related to the following condition areas.

- D = At least once a DAY (4)
- W = At least once a WEEK (3)
- M = At least once per MONTH, but not weekly (2)
- Y = Not monthly, but have performed at least once (1)
- NP = Never performed (0)

The responses were translated into a 4-point scale, as shown above, with the most frequent (i.e., “At least once a DAY”) and most important (i.e., “Very Important”) ratings assigned 4 points and the least frequent and important assigned 1 point. “Never Performed” was assigned 0 points.

Next, participants were asked to assign weights for the Condition Areas, Disciplines, and Skills for each exam. The survey was organized by domain and subdomain. Participants could click on each of these elements to get further information about the element. Additionally, participants were provided the current weights associated with each of these elements as a point of reference.

The survey concluded with two open-ended items:

1. Given the purposes of the NBEO examinations described above, if you have suggestions for condition areas or disciplines you feel are omitted from all of the current assessments, please enter them here:
2. Given the purposes of the NBEO examinations described above, if you have suggestions for condition areas or disciplines you feel should be removed from the current assessments, please enter them here:

A copy of the full survey is included in Appendix B.

Survey Administration

Email addresses for potential participants were identified by the Optometric Examination Data Information System (OEDIS) which all optometrists have used in order to register to take Parts of the NBEO examinations and/or order their official score reports.

The survey was administered from January 2016 to February 2016. Invitation surveys were sent on January 6, 2016 to January 29, 2016. Reminder e-mails were sent out on February 1, 2016 to February 29, 2016. Copies of the invitation and reminders are included in Appendix B.

Response Rate and Sampling Error

A total of 38,000 surveys were sent to members of the candidate population of licensed optometrists using the web survey program created by the Information Technology staff of the NBEO. Table 3 displays the breakdown of the results from the invitations. For this survey, the average response rate for the survey was 3.07%.

Table 3. Breakdown of the Responses to the Survey

Surveys Sent	38,000
Returned Questionnaires	1,168
Excluded Respondents**	67
10% or less time spent dealing with patient care	19
Does not have an active therapeutic (TPA) license to practice optometry	50
Not currently working	18
Total Responses Used in Analysis	1,101
Response Rate***	3.07
Approximate Margin of Error for Response Ratings	3%

*Total excluded is less than the sum of the respondents meeting the individual exclusion criteria because some respondents met multiple exclusion criteria.

**Margin of Sampling Error = $z \cdot \sqrt{pq/N}$, where $z = 1.96$, $p = 0.5$, $q = 1-p$,
N = number of surveys used in analysis

***Response rate = (number of invitations sent/number of returned questionnaires)

The respondents surveyed were generally representative of the population (see the demographic survey section of this report). The margin of sampling error (Dillman, Smyth, & Christian, 2014) for the survey ratings was within a maximum of ± 3 percentage points of the true population value 95% of the time. This assumes the most conservative assumption that 50% of the respondents (“p”) select one option over another. For example, say 50% of the survey respondents rated a condition as being encountered “daily.” In that

example, we can say that there is a 95% chance that the overall percentage of all optometrists who would rate that condition as being encountered “daily” is between 47% and 53%.

Demographic and Background Characteristics of Sample

Demographic and background data were collected from respondents. These data included variables like gender, age, state/jurisdiction of practice, and employment/license status.

There were a total of 1,168 completed surveys. Sixty-seven respondents were excluded from the analysis because they reported (1) not having an active therapeutic (TPA) license to practice optometry, (2) spending 10% or less time dealing directly with patient care, and/or (3) having an employment status of “not currently working.” The rationale for removing these respondents was that it was NBEO’s view that only actively practicing professionals should be included in the analyses. The remaining 1,101 respondents were considered the most appropriate (and valid) set of responses to analyze for two primary reasons: (1) these were the most qualified respondents to complete the survey, and (2) this criteria did not greatly reduce the number of analyzed surveys (see Table 3).

For this survey, the most common background characteristics were the following:

Primary employer	Optometrist not affiliated with a regional/national optical company (36.2%)
Year of graduation from optometry school	2011-present (59.0%)
State of practice	California (10.1%)
Percent of time spent dealing directly with patient care	75-100% (81.2%)
Age	Under 30 (42.3%)
Gender	Female (60.2%)
Ethnicity	White (67.2%)

Figure 1 shows how the responses by state compare with state population size (based on 2014 U.S. Census estimates of the population aged 18 and above). Some states were over-represented (e.g., Alaska was the 32nd largest in terms of survey responses but only 48th in terms of population), and some were under-represented (e.g., Louisiana was 39th in terms of survey responses but was 25th in terms of population, Arkansas was 44th in terms of survey responses but was 32nd in terms of population). However, generally states with larger populations had larger groups of survey respondents. There was a strong, positive rank-order correlation between state population and survey response ($r = .92$)².

² There were also responses from U.S. territories and Canadian provinces. However, the data in this comparison focuses only on U.S. states and Washington D.C.

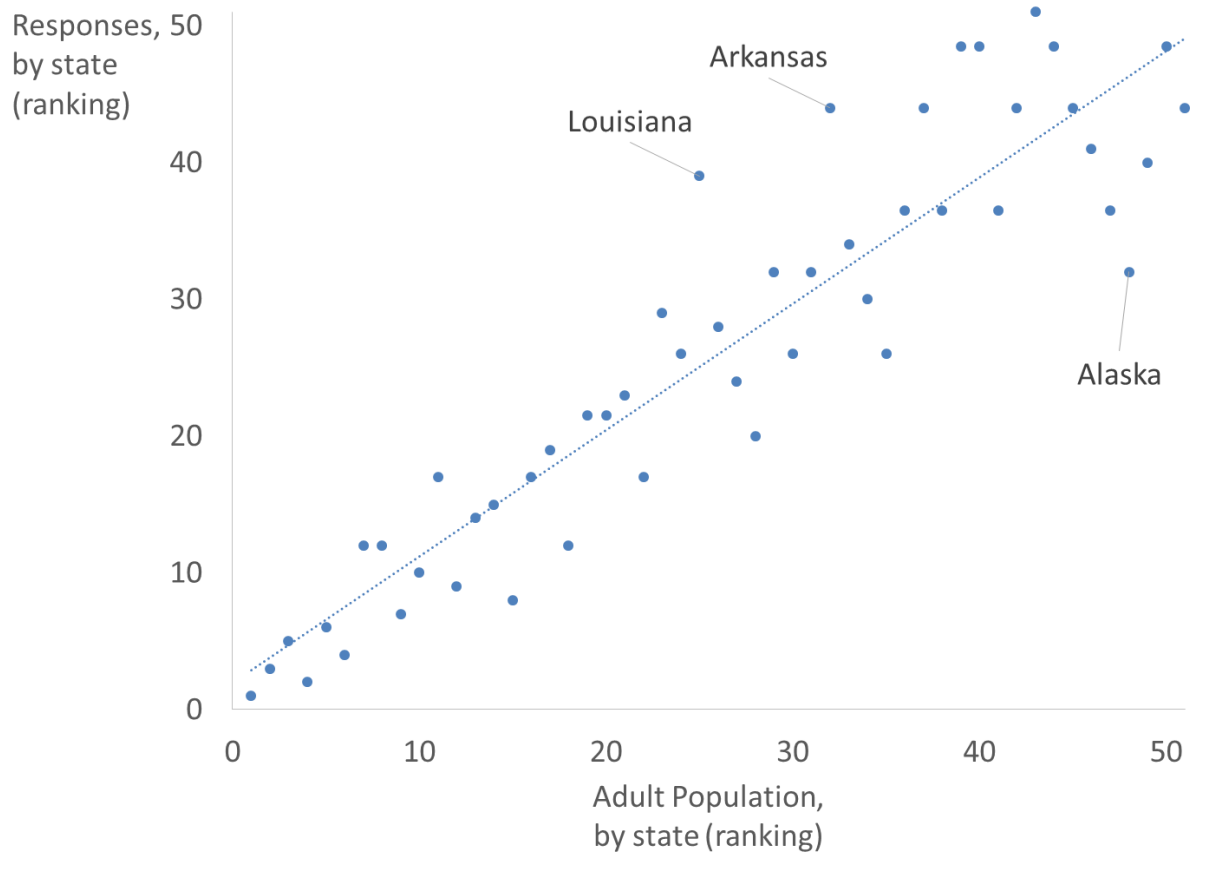


Figure 1. Comparison of representation in the survey sample with the population sizes of states. Data is based on ranks (i.e., smaller numbers indicate larger states/samples; larger numbers indicate smaller states/samples).

Figure 2 shows how the responses by state compare with number of licensed optometrists in each state³. As with the general population data, some states were over-represented (e.g., Alaska was the 32nd largest in terms of survey responses but only 48th in the number of licensed optometrists), and some were under-represented (e.g., Idaho was among the lowest in terms of survey responses but was 34th in the number of licensed optometrists). However, states with larger numbers of licensed optometrists tended to have larger groups of survey respondents. There was a strong, positive rank-order correlation between number of licensed optometrists in a state and survey response ($r = .92$).^{4,5}

³ Optometrist license data was provided by The Association of Regulatory Boards of Optometry (ARBO)

⁴ As with the previous figure, there were also responses from U.S. territories and Canadian provinces. However, the data in this comparison focuses only on U.S. states and Washington D.C.

⁵ The correlation between the state-level raw number of respondents and counts of licensed optometrists (as opposed to state ranks) was also very strong ($r = .97$).

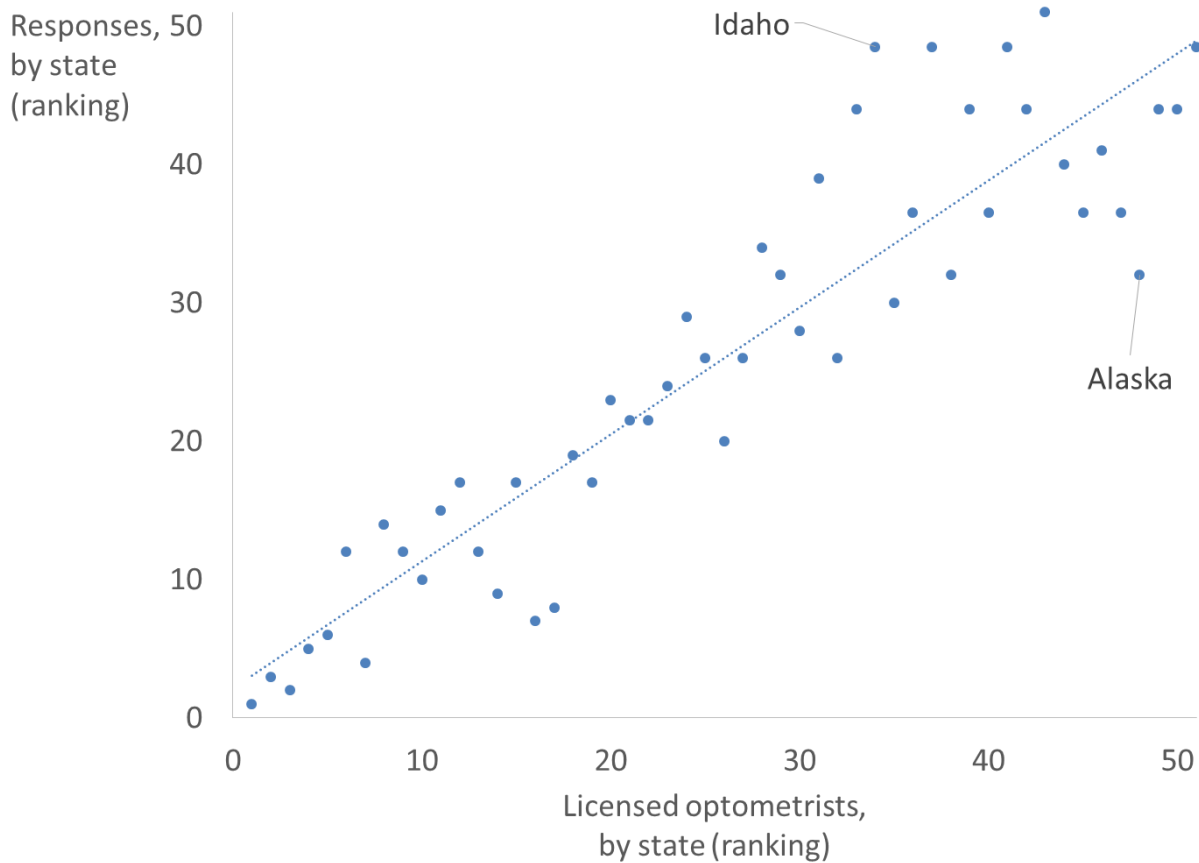


Figure 2. Comparison of state-level representation in the survey sample with the number of licensed optometrists for each state. Data is based on ranks (i.e., smaller numbers indicate larger optometrist counts/samples; larger numbers indicate smaller optometrist counts/samples).

Overall, the percent of respondents in each category for the demographic questions was viewed to be similar to the full population of optometrists. One exception was that the sample tended to include more recent graduates (from optometry school) than the general population of optometrists. This was likely an artifact of recently graduated respondents more likely to be included in NBEO’s email lists due to their recent exam participation. To determine if the relatively large group of recently licensed respondents had the potential to bias the overall survey results, ratings were compared between recent graduates (i.e., graduated from optometry school 2011-present) and the remaining respondents. Full results are included in Appendix C (Tables C1-C3), and indicate that the mean and median ratings are very similar for both recent graduates and other optometrists. The correlations between mean importance, frequency, and weight recommendations for recent graduates and other optometrists were 0.99, 0.98, and 1.00, respectively. Thus, based on these correlations, the sample of respondents to the survey was considered sufficiently representative of the population and a reasonable sample to use to analyze and interpret the survey results. A complete analysis of the survey demographics is in Appendix C.

C Table 4. This table also indicates the center of the distribution of recommendation through showing the range covering the middle half of respondent ratings (i.e., the 25th to 75th percentile)⁶. In most cases, these ranges overlap with the current weight values/ranges.

Table 4. Survey Results: Weights for Major Condition Areas, Disciplines, and Skills

Conditions/Disciplines	Current Weight	From JTA	
		Median Rating	Middle half of ratings
Pt1: Refractive Status, Sensory Processes, and Oculomotor Processes	35%	35%	35% - 40%
Pt1: Normal Health, Disease, and Trauma	65%	65%	60% - 65%
Pt1: Anatomy (Gross, Neuroanatomy, Histology, Development)	12 - 18%	15%	15% - 20%
Pt1: Biochemistry/Physiology	10 - 14%	10%	10% - 15%
Pt1: Immunology/Microbiology/Pathology	22 - 30%	22%	20% - 25%
Pt1: Optics (Geometrical, Physical, Ophthalmic, Physiological)	31 - 35%	30%	25% - 35%
Pt1: Pharmacology	11 - 17%	20%	15% - 25%
Pt2: Refractive Status, Sensory Processes, and Oculomotor Processes	32%	32%	30% - 35%
Pt2: Normal Health, Disease, and Trauma	68%	68%	65% - 70%
Pt2: Clinical Correlation of Basic Science Principles	11 - 17%	12%	10% - 15%
Pt2: Diagnosis	26 - 34%	35%	30% - 40%
Pt2: Treatment/Management	40 - 57%	50%	40% - 50%
Pt2: Legal Issues/Ethics/Public Health	4 - 10%	5%	5% - 8%
Pt3: Refractive Status, Sensory Processes, and Oculomotor Processes	38%	38%	35% - 40%
Pt3: Normal Health, Disease, and Trauma	62%	62%	60% - 65%
Pt3: Case History/Patient Communication	7.6%	8%	8% - 10%
Pt3: Patient Education	4.9%	5%	5% - 6%
Pt3: Binocular Extraocular Muscle Motility Evaluation	3.0%	3%	3% - 3%
Pt3: Static Peripheral Confrontation Visual Fields	2.9%	3%	2% - 3%
Pt3: Near Cover Test and Near Point of Convergence	2.7%	3%	2% - 3%
Pt3: Pupil Testing	4.6%	5%	5% - 5%
Pt3: Blood Pressure Measurement	3.4%	3%	2% - 3%
Pt3: Ophthalmic Lens Evaluation	3.5%	4%	3% - 4%
Pt3: Biomicroscopy	8.0%	8%	8% - 10%
Pt3: Goldmann Applanation Tonometry	6.2%	6%	5% - 6%
Pt3: 3-Mirror Gonioscopy	5.1%	5%	4% - 5%
Pt3: Collagen Implant Insertion and Removal	3.3%	3%	2% - 3%
Pt3: Soft and GP Contact Lens Insertion, Evaluation, and Removal	5.7%	6%	5% - 7%
Pt3: Retinoscopy	5.4%	5%	5% - 5%
Pt3: Distance Subjective Refraction	7.3%	7%	7% - 8%
Pt3: Heterophoria and Vergence Testing at Distance	2.7%	3%	2% - 3%
Pt3: Accommodation Testing	2.4%	3%	2% - 3%
Pt3: Binocular Indirect Ophthalmoscopy	7.4%	7%	7% - 9%
Pt3: Dilated Biomicroscopy and Non-Contact Fundus Lens Evaluation	7.6%	8%	8% - 10%
Pt3: Injections	4.7%	3%	2% - 5%
CPDO: Refractive Status, Sensory Processes, and Oculomotor Processes	0%	0%	0% - 10%
CPDO: Normal Health, Disease, and Trauma	100%	100%	90% - 100%
CPDO: Diagnosis	25-38%	35%	30% - 40%
CPDO: Clinical Correlation of Basic Science Principles	17-31%	20%	15% - 25%
CPDO: Treatment/Management	22-53%	45%	40% - 50%

⁶ In several cases the median values are the same as the values for the 25th and/or 75th percentiles. This is not a calculation error. Instead, it is the result of many respondents providing the same recommendation. Elements are grouped by exam and type (e.g., Condition Area, Discipline, Skill).

Condition Level Analysis

The survey results of the Condition analysis are displayed in Tables 5 and 6 on the next page. Table 5 summarizes the importance ratings for the Conditions. Conditions with lower importance ratings indicate that respondents felt that it was less important for entry-level optometrists to have knowledge and understanding of. The Condition with the lowest importance rating was “Low Vision” (average rating = 3.0); the Condition with the highest importance rating was “Glaucoma” (average rating = 4.0). All Conditions had average importance ratings of 3 (“Somewhat Important”) or higher.

Table 6 summarizes the frequency ratings for the Conditions. Conditions with lower frequency ratings indicate that respondents made diagnoses or provided treatments for these Conditions less often. The Condition with the lowest frequency rating was “Low Vision” (average rating = 1.8); it was also the Condition that was rated “Not Performed” by the highest percent of respondents (9.0%). The Condition with the highest frequency rating was “Ophthalmic Optics/Spectacles” (average rating = 3.9); more than 90% of respondents dealt with this condition on a daily basis. All Conditions except for “Low Vision” had average frequency ratings of 2 (“Monthly”) or higher.

Weights for the Conditions were determined using a multiplicative model (Kane, et al., 1989) in which the importance ratings contributed twice as much frequency to the overall weights. Importance was deemed to warrant greater weight than frequency because there are some infrequently occurring conditions that, if not properly diagnosed and treated, could result in risks to a patient’s sight and/or life. Giving extra weight to importance helped ensure that frequently seen but low risk conditions did not outweigh dangerous but relatively rare conditions. The survey results showing the Conditions weights are displayed in Table 7. These values reflect the analysis of the survey results using the multiplicative model. Overall, some of the Condition weights fell within the currently used weight ranges, but others did not. The Condition receiving the least weight was “Low Vision.” The Condition receiving the highest weight was “Lids/Lashes/Lacrimal System/Ocular Adnexa/Orbit,” which was rated high in both importance and frequency.

Analysis of Open-Ended Questions

At the conclusion of the survey, respondents were given the opportunity to identify condition areas or disciplines that (1) they felt were omitted from all of the current assessments, and/or (2) should be removed from the current assessments. A complete list of provided comments is included in Appendix D. NBEO staff reviewed these responses in the context of the other survey and determined that none of the comments warranted additional changes to the content matrices beyond those indicated in the other survey results.

Table 5. Survey Results: Importance Ratings for Conditions

In order to practice safely and effectively, how important is it for ENTRY LEVEL OPTOMETRISTS to have knowledge and understanding of each of the following condition areas?

	Not At All Important	Not Very Important	Somewhat Important	Very Important	Distribution	Average Rating*
REFRACTIVE STATUS/ SENSORY PROCESSES/ OCULOMOTOR PROCESSES						
Ametropia	0.1%	1.5%	9.1%	89.4%		3.9
Ophthalmic Optics / Spectacles	0.3%	4.4%	22.7%	72.7%		3.7
Contact Lenses	0.0%	0.5%	9.2%	90.3%		3.9
Low Vision	1.1%	27.7%	45.7%	25.5%		3.0
Accommodation / Vergence / Oculomotor Function	0.3%	4.3%	31.5%	63.9%		3.6
Amblyopia / Strabismus	0.0%	1.0%	16.2%	82.8%		3.8
Perceptual Function / Color Vision	2.1%	21.5%	44.4%	32.0%		3.1
Visual and Human Development	1.9%	13.1%	42.0%	43.1%		3.3
NORMAL HEALTH / DISEASE / TRAUMA						
Lids / Lashes / Lacrimal System / Ocular Adnexa / Orbit	0.0%	0.3%	6.0%	93.7%		3.9
Conjunctiva / Cornea / Refractive Surgery	0.0%	0.7%	5.3%	94.0%		3.9
Lens / Cataract / IOL / Pre- and Post-Operative Care	0.0%	1.1%	11.3%	87.6%		3.9
Episclera / Sclera / Anterior Uvea	0.1%	0.6%	8.9%	90.4%		3.9
Retina / Choroid / Vitreous	0.1%	0.5%	4.5%	95.0%		3.9
Optic Nerve / Neuro-Ophthalmic Pathways	0.1%	0.9%	9.7%	89.3%		3.9
Glaucoma	0.0%	0.1%	3.5%	96.5%		4.0
Emergencies / Trauma	0.1%	0.6%	9.0%	90.3%		3.9
Systemic Health	0.2%	0.9%	16.3%	82.7%		3.8

*Calculated by coding "Not At All Important" = 1, "Not Very Important" = 2, "Somewhat Important" = 3, "Very Important" = 4

Table 6. Survey Results: Frequency Ratings for Conditions

Use the scale below to indicate how often you make diagnoses or provide treatments related to the following condition areas.

Condition Area	Use the scale below to indicate how often you make diagnoses or provide treatments related to the following condition areas.					Distribution	Average Rating*
	Not Performed	Yearly	Monthly	Weekly	Daily		
REFRACTIVE STATUS/ SENSORY PROCESSES/ OCULOMOTOR PROCESSES							
Ametropia	0.1%	0.9%	3.2%	6.6%	89.2%		3.8
Ophthalmic Optics / Spectacles	0.6%	0.4%	2.1%	6.5%	90.4%		3.9
Contact Lenses	1.5%	2.9%	7.5%	11.2%	76.9%		3.6
Low Vision	9.0%	28.5%	42.5%	13.3%	6.7%		1.8
Accommodation / Vergence / Oculomotor Function	1.1%	3.5%	29.4%	37.1%	29.0%		2.9
Amblyopia / Strabismus	0.5%	2.2%	26.9%	48.3%	22.1%		2.9
Perceptual Function / Color Vision	4.4%	27.0%	45.0%	14.5%	9.2%		2.0
Visual and Human Development	8.0%	23.1%	34.4%	16.7%	17.8%		2.1
NORMAL HEALTH / DISEASE / TRAUMA							
Lids / Lashes / Lacrimal System / Ocular Adnexa / Orbit	0.0%	0.3%	1.6%	11.1%	87.0%		3.8
Conjunctiva / Cornea / Refractive Surgery	0.1%	0.5%	4.9%	16.4%	78.0%		3.7
Lens / Cataract / IOL / Pre- and Post-Operative Care	0.5%	1.5%	9.9%	20.3%	67.8%		3.5
Episclera / Sclera / Anterior Uvea	0.1%	4.3%	26.2%	27.4%	42.1%		3.1
Retina / Choroid / Vitreous	0.1%	1.1%	11.7%	24.7%	62.4%		3.5
Optic Nerve / Neuro-Ophthalmic Pathways	0.4%	6.8%	28.2%	25.1%	39.6%		3.0
Glaucoma	0.4%	0.7%	14.1%	27.8%	57.0%		3.4
Emergencies / Trauma	0.5%	5.7%	26.2%	35.8%	31.9%		2.9
Systemic Health	0.4%	2.7%	11.2%	20.8%	64.9%		3.5

*Calculated by coding "Not Performed" = 0, "Yearly" = 1, "Monthly" = 2, "Weekly" = 3, "Daily" = 4

Table 7. Survey Results: Weights for Conditions (Based on Multiplicative Model)

	Current Estimated		Recommended Weights from JTA*
	Weights Across Parts I and II		
	Minimum	Maximum	
REFRACTIVE STATUS/ SENSORY PROCESSES/ OCULOMOTOR PROCESSES	32.5%	37.5%	35.3%
Ametropia	5.7%	8.8%	7.9%
Ophthalmic Optics / Spectacles	3.3%	6.2%	6.1%
Contact Lenses	3.6%	5.8%	7.6%
Low Vision	1.7%	3.6%	1.0%
Accommodation / Vergence / Oculomotor Function	4.4%	6.1%	4.1%
Amblyopia / Strabismus	2.2%	4.7%	5.5%
Perceptual Function / Color Vision	2.4%	4.9%	1.3%
Visual and Human Development	0.9%	2.4%	1.9%
NORMAL HEALTH / DISEASE / TRAUMA	62.5%	67.5%	64.7%
Lids / Lashes / Lacrimal System / Ocular Adnexa / Orbit	4.4%	7.1%	8.5%
Conjunctiva / Cornea / Refractive Surgery	9.5%	13.5%	8.2%
Lens / Cataract / IOL / Pre- and Post-Operative Care	3.5%	5.7%	7.1%
Episclera / Sclera / Anterior Uvea	3.9%	6.4%	6.5%
Retina / Choroid / Vitreous	7.1%	9.9%	7.8%
Optic Nerve / Neuro-Ophthalmic Pathways	6.1%	8.5%	6.1%
Glaucoma	4.3%	6.9%	7.8%
Emergencies / Trauma	2.8%	4.9%	6.1%
Systemic Health	9.4%	13.9%	6.6%

