

Report on the Standard Setting Process for the Dispensing Examination

28 September 1998

Prepared for: National Accreditation Committee of Opticians (NACO)

Prepared by: Assessment Strategies Incorporated

Introduction

On 19-20 September 1998, ten opticians representing all regions of Canada participated in the development of a criterion-referenced standard for the dispensing portion of the NACO examination. Assessment Strategies was selected by NACO to assist in the development of this standard whose primary role was to provide the testing expertise and to facilitate the various standard setting activities. A modified version of the Angoff methodology was used to set the standard. Appendix A provides a summary of this procedure.

Committee Participants

In order to ensure that the standard represented the interests of opticians across Canada, the standard setting committee was carefully selected to ensure appropriate regional representation. All of the participants are considered to be experts in their field and actively participated in all phases of the process. The following table provides the participants' names and jurisdiction that they represent.

Participant	Jurisdiction
Mr. Glen Oxenbury	British Columbia
Mrs. Maureen Hussey	Alberta
Mrs. Diana Hicks	Saskatchewan
Mrs. Jodi Dodds	Manitoba
Mr. Norm Eggett	Ontario
Mr. Robert Grimard	Québec
Mr. Stefan Bohnsack	New Brunswick
Mrs. Marilyn O'Hara	New Brunswick
Mrs. Marlene Bayers	Nova Scotia
Ms Marian Walsh	Newfoundland

The Standard Setting Process

During the first two hours of the meeting, Assessment Strategies lead an exercise designed to orient participants to the concept of a borderline or minimally competent entry-level optician (see Appendix B for an outline of the process and information presented). Participants defined the domain of an entry-level optician, their roles and responsibilities, and the knowledge, skills and abilities of a fully competent, incompetent, and finally, the minimally competent candidate. The purpose of this exercise was to encourage participants to fully explore acceptable and unacceptable performance and to promote a consistent definition of minimally competent across all participants. All committee members were active in these discussions and concluded that there appeared to be a consistent interpretation of a minimally competent entry-level optician across all committee members following the exercise.

Having reached a consensus on the knowledge, skills, and abilities of a minimally competent entry-level optician, the committee proceeded to set the standard for the dispensing portion of the NACO examination. Throughout the remaining two days of the meeting, the participants addressed the following question for each section of the examination:

What percentage of minimally competent candidates will get this section of the examination correct?

Participants proceeded to evaluate the examination, section by section. For each component, every participant provided an estimate of the percentage of minimally competent candidates who would answer or perform the component correctly based on the definition of minimally competent. To illustrate, the following example is provided:

Station 1 Part A: Basic Dispensing Theory

Candidates are asked to consider a situation where lenses are ordered from a lab. The specifications for the order are provided (i.e. OD, OS, and PD). Upon receiving the lenses, the actual specifications are provided. Using the standard tolerance chart supplied, the candidate is asked to determine whether they would accept or return the glasses to the lab. If the candidate recommends returning the glasses to the lab, they are asked to provide the reason for this action.

For each example, the standard setting committee participants provided their best estimate of the percentage of minimally competent candidates who would correctly respond to the situation. If the lenses were to be returned to the lab, the committee participants were asked to estimate the percentage of minimally competent candidates who would correctly identify the reason for returning the lenses to the lab.

Following each rating by the committee participants, their estimates were recorded in a spreadsheet format. If any of the estimates differed by more than 30% (e.g., Rater 1 believes that 80% of the minimally competent candidates will get the question right whereas Rater 7 believes that only 40% will get it right), the rationale for each rating was discussed and following this discussion, all participants were provided an opportunity to change their rating based on the information presented. To arrive at the standard for each station, the ratings were averaged across all committee participants and sections within each station.

Findings

Appendix C presents a table that provides the average rating for each committee participant for each section within a station. All of the ratings for Station 1 have been provided. The maximum score for each section is also provided, along with the mean score and the resulting cutoff score or standard.

Looking at Table 1, Station 1 had two sections with a maximum score of 38 points. The standard committee participants set the standard for this station at 64.23 percent or 24.41 points. The total percentages for each section have been appropriately weighted to reflect the number of questions within each sub component.

In looking at the average score for each rater at the bottom of the table, only one set of ratings could be considered extreme (e.g., an average rating of 55.88% compared to the next lowest rating of 63.85%). This difference is significant and could be considered an outlier. It is recommended that NACO discuss with this rater (i.e., Glen Oxenbury) the reasons for this lower rating to explore whether there is reason to believe that candidates from British Columbia would be expected to perform at a lower level compared to the national average. If it is suspected that the exam disadvantages candidates from British Columbia, the reasons need to be identified and addressed immediately. If, however, there is no reason to believe there will be a significant difference in performance, NACO must then decide whether to drop Glen's ratings when calculating the standard. Such a decision would likely require the involvement of the entire standard setting committee with clear explanations as to why the differences in ratings might have occurred. Appendix D provides the average ratings with Glen's ratings excluded.

Next Steps

Assessment Strategies recommends that this report be disseminated to all committee participants for their review. In particular, the participants should carefully consider the percentage required to pass each section and either approve or reject the standard. It is important to note that the Angoff procedure provides one piece of information to the standard setting process. If committee participants have access to other information that should be considered when setting the standard, this information should be presented and explored to arrive at a final decision as to what the standard should be.

Another issue that was identified during the meeting that also deserves consideration is the requirement that the candidates must pass all sections to be successful. In principle, Assessment Strategies supports this approach given that a candidate may be extremely unsafe to practice in one component that might otherwise be overlooked if only the total score is used for pass/fail decisions. However, some stations have very few questions (e.g., Station 4 is worth only 20 points) which is likely to result in an unreliable estimate of a candidