

**External Review of the Equivalency of the Licensing Examinations
for Opticians in Canada:
A Report to the National Accreditation Committee of Opticians**

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1.0 INTRODUCTION

In order to meet the increased public demands for competence, continuing competence, and accountability, organizations and agencies responsible for licensing, registering, or certifying their members have implemented testing programs. For example, the Medical Council of Canada, the Royal College of Physicians and Surgeons of Canada, the Canadian Chiropractic Examining Board, and various allied health fields such as Occupation Therapy, Physiotherapy, Speech Language Pathology and Audiology, and Dental Assisting have embarked on testing programs for assuring the competence of the members of their respective professions.

Although many of the examinations are administered at the national level, the right to practice for many of the professions is a provincial matter. Where national examinations exist, provinces, in general, accept the national examinations as a standard for entry into practice. However, provinces may demand additional requirements, such as success on provincially set examinations and/or a satisfactory period of internship or supervised practice. While national exams are usually standardized, objective, and have some modicum of evidence for validity and reliability of the test scores, such might not necessarily hold for all provincial examinations. That is, an exam administered by one province may fall short on standardization, objectivity, and evidence for validity and reliability compared to examinations administered by another province. As a result, provinces may be reluctant to accept successful completion of exams in another province as equivalent to successful completion of their own exams. In such situations, the intention of the Agreement on Internal Trade to reduce or eliminate barriers to the free movement of persons, goods, services, and investments within Canada and the premise that qualified practitioners should be able to practice anywhere in Canada would be violated.

In this regard, the National Accreditation Committee of Opticians (NACO), which consists of representatives of the ten provincial regulatory bodies, issued a request for proposal to determine the equivalency of assessment processes used for licensing opticians across Canada.

2.0 PURPOSE OF THE STUDY

The purpose of the present study is to provide an objective comparison of three assessment processes used for licensing opticians in Canada. The three processes are as follows:

1. The examinations administered by the College of Opticians of British Columbia (BC).
2. The examinations administered by the College of Opticians of Ontario (ON).
3. The National Accreditation Committee of Opticians (NACO) used in Alberta, Saskatchewan, Manitoba, New Brunswick, Nova Scotia, Newfoundland, and Prince Edward Island.

3.0 LIMITATIONS OF THE STUDY

The initial proposal also requested that the assessments used by the Optician programs in Quebec be included in the comparison. However, a letter from Marielle Poirier, vice-president academic College Edouard-Monpetit, to Mrs. Jean Warbucks, Chair, NACO, stated that no

possible comparison was possible between either provincial programs or provincial assessments. No reasons were given as to why such a comparison was not possible. Therefore, for the purposes of this study, assessments used by programs in Quebec were excluded from the analysis.

4.0 RATIONALE AND FRAMEWORK

The comparison is conducted from the perspective of determining the communality of the content assessed by the three different jurisdictions. The comparison also focuses on the degree to which the exam and program assessment development processes conducted by the jurisdictions are equivalent. The critical aspect in the comparison is the process used to develop the examinations and assessments. It is therefore necessary to base such comparisons using a framework for the development of examinations serving a licensing purpose. Typically, meeting the requirements of psychometrically sound testing instruments can be achieved by conducting the following thirteen steps in developing examinations. The activities listed for each step in the thirteen-step process identify the specific objectives while the steps and the activities constitute the process. These steps are adapted from Hambleton (1984), Impara (1995), Browning, Bugbee, and Mullins (1996), and Showers (1999) and are in keeping with the *Standards for Educational and Psychological Testing* developed jointly by the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education (1999).

Throughout the words "test", "exam", and "item" are used in the generic sense.

Examination Development Steps

1. Preliminary Considerations
 - 1.1 Specify test purposes.
 - 1.2 Specify examinees to be tested.
 - 1.3 Develop policy for special assessment accommodations and requirements.
 - 1.4 Identify qualified staff to assist with description and review of the domain, item writing, item review, test specification development, standard setting, key validation, training of clients and examiners, writing of candidate handbook and test proctor handbook.

2. Domain Description
 - 2.1 Conduct a job analysis to determine the knowledge, skills, and attitudes (domain) required to practice the profession. Such an analysis should be targeted at the entry-level professional.
 - 2.2 Describe the domain (This should be a listing of the competencies reflecting the knowledge, skills, and attitudes deemed necessary for entry to practice the profession. The competencies should be stated in observable and measurable terms).
 - 2.3 Review the domain to ensure acceptability, clarity, and relevance.
 - 2.4 Develop a questionnaire based on the list of competencies and survey a representative sample of stakeholders seeking responses to the relevance, frequency of performance, and criticality of each competency.

3. Item Formats and Test Specifications
 - 3.1 Identify the different item formats, (e.g., select response, constructed-response, performance tests, simulations, portfolio, Objective Structured Clinical Examination (OSCE)) that may be suitable for use on the examinations.
 - 3.2 Identify competencies of the domain to be tested by the different examination formats.
 - 3.3 Identify common and high impact situations (if applicable).
 - 3.4 Develop test specifications.
 - 3.5 Develop test blueprint (as a minimum this should be a matrix in which the two axes are represented by content and task).
 - 3.6 Identify any other parameters (e.g., patient/client age and sex, practice setting, area of practice) which may be included in the test blueprint.
 - 3.7 Indicate proportion of examination to be allocated to each axis and each cell of the test blueprint. This should be determined by an Importance Score (e.g., Product of rating for Frequency and Criticality for each competency).
4. Item Writing
 - 4.1 Conduct workshop on principles of assessment and item writing.
 - 4.2 Draft a sufficient number of items for pilot testing.
 - 4.3 Conduct item review and edit.
5. Assessment of Item and Content Relevance
 - 5.1 Identify a sufficient pool of subject matter experts who will review items.
 - 5.2 Review test items to determine their match to the domain.
 - 5.3 Review test items for relevance, importance, representativeness, freedom from bias, and stereotyping.
 - 5.4 Review test items to determine their technical adequacy.
6. Revisions to Test Items
 - 6.1 Based upon data from 5.2 to 5.4 above, revise items accordingly or delete them.
 - 6.2 Design more items if required and repeat step 5.
7. Preparation of Handbooks
 - 7.1 Write handbook for candidates.
 - 7.2 Write handbook for exam proctors.
 - 7.3 Write handbook for examiners (practical exams, OSCE).
8. Monitoring Examination Program
 - 8.1 Determine the type of evidence for validity and reliability that will be collected from the field test administration
 - 8.2 Begin developing a long range plan for validity and reliability studies.
9. Field Test Administration
 - 9.1 Organize the test items into forms for pilot testing.

- 9.2 Prepare test instructions, scoring keys, scoring rubrics for practical exam, answer sheets.
 - 9.3 Select stations from Test Item Library (TIL) for practical exam.
 - 9.4 Hold a training session for practical exam examiners.
 - 9.5 Train standardized patients if practical exam makes use of "real" patients.
 - 9.6 Administer the test forms to appropriately chosen groups of examinees.
 - 9.7 Conduct key validation and item analyses.
 - 9.8 Conduct initial studies on test score validity and reliability.
 - 9.9 Prepare report on field trial administration.
 - 9.10 Plan additional validity and reliability studies.
10. Revisions to Test Items
- 10.1 Revise test administration procedures, test items, scoring rubrics using information obtained for the field test.
11. Test Assembly
- 11.1 Finalize test blueprint.
 - 11.2 Finalize test length and the number of examination forms.
 - 11.3 Select test items from Test Item Library (TIL).
 - 11.4 Finalize test instructions, test booklet layout, scoring keys, answer sheets.
 - 11.5 Select stations from TIL for practical exam.
 - 11.6 Hold a training session for practical exam examiners.
 - 11.7 Train standardized patients if practical exam makes use of "real" patients.
12. Selection of a Standard or Passing Score
- 12.1 Initiate a process to determine the passing score on the examination.
 - 12.2 Conduct a workshop on standard setting.
 - 12.3 Assign tasks to Standard Setting Committee.
 - 12.4 Conduct follow-up activities on tasks assigned in 12.3.
 - 12.5 Select a "back-up" system for passing score should initial passing score produce unreasonable failure rates.
 - 12.6 Develop plans for gathering evidence for the validity of the passing score.
13. Test Administration for Decision-Making Purposes
- 13.1 Design test administration to collect further evidence for test score validity and reliability.
 - 13.2 Administer the test to appropriately chosen groups of examinees.
 - 13.3 Evaluate the test administration procedures, test items, and the evidence for test score validity and reliability.
 - 13.4 Prepare technical reports, candidate feedback letters, feedback letters to programs, institutions, and candidate status reports to client.

For the purposes of the comparison, some of the steps will not apply. For example, Field Test Administration may not apply especially if the testing program has been in place for some time and several administrations of the exam have been held. Note that following each exam

administration, the entire examination development and administration process is reviewed taking into consideration the relevant aspects of the thirteen step process outlined above.

5.0 METHODS

To obtain information about the assessments administered by the three jurisdictions, a questionnaire (see Appendix 1) was developed and forwarded to and completed by the respective personnel at each of the jurisdictions. Basically, the items in the questionnaire request a response and supporting evidence for each of the activities in the test development process outlined in Section 4 above. The development of such a questionnaire is supported by the work of Norcini (1998) who in reviewing the Clinical Component of the Physiotherapy National Examination considered eight issues based in part on the *Standards for Educational and Psychological Testing*. The topics included 1) purpose of the examination, 2) test content, 3) examiners, 4) scoring, 5) passing scores, 6) validity, 7) threats to validity, and 8) documentation. In reviewing the Clinical Component of the Physiotherapy National Examination, Norcini posed several questions for each of the issues. For example, for purpose, the following three questions were asked. 1) Is there an explicit purpose?, 2) Is the purpose clearly stated and tied to a definition of competence?, and 3) Has the purpose been widely communicated? Responses to the questions along with the supporting documentation is then used to determine to what extent principles of assessment are being adhered to in developing, administering, and monitoring examinations that serve a licensing, certifying, or registering purpose. That is, it is a matter of judgment in determining to what extent the supporting evidence is in concert with acceptable testing practices. That judgment can only be provided by someone with an educational background in testing, measurement, and psychometrics and experience in the field of high-stakes assessments.

6.0 RESULTS

The results of the review of the exams and exam processes of the three jurisdictions will be presented as follows:

1. Brief description of the exams.
2. Communalities.
3. Examination development process.

6.1 Brief description of exams

6.1.1 College of Opticians of Ontario

The exams administered by the College of Opticians of Ontario consist of two components - Written and Practical. Three sections comprise the Written component. Written "A" is a select-response format comprised of 100 multiple-choice items. Candidates are allotted 2 hours to respond to items dealing with any aspect of dispensing eye glasses, contact lenses, and sub-normal vision devices and covering topics such as:

1. Anatomy and Physiology of the Eye and Adnexa,
2. Physiological Optics, Geometric Optics
3. Eye Glasses, Lens Design, and Fitting,
4. Jurisprudence,
5. Patient Health Records,
6. Pathology and Pharmacology,
7. Rigid and Soft Contact Lens Fitting,

8. Instrumentation, and

9. Problem Solving.

Written "B", of 3 hours duration, is a constructed-response format and consists of long answer items and essay-type questions dealing with the same aspects and topics as listed above for Written "A".

The third section, Pathology, is 1 hour in length and consists of 20 photographs which deal with pathological conditions of the eye and contact lens dispensing. The task for the candidate is to identify and describe the conditions .

The Practical component consists of seven sections; three sections on eye glasses dispensing and four sections on contact lens dispensing. For eye glasses dispensing, section 1(30 minutes) deals with fitting and measurements. In this section candidates are given a patient model's prescription and a "case study" and the task is to select a suitable frame and to take appropriate measurements. The fit of the frame on the live patient model is to be verified. Measurements may be required for single vision, bifocals, trifocals, and/or progressive lenses. In this section candidates are also required to identify several lenses and measure the base curves and thicknesses of a different set of lenses.

In section 2(30 minutes), Lensometry, the task for the candidate is to measure and record parameters of eye glasses and lenses.

Section 3, Fabrication of single vision and progressive eye glasses (60 minutes), consists of two parts. In Part A, fabrication of single vision eye glasses, the candidate is to perform lensometry, layout, blocking, edging and mounting of single vision lenses. In addition, the candidate is to measure and record base curves of edged lenses. Part B requires the candidate to perform layout, blocking, edging and mounting of progressive style lenses. For both Parts A and B, the candidate is marked for height, lens centre distance, axis, mounting and bench alignment.

Four sections comprise the contact lens dispensing examination. For Section 1, Lens design, (30 minutes), the candidate is required to take and record corneal curvature readings of a patient model. In addition, the candidate is asked to describe advantages and disadvantages of rigid lenses and of soft lenses and to indicate which is preferable and why. Candidate is to record final lens design so as to permit ordering of the lenses.

Section 2, Lens handling, (30 minutes), requires the candidate to interact with a patient model and to teach the patient how to insert or remove hard and soft contact lenses; to instruct the patient on a contact lens care system; to indicate "do's and don'ts" to a live patient model who is a newly fitted client; and to demonstrate the insertion and removal of a soft and a rigid contact lens.

In section 3, Slit lamps, (30 minutes), the candidate has to demonstrate, describe, and explain three slit lamp (Biomicroscope) illuminations. In addition, candidates have to assess both eyes of a "pathology" patient model using the slit lamp, and then to draw, label, and explain the pathological findings. If the patient model displays less pathology, then the examiner is to create, from a master list, hypothetical situations to which the candidate is to respond.

Section 4, Radiuscope, (30 minutes), the candidate is to answer several oral questions related to the Radiuscope and the Adjustment Bucket. The candidate is also required to measure the base curve of a rigid contact lens and to go through the motions for reducing diameter, removing scratches, adding minus power, and adding plus power.

6.1.2 College of Opticians of British Columbia

The licensing exam of the College of Opticians of British Columbia consists of a Practical Exam dealing with eye glasses dispensing registration and with contact lens registration.

Three stations, each of 30 minutes duration, comprise the eye glasses dispensing part of the exam.

Station 1 deals with Lens neutralizing, verification, and identification. In this station candidates are required to perform three tasks: neutralize two pairs of glasses, verify the Rx of one pair of glasses using a lensometer, and identify various uncut lenses by material, characteristic, coating, style, and segment size-style.

Station 2 deals with insertion, adjustment, and repair. Candidates are required to repair a nylon mount frame and insert the lens, to insert lenses and align a metal frame, and to visually and verbally explain recommended adjustments for a set of adjustment problems on an Rx glazed frame either supplied or brought by the candidate.

In Station 3, interpretation and communication, candidates are required to demonstrate how to choose a suitable frame and lens selection for a client based on a client profile which is provided. For a separate client profile, candidates are required to communicate with a client who is having problems becoming adjusted to wearing progressive lenses.

Four stations, each of 20 minutes duration, comprise the contact lens examination.

Station 1 deals with Biomicroscopic Illuminations in which candidates demonstrate skill in setting up four biomicroscope illuminations.

In Station 2, Keratometry, Equipment, and Lens Design, candidates are required to demonstrate skill at preparing and obtaining readings from a keratometer, lensometer, and radiuscope. Candidates are also required to design a pair of gas permeable contact lenses.

In Station 3, Slide Identification, candidates are required to identify slide/photograph slitlamp illuminations, fitting characteristics of contact lenses, types of contact lenses, lens conditions, and various pathologies.

Station 4 deals with Insertion, Removal, and Applied Care Systems. In this station, candidates are required to communicate with a patient and instruct the patient in various procedures in soft contact lens dispensing including care systems of soft lenses. Candidates are also required to insert and remove a soft contact lens. In addition, candidates are required to communicate with a patient and instruct the patient in various procedures in hard contact lens dispensing including care systems of hard lenses.

6.1.3 National Accreditation Committee of Opticians (NACO)

The eyeglasses examination consists of 6 sections. Section 1, Basic dispensing theory, (40 minutes) is comprised of two parts. In Part A, candidates are required to make judgments using written specifications on the accuracy of a number of eyeglasses using a standard tolerance chart that is supplied. Part B is a multiple-choice exam which assesses a candidate's ability to trouble-shoot client complaints related to poorly fitting eyeglasses.

Section 2, Lens duplication (45 minutes) requires the candidate to neutralize lenses using a lensometer, lens clock, thickness calipers, and a PD ruler.

In Section 3, PD measurements and vertex measurement, (20 minutes), a live patient model is provided and the task for the candidate is to measure monocular PD's using both a PD ruler and penlight and a pupilometer. In addition the candidate is assessed on taking a vertex measurement using a vertex distometer. The candidate is also required to take the necessary measurements for a progressive and a flat-top bifocal lens.

Section 4, Lens finishing, (30 minutes), provides to the candidate a frame, uncut lenses, a prescription, and a distance P.D. and requests the candidate to edge a pair of uncut single vision lenses into a plastic frame. The candidate is required to produce a pair of glasses that are within standard tolerance.

In Section 5, Verification, (45 minutes) the candidate is provided with 5 pairs of eyeglasses and the task is to neutralize each pair of glasses to ensure that they correspond to the work order and that the eyeglasses meet standard tolerances.

The final section for eyeglasses, Service, (20 minutes), tests a candidate's ability to place a metal frame into standard alignment and to adjust it properly and to re-insert a lens into a nylon mount frame.

Five sections comprise the contact lens examination. Sections 1, 2, and 3 have two parts to each while Section 5 has three parts. In Section 1, Keratometry and Rx Interpretation, (35 minutes), the candidate is required to check the calibration of the keratometer and then to take readings of a live patient model. In the second part, the candidate is required to analyze corneal contour and to develop contact lens specifications based on a prescription. In addition, the candidate is required to define the corneal astigmatism and to develop specifications for various contact lens types.

Section 2, Pathology and contact lenses, (30 minutes) provides to the candidate a set of photographs and the task for the candidate is to identify various pathologies or contact lens anomalies. In Part B of Section 2, the candidate responds to a series of multiple-choice items based on photographs depicting various pathologies and contact lens anomalies.

In Section 3, Verification and lens design, (70 minutes), Part A requires the candidate to take measurements and to identify the lens design of a series of lenses provided using a radiuscope, lensometer, and diameter gauge. In Part B, the candidate is to analyze a finished contact lens to determine whether it is safe to dispense the lens.

In Section 4, Insertion and removal, (20 minutes), the task for the candidate is to insert and remove a soft and hard contact lens using a live patient model. The candidate is also required to demonstrate how to locate a displaced contact lens by flipping the upper eyelid.

The final section, Follow-up, (55 minutes), requires the candidate to name the condition or identify the cause of a customer's problem. Six case scenarios are provided. In Part B, a case study and a live patient model are provided and the task for the candidate is to perform a routine six-month follow-up examination. In Part C, the task for the candidate is to demonstrate three randomly chosen forms of illumination using the slit lamp.

All three jurisdictions administer exams related to eye glasses and to contact lenses and all three make use of a variety of item formats such as select response items (e.g., multiple-choice), constructed-response (e.g., short-answer, essay, verbal response to oral questions, verbal responses related to education, counseling, and teaching), and demonstrations (e.g., measuring monocular P.D., inserting and removing a contact lens). In the case of the College of Opticians of Ontario, two distinct components - a written and a practical exam constitute the licensing examination. The exams administered by the College of Opticians of British Columbia and the National Accreditation Committee of Opticians do not have a separate, distinct written component, although stations or sections may require written or verbal responses. From the description of the exams it is evident that the amount of time allotted to complete the exams varies across the jurisdictions. Table 1 presents, by jurisdiction, the number of hours allotted to the different components of the licensing exams.

TABLE 1

Jurisdiction	Time (hours) allotted for exam			
	Written	Eyeglasses	Contact Lenses	Total
British Columbia	-	1.5	1.33	2.83
Ontario	6.0	2.0	2.0	10.0
NACO	-	3.3	3.5	6.8

The longest exam is administered by College of Opticians of Ontario. However, of the total of 10 hours, 6 hours is devoted to the written exams. If the written exam is excluded, then the number of hours for the practical component ranges from 2 hours and 50 minutes (College of Opticians of British Columbia) to 6.8 hours for the exams administered by the NACO.

6.2 Communalities

A review of the descriptions of the eyeglasses dispensing examinations administered by the three jurisdictions would indicate that all three assess very similar, if not identical, content and/ or competencies of the Optician domain. Table 2 presents a summary of the major content/ competencies assessed and the respective weight (reported as a percent) assigned to each content/ competency category.

TABLE 2

Content/ competencies assessed by the eyeglasses dispensing examination

Content/ Competencies	Ontario	British Columbia	NACO
1. Lensometry/ Neutralization	Yes 25%	Yes 28%	Yes 27%
2. Verification	Yes 13%	Yes 10%	Yes 12%
3. Identification	Yes 12%	Yes 12%	Yes 13%
4. Finishing/ Blocking/ Edging	Yes 20%	No -	Yes 8%
5. Measurements	Yes 12%	Yes 10%	Yes 10%
6. Service/ Restrung/ Adjustment/ Align	Yes 12%	Yes 20%	Yes 20%
7. Interpretation/	Yes	Yes	Yes

Communication 6% 20% 10%

The percentage weight is an approximation based on the total marks assigned for the category and the total marks assigned for the eyeglasses dispensing examination. From Table 2, each of the three jurisdictions attributes approximately 25% of the Eyeglasses Dispensing Examination to the neutralization of eyeglasses. A review of the station/ section checklists pertaining to Lens neutralization reveals that candidates are required to record values for sphere, cylinder, axis, prism, add power, PD distance, and so on for OD and for OS. In addition, each of the three jurisdictions have linked their station/section exam to a set of competencies. For example, Station 1 of the Eyeglass Dispensing Examination administered by the College of Opticians of British Columbia lists 14 competencies that potentially can be assessed by Station 1. The same pattern of similarity between the three jurisdictions exists for each of the remaining major content/ competency categories listed in Table 2. The only exception is for category 4, Lens finishing/ blocking/ edging. I was unable to determine whether the BC exam tests for these competencies.

Hence, the overall conclusion is that all three jurisdictions perform, to a degree, an equivalent task of testing for competencies associated with eyeglass dispensing. It is, "to a degree" because each of the jurisdictions can argue that they are better than another jurisdiction because, for example, their candidates have to neutralize five pairs of glasses rather than 2 pairs. In responding to such an argument it is necessary to consider several aspects. Every exam is a sample of the domain of interested to be assessed. The adequacy of the sampling is going to be dependent on the detail embedded in the domain description. For example, if a domain lists 400 competencies, it may prove difficult to assess these competencies with a three-hour exam. In order to assess all competencies and to be somewhat confident in the assessment, would require longer exams of longer length. In this regard, each jurisdiction has grappled with balancing the critical competencies to be assessed and the length of the exam. Hence, the College of Opticians of British Columbia lists about 45 competencies that can be potentially assessed in the Eyeglasses Dispensing Exam; the NACO and the College of Opticians Ontario use a slightly smaller set (around 40), although each of the 40 competencies are further defined a lists of about 135 enabling objectives.

Table 3 provides information similar to that provided in Table 2, but for the Contact Lens Examination.

TABLE 3

Content/ competencies assessed by the contact lenses examination

Content/ Competencies	Ontario	British Columbia	NACO
1. Lens Design/ Keratometry	Yes 20%	Yes 13%	Yes 22%
2. Lens handling/ Insertion/ Follow-up	Yes 19%	Yes 25%	Yes 20%
3. Slit Lamp/ Follow-up	Yes 28%	Yes 34%	Yes 23%

4. RADIUSCOPE	Yes 17%	Yes 9%	Yes 20%
5. PATHOLOGY	Yes 16%	Yes 19%	Yes 15%

The contact lens examinations administered by the three jurisdictions assess similar content/competencies. Each of the three jurisdictions link the respective stations or sections to a set of competencies. The exam administered by British Columbia is based on a set of approximately 60 competencies while the exams administered by the other two are based on a smaller set of about 30 competencies. However, the 30 competencies are further defined by about 125 enabling objectives. Although the weights are approximate, it would appear that the contact lens examinations administered by the three jurisdictions are very similar. Likewise, it has to be acknowledged that each exam may have a unique feature in terms of assessment. For example, the NACO exam requires that a candidate be able to demonstrate the "flipping upper eyelid" technique for locating a displaced contact lens.

The claim that the exams for Eyeglasses Dispensing and Contact Lens Dispensing administered by the College of Opticians Ontario, the College of Opticians of British Columbia, and the National Accreditation Committee of Opticians can be considered as being equivalent is made on the following basis.

1. Domain described in terms entry-level competencies.
2. Competencies "validated" by surveying opticians and requesting opticians to respond to questions related to variables such as importance, relevance, criticality, and/ or frequency of performance.
3. Test specifications based on "validated competencies" taking into consideration those competencies that be given a "high" rating for any variable or product of variables listed in 2 above.
4. Stations or sections of the exam designed to reflect the test specifications.
5. Specific candidate tasks or activities to be performed in a station or section linked directly with competencies in domain description.
6. Overall similarity of content/ competencies assessed by the three different jurisdictions.
7. Detail and attention given to exam administration elements such as training of examiners, development of detailed checklists, and development of scoring rubrics.

6.3 Differences

The one difference between the examinations administered by the three jurisdictions is that the College of Opticians Ontario administers a Written "A" and "B" exam. To re-iterate, Written "A" is a multiple-choice format and Written "B" is a constructed-response format. Most certifying processes include a written examination, however, the items appearing on such exams require examinees to apply acquired knowledge to resolve real-world practical problems. That is, these items do not test for the recall of factual information or for isolated facts that were acquired very early in the examinees' program and which have been tested more than adequately by the programs. When written exams are used, their need is expressed in the purpose served by the exam. In the case of the College of Opticians Ontario the purpose of the Written exam is not stated clearly. In situations where a distinct written examination is not required for certification,

the certifying agency will in fact make the statement that this knowledge has been adequately tested by the programs.

6.4 Examination development process

Having made the claim that the exams are equivalent, there are a number of elements of the examination development, administration, and monitoring process that perhaps fall short of acceptance. I make this claim fully aware that most exams "sort of develop", that most of those involved with the various aspects of the exam do not have a strong background in testing and measurement; and that for those who have access to experts in psychometrics, others factors may be of greater importance, thereby precluding the need to address issues such as evidence for validity and reliability, setting of rational passing scores, and the evidence for the validity of the passing scores. In this regard, I will review the Examination Development Steps listed in Section 4 above and outline what I consider to be the strengths and steps that require some action.

As stated in the questionnaire, the degree to which associations responsible for licensing, their members follow a rigid process for examination development, administration, and maintenance varies. Typically, one considers the match between the activities in the exam process (see Examination Development Steps in Section 4 - Rationale and Framework) and the evidence, as provided in the responses to the questionnaire and the supporting documentation, that the activities actually occur.

The following is a summary of the responses made by the chairs to the thirteen steps that comprise the examination development process.

6.4.1 Preliminary Considerations

All three jurisdictions indicated either in writing or verbally that the purposes served by the exams is to protect public safety by ensuring that candidates have performed at a level suitable for licensure as opticians, and that they pose no observable risk to the public. On the other hand, no jurisdiction stated explicitly that the purpose of the exam was to serve as an audit on the programs offered by the educational institutions.

All jurisdictions have committees who are responsible for the design and review of test items, the development of scoring paradigms, and the setting of passing scores. Candidates are provided with a description a description of the exam. The description lists the general topics covered either by each section or each station of the exam. This description is very similar to the description provided in 6.1 above. In this regard, it would be appropriate for each jurisdiction to either develop or review and revise if necessary, a Candidate Handbook that would contain information of topics such as purpose of the exam, eligibility, fees, examination rules, appeals, description of the exam, a set of sample items and stations, and scoring. Such information made available to the candidates will ensure the transparency of the exam process. A request to other certifying/ licensing agencies such as the Medical Council of Canada and the Canadian Alliance of Physiotherapy Regulators for a copy of their Candidate Handbook will provide an example of the type of information contained in such handbooks.

6.4.2 Domain Description

All three jurisdictions replied that the content and the candidate activities to be tested are explicitly stated. The NACO and the College of Opticians of British Columbia each have conducted a job analysis and the competencies have been verified by a broader community of Opticians. The College of Opticians Ontario is currently developing "Proposed competencies for entry to practice". However, much of this document along with the development of their exam

is based on the job analysis conducted by the OAC and the Northern Institute of Technology (Edmonton, Alberta). All three jurisdictions have gone through the process of mapping the verified list of competencies onto the different sections or stations that constitute their exams. In the case of the NACO and BC, this mapping is very explicit; in the case of Ontario, this documentation needs to be more explicit. That is, it is imperative that the competencies tested by each station or section be explicitly listed.

6.4.3 Item Formats and Test Specifications

Developing test specifications is a complex task because test specifications provides information on the matters such as test and item formats, instructions to examiners and candidates, candidate tasks and activities, response formats, conditions for responding, time restrictions, scoring rubrics, properties such as item difficulty, item discrimination, how scores are to be interpreted, and the proportion of the exam allotted to different content areas and competencies (test matrix). While all three jurisdictions do an adequate job of delineating item formats, instructions, scoring, and time allotment, and indicating the proportion of the exam delineated to different major content/ competency categories (Tables 2 and 3), BC adds a second dimension to its test matrix. The second dimension, which I have labeled as Taxonomic Level consists of the three categories of Knowledge, Understanding, and Application. This second dimension is used to guide item and exam development. Although the BC College makes no inferences regarding Taxonomic Level, the categories are useful in making items writers aware of how questions might be structured to tap these different levels. None of the jurisdictions incorporate into their test matrix structural variables such as patient conditions, patient demographics, or practice settings.

6.4.4 Item Writing

All three jurisdictions have a process in place for developing items/ exams/ sections/ stations; item writers are provided with instructions for developing items/ exams/ sections/ stations; and there is a committee to review items/ exams/ sections/ stations. All three jurisdictions offer workshops on various aspects of their exam process, however, I am unaware as to the frequency, topics, participants and so on. However, it is necessary that regular workshops/ seminars be held so as to keep the colleges and the associations abreast of recent developments in assessment.

6.4.5 Assessment of Item and Content Relevance

All three jurisdictions review items/ exams/ sections/ stations. In reviewing items for relevance, all three jurisdictions claim to consider the match between item and content, competencies, importance, representativeness, criticality, and freedom from bias.

6.4.6 Revisions to Test Items Following Exam Administration

All three jurisdictions review items/ exams/ sections/ stations following administration.

The activities associated with 6.4.2 (Development) to 6.4.6 (Revisions to Test Items Following Exam Administration), require input from subject matter experts. All three jurisdictions indicated that committees were in place to assist with these activities. However, the documentation regarding the qualifications, experience, and relevant education and training was not necessarily complete across all three jurisdictions. All three jurisdictions are making concerted efforts to include in their committees representation from instructional programs and from practice.

Obviously, the inclusion of instructors from programs raises issues of exam security. However, I would suggest that efforts be made to include instructors and that the choice of instructors be judicious. It is important that the certification process be seen as a partnership between programs and the certifying agency.

6.4.7 Preparation of Handbooks

I have alluded earlier to the need for handbooks not only for candidates but for others such as examiners and item writers. Handbooks need to be reviewed and revised on a regular basis. Typically, such reviews are conducted every three years or so.

6.4.8 Final Test Assembly and Information to Candidates

Each of the three jurisdictions uses a committee to select items/ stations for the respective exams. Examiners who serve as patients or people who serve as live patient models are trained and coached on how they are to act and respond. With respect to the practical exams, all three provide checklists that are used by examiners for recording the observed behavior of each candidate. BC and NACO have very detailed information for examiners regarding the purpose of each station, the tasks, required equipment, instructions for administering the station, scoring, and so forth. Instructions to candidates are also detailed and explicit. Information provided by Ontario is not as detailed. Model responses or appropriate responses are provided for examiners/markers.

6.4.9 Passing Score and Equating

Ontario uses an absolute passing score which is 70% for each section of the exam except for Lensometry which has a passing score of 80%. The model is disjunctive, that is, candidates must pass each section. I would caution use of this approach. The number of items that constitute some of the sections is small thereby compromising the reliability of pass/fail decisions.