*Estimated using Criticality and Frequency ratings from respondents, with Criticality weighted twice as much as Frequency

Committee/Council Recommendations

In late 2016, the refractive and disease committees and councils for the Part I/II exams provided their recommendations on the final weights for the Part I/II exams. In doing so, the members provided initial estimates, reviewed the JTA Survey results (see above), and then provided final recommendations. These results are summarized in Tables 8 and 9. For Refractive Status/Sensory Process/Oculomotor Processes, the refractive committee recommendations were given twice the weight of the disease committee. For Normal Health/Disease/Trauma, the disease committee recommendations were given twice the weight of the refractive committee. For the Disciplines, and the overall weights for Refractive Status/Sensory Process/Oculomotor Processes vs. Normal Health/Disease/Trauma each committee was given equal weight. Percentages were rounded by fractions of a percent so that weights consistently totaled 100%.

Table 8. Combined Committee/Council Recommendations: Part I

	Recommended Weights
REFRACTIVE STATUS/ SENSORY PROCESSES/ OCULOMOTOR PROCESSES	34.8%
Ametropia	7.7%
Ophthalmic Optics / Spectacles	6.7%
Contact Lenses	4.9%
Low Vision	2.3%
Accommodation / Vergence / Oculomotor Function	5.0%
Amblyopia / Strabismus	3.6%
Perceptual Function / Color Vision	2.5%
Visual and Human Development	2.1%
NORMAL HEALTH / DISEASE / TRAUMA	65.2%
Lids / Lashes / Lacrimal System / Ocular Adnexa / Orbit	6.8%
Conjunctiva / Cornea / Refractive Surgery	10.1%
Lens / Cataract / IOL / Pre- and Post-Operative Care	4.2%
Episclera / Sclera / Anterior Uvea	4.9%
Retina / Choroid / Vitreous	7.7%
Optic Nerve / Neuro-Ophthalmic Pathways	6.4%
Glaucoma	7.2%
Emergencies / Trauma	4.1%
Systemic Health	13.8%
DISCIPLINES	
Anatomy	17.6%
Biochemistry/Physiology	12.7%
Immunology/Microbiology/Pathology	22.8%
Optics	29.2%
Pharmacology	17.7%

Table 9. Combined Committee/Council Recommendations: Part II

	Recommended Weights*
REFRACTIVE STATUS/ SENSORY PROCESSES/ OCULOMOTOR PROCESSES	35.6%
Ametropia	5.5%
Ophthalmic Optics / Spectacles	4.4%
Contact Lenses	7.6%
Low Vision	3.5%
Accommodation / Vergence / Oculomotor Function	6.3%
Amblyopia / Strabismus	4.6%
Perceptual Function / Color Vision	2.4%
Visual and Human Development	1.3%
NORMAL HEALTH / DISEASE / TRAUMA	64.4%
Lids / Lashes / Lacrimal System / Ocular Adnexa / Orbit	5.3%
Conjunctiva / Cornea / Refractive Surgery	10.2%
Lens / Cataract / IOL / Pre- and Post-Operative Care	6.7%
Episclera / Sclera / Anterior Uvea	4.8%
Retina / Choroid / Vitreous	10.8%
Optic Nerve / Neuro-Ophthalmic Pathways	8.8%
Glaucoma	7.6%
Emergencies / Trauma	4.9%
Systemic Health	5.3%

*Committees did not provide Discipline weight recommendations or overall weights for major condition areas. Major condition area weights are calculated by adding the individual condition weights

Summary

There were three main goals of this job analysis:







1. summarize the current Conditions, Condition Areas, Disciplines and Skills,
2. obtain updated weights for Conditions, Condition Areas, Disciplines and Skills, and
3. Identify any Conditions, Condition Areas, Disciplines or Skills that should be added or removed.

The results from the JTA provided data to support each of these goals. Questions related to currently assessed Conditions, Condition Areas, Disciplines and Skills, were sent out in a survey to collect information related to their recommended weights, importance, and frequency. A total of 1,101 survey responses from licensed respondents were analyzed. Comments from the survey respondents were also collected (see Appendix D). Although in many cases the weights determined through this study support the currently used weights, it is recommended that the results of this job analysis be reviewed by subject matter experts to determine whether or not the weights associated with Conditions, Condition Areas, Disciplines and Skills should be revised to bring the current weights into closer alignment with the recommendations of the survey respondents. To this end, NBEO has convened a task force of representatives of ARBO (Association of Regulatory Board of Optometry), ASCO (Association of Schools and Colleges in Optometry), and NBEO to review the job task analysis and to make recommendations to the NBEO Board of Directors.




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- Soroka, M., Krumholz, D., Bennet, A., & the National Board of Examiners Conditions Domain Task Force. (2006). The practice of optometry: National Board of Examiners in Optometry survey of optometric patients. *Optometry and Vision Science*, 83, 625-634.