BC, likewise, uses an absolute passing score which is 75% for the eyeglasses dispensing and for the contact lens exam. However, the model is compensatory. For example, although there are three stations comprising the eyeglasses dispensing exam, the candidate has to achieve an overall score of 75% or higher to pass. That is, a candidate can compensate for poor performance on one station by doing well on the two other stations.

NACO has different passing scores for the eyeglasses dispensing (67%) and for the contact lens (68%) exams. Both passing scores are derived from using a test-centered method attributed to Angoff. The model is also compensatory. For example, for the eyeglasses dispensing exam, which consists of 6 sections, a candidate has to achieve an overall score of 67% or higher to pass. Poor performance on one or two sections/ stations can be compensated for by doing well on the other sections.

The setting of a rational passing score is a difficult task. The task of setting a passing score is arbitrary and it requires judgment. There is no true passing score. Yet it is this score that determines who passes and who fails and it is this score that jurisdictions use to praise the laurels of the purposes served by their exams. Somehow there is a mistaken notion that the higher the passing score, the more professional the occupation. I would venture a guess that the three jurisdictions (Ontario, BC, and NACO) will argue that because the passing scores differ, the claim that the examinations are equivalent cannot be substantiated. However, the use of absolute passing scores (for example, 75%, 70%) and specifically passing scores which are set above the mean of the test scores, can hardly be justified. In this regard, all three jurisdictions

would profit from reading Cizek (2001). Assuming that most of the candidates are graduates of accredited optician programs in the country, it is somewhat troubling to see high failure rates for some of the exams. It behooves the jurisdictions to determine the cause of the high failure rates. Is it due to poorly prepared candidates?, is it due to candidate characteristics (age, language barriers, lack of familiarity with the exam format)?, Is it due to lack of standardization in exam administration?, Is it due to unusually difficult exams?, Is it due to unreasonable expectations (high passing scores)? Or is due to some combination of all of these factors? In this regard, jurisdictions should be gathering information to answer the above questions.

None of the jurisdictions either equate exam scores across administrations or adjust the passing scores taking into consideration the variation in exam difficulty (mean scores) across different administrations. All jurisdictions would benefit from reading the book edited by Impara (1995).

6.4.10 Monitoring the Exam

While all three jurisdictions indicated that there is an on-going program for the evaluation of test administration procedures, test items, and evidence for test score validity and reliability, all three jurisdictions, except for BC, had difficulty producing such information. There is also a mistaken belief that determining the worth and value of an exam (evidence for validity and reliability) is a "one-time" activity. That is, if evidence has been provided for one exam administration, there is no further need to continue with analysis of future exam administrations. This is hardly the case. Monitoring the worth of the exam is an on-going activity. For example, I suspect that the reliability of the test scores is fairly low (probably in the 0.50 - 0.60 range). Such coefficients are too low for high-stakes examinations. The reliability of test scores can be increased by either increasing the number of items/stations on an exam or sub-dividing the items appearing in a station into meaningful sub-tests. BC has in fact done this resulting in an improved reliability estimate.

With respect to the development, administration, and monitoring of examinations, I would suggest a reading of the references listed at the conclusion of this report.

7.0 CONCLUSIONS

The licensing examinations administered by the College of Opticians of Ontario, the College of Opticians of British Columbia, and the National Accreditation Committee of Opticians are equivalent. The descriptions of the various sections comprising each of the exams suggest strongly that all three jurisdictions are assessing the same or similar content and competencies and all three jurisdictions follow, to a degree, some sort of a process to develop, administer, maintain, and monitor their exams.

Overall, the strengths of the exams administered by the three jurisdictions reside in well-described and validated domains, the development of practical stations that are linked to the competencies identified in the domain (an indicator for the content validity of the exam), the training of examiners, the development of scoring paradigms (the latter two reduce threats to validity), and the initial stages of monitoring of the exam process.

Improvements in the process should be directed towards the following -- 1) making explicit the purpose served by the exam, 2) providing a defensible rationale for the method used in setting the passing score, 3) providing a defensible rationale for what comprises a scoring unit for making pass/fail decisions (e.g., does the examinee have to pass every section, or does the

examinee have to pass the eyeglasses and the contact lenses parts, or does the examinee have to pass an exam?), and 4) developing a plan of action that spans several years and deals with monitoring the exam and research.

Considering that certification exams for opticians is a recent endeavor, I would expect that weaknesses in the processes will be corrected over the next year or two.

8.0 RECOMMENDATIONS

Throughout the report, I have indicated areas that require some additional work. In addition to these I would make two other global recommendations.

1. In order to progress toward the assurance that candidates are being examined to a common standard, the three jurisdictions should pool their resources and develop a national exam for the licensure of opticians. There is no need to have three separate jurisdictions trying to accomplish the same goal. Build on the strengths of each jurisdiction.
2. Seek consulting services from testing experts.

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