Appendix A – Current Content Information for NBEO Exams

Current Content Matrix for Parts I, II, and III	 Adobe Acrobat Document
Current Part I Content Matrix	 Adobe Acrobat Document
Current Part II Content Matrix	 Adobe Acrobat Document
Current Part III Content Matrix	 Adobe Acrobat Document
Current Part III Skills Overview	 Adobe Acrobat Document
Current CPDO Study Topics	 Adobe Acrobat Document

Appendix B – Copy of Full Blueprint Validation Survey and Accompanying Materials

Job Analysis Survey	 JTA Survey
Invitation Email	 Invitation Email.pdf
Reminder Email	 Invitation Reminder.pdf

Appendix C – Respondent Demographic Data and Recent Graduate Comparisons

Complete respondent demographic information for the 1,101 respondents who met inclusion requirements



Adobe Acrobat Document

Table C1. Comparison of Recent Graduates (n=651) vs. Others (n=450): Condition Area, Discipline, and Skill Weights

	Mean			Median		
	Others	Recent Graduates	Difference	Others	Recent Graduates	Difference
Pt1: Refractive Status, Sensory Processes, and Oculomotor Processes	36.5%	36.4%	0.1%	35.0%	35.0%	0.0%
Pt1: Normal Health, Disease, and Trauma	63.5%	63.6%	-0.1%	65.0%	65.0%	0.0%
Pt1: Anatomy (Gross, Neuroanatomy, Histology, Development)	17.4%	17.5%	-0.1%	15.0%	15.0%	0.0%
Pt1: Biochemistry/Physiology	12.4%	11.5%	0.9%	10.0%	10.0%	0.0%
Pt1: Immunology/Microbiology/Pathology	22.2%	21.9%	0.3%	22.0%	22.0%	0.0%
Pt1: Optics (Geometrical, Physical, Ophthalmic, Physiological)	27.9%	28.8%	-0.9%	30.0%	30.0%	0.0%
Pt1: Pharmacology	20.0%	20.3%	-0.3%	20.0%	20.0%	0.0%
Pt2: Refractive Status, Sensory Processes, and Oculomotor Processes	33.5%	33.5%	0.0%	32.0%	32.0%	0.0%
Pt2: Normal Health, Disease, and Trauma	66.5%	66.5%	0.0%	68.0%	68.0%	0.0%
Pt2: Clinical Correlation of Basic Science Principles	12.8%	12.4%	0.4%	12.0%	11.0%	1.0%
Pt2: Diagnosis	34.4%	33.6%	0.8%	35.0%	34.0%	1.0%
Pt2: Treatment/Management	46.0%	48.4%	-2.4%	45.0%	50.0%	-5.0%
Pt2: Legal Issues/Ethics/Public Health	6.8%	5.6%	1.2%	5.0%	5.0%	0.0%
Pt3: Refractive Status, Sensory Processes, and Oculomotor Processes	37.1%	37.6%	-0.5%	38.0%	38.0%	0.0%
Pt3: Normal Health, Disease, and Trauma	62.9%	62.4%	0.5%	62.0%	62.0%	0.0%
Pt3: Case History/Patient Communication	8.5%	7.9%	0.5%	8.0%	8.0%	0.0%
Pt3: Patient Education	5.7%	5.7%	0.0%	5.0%	5.0%	0.0%
Pt3: Binocular Extraocular Muscle Motility Evaluation	3.1%	2.9%	0.2%	3.0%	3.0%	0.0%
Pt3: Static Peripheral Confrontation Visual Fields	2.7%	2.7%	0.0%	3.0%	3.0%	0.0%
Pt3: Near Cover Test and Near Point of Convergence	2.8%	2.9%	0.0%	3.0%	3.0%	0.0%
Pt3: Pupil Testing	5.0%	4.9%	0.1%	5.0%	5.0%	0.0%
Pt3: Blood Pressure Measurement	2.5%	2.6%	0.0%	3.0%	3.0%	0.0%
Pt3: Ophthalmic Lens Evaluation	3.8%	3.8%	0.0%	4.0%	4.0%	0.0%
Pt3: Biomicroscopy	8.6%	8.7%	-0.1%	8.0%	8.0%	0.0%
Pt3: Goldmann Applanation Tonometry	5.9%	6.2%	-0.3%	6.0%	6.0%	0.0%
Pt3: 3-Mirror Gonioscopy	4.5%	4.6%	-0.1%	5.0%	5.0%	0.0%
Pt3: Collagen Implant Insertion and Removal	2.7%	2.7%	0.0%	3.0%	3.0%	0.0%
Pt3: Soft and GP Contact Lens Insertion, Evaluation, and Removal	5.8%	6.2%	-0.4%	6.0%	6.0%	0.0%
Pt3: Retinoscopy	5.1%	5.2%	0.0%	5.0%	5.0%	0.0%
Pt3: Distance Subjective Refraction	7.7%	7.8%	-0.1%	7.0%	7.0%	0.0%
Pt3: Heterophoria and Vergence Testing at Distance	2.8%	2.6%	0.1%	3.0%	3.0%	0.0%
Pt3: Accommodation Testing	2.9%	2.8%	0.1%	3.0%	3.0%	0.0%
Pt3: Binocular Indirect Ophthalmoscopy	7.8%	7.9%	-0.1%	7.0%	7.0%	0.0%
Pt3: Dilated Biomicroscopy and Non-Contact Fundus Lens Evaluation	8.4%	8.8%	-0.3%	8.0%	8.0%	0.0%
Pt3: Injections	3.5%	3.1%	0.4%	4.0%	3.0%	1.0%
CPDO: Refractive Status, Sensory Processes, and Oculomotor Processes	8.6%	7.0%	1.6%	5.0%	0.0%	5.0%
CPDO: Normal Health, Disease, and Trauma	91.4%	93.0%	-1.6%	95.0%	100.0%	-5.0%
CPDO: Diagnosis	35.4%	34.2%	1.2%	35.0%	35.0%	0.0%
CPDO: Clinical Correlation of Basic Science Principles	20.3%	20.0%	0.3%	20.0%	20.0%	0.0%
CPDO: Treatment/Management	44.2%	45.8%	-1.5%	45.0%	45.0%	0.0%



Table C2. Comparison of Recent Graduates (n=651) vs. Others (n=450): Condition Importance Ratings

	Mean			Median		
	Others	Recent Graduates	Difference	Others	Recent Graduates	Difference
SENSORY						
Ametropia	3.9	3.9	0.0	4.0	4.0	0.0
Ophthalmic Optics / Spectacles	3.7	3.7	0.1	4.0	4.0	0.0
Contact Lenses	3.9	3.9	0.0	4.0	4.0	0.0
Low Vision	3.0	2.9	0.1	3.0	3.0	0.0
Accommodation / Vergence / Oculomotor Function	3.6	3.6	0.0	4.0	4.0	0.0
Amblyopia / Strabismus	3.8	3.8	0.0	4.0	4.0	0.0
Perceptual Function / Color Vision	3.2	3.0	0.2	3.0	3.0	0.0
Visual and Human Development	3.3	3.2	0.1	3.0	3.0	0.0
NORMAL HEALTH / DISEASE /						
Lids / Lashes / Lacrimal System / Ocular Adnexa / Conjunctiva / Cornea / Refractive Surgery	3.9	3.9	0.0	4.0	4.0	0.0
Lens / Cataract / IOL / Pre- and Post-Operative Care	3.9	3.9	0.0	4.0	4.0	0.0
Episclera / Sclera / Anterior Uvea	3.9	3.9	0.0	4.0	4.0	0.0
Retina / Choroid / Vitreous	3.9	3.9	0.0	4.0	4.0	0.0
Optic Nerve / Neuro-Ophthalmic Pathways	3.9	3.9	0.0	4.0	4.0	0.0
Glaucoma	4.0	4.0	0.0	4.0	4.0	0.0
Emergencies / Trauma	3.9	3.9	0.0	4.0	4.0	0.0
Systemic Health	3.9	3.8	0.1	4.0	4.0	0.0

Table C3. Comparison of Recent Graduates (n=651) vs. Others (n=450): Condition Frequency Ratings

	Mean			Median		
	Others	Recent Graduates	Difference	Others	Recent Graduates	Difference
SENSORY						
Ametropia	3.8	3.9	0.0	4.0	4.0	0.0
Ophthalmic Optics / Spectacles	3.9	3.8	0.1	4.0	4.0	0.0
Contact Lenses	3.5	3.7	-0.2	4.0	4.0	0.0
Low Vision	1.9	1.7	0.2	2.0	2.0	0.0
Accommodation / Vergence / Oculomotor Function	3.0	2.9	0.1	3.0	3.0	0.0
Amblyopia / Strabismus	2.9	2.9	0.0	3.0	3.0	0.0
Perceptual Function / Color Vision	2.1	1.9	0.3	2.0	2.0	0.0
Visual and Human Development	2.2	2.1	0.1	2.0	2.0	0.0
NORMAL HEALTH / DISEASE /						
Lids / Lashes / Lacrimal System / Ocular Adnexa / Conjunctiva / Cornea / Refractive Surgery	3.9	3.8	0.1	4.0	4.0	0.0
Lens / Cataract / IOL / Pre- and Post-Operative Care	3.8	3.7	0.1	4.0	4.0	0.0
Episclera / Sclera / Anterior Uvea	3.6	3.5	0.2	4.0	4.0	0.0
Retina / Choroid / Vitreous	3.3	2.9	0.4	4.0	3.0	1.0
Optic Nerve / Neuro-Ophthalmic Pathways	3.6	3.4	0.2	4.0	4.0	0.0
Glaucoma	3.2	2.8	0.4	4.0	3.0	1.0
Emergencies / Trauma	3.5	3.3	0.2	4.0	3.0	1.0
Systemic Health	3.1	2.8	0.2	3.0	3.0	0.0
Systemic Health	3.6	3.4	0.2	4.0	4.0	0.0

Appendix D – Responses to Open-Ended Questions

"Given the purposes of the NBEO examinations described above, if you have suggestions for condition areas or disciplines you feel are omitted from all of the current assessments, please enter them here"	 Suggested topics to add to exams.doc
"Given the purposes of the NBEO examinations described above, if you have suggestions for condition areas or disciplines you feel should be removed from the current assessments, please enter them here"	 Suggested topics to remove from exar

Note: All responses are taken directly from the typed survey responses. All typos/errors are present in the originals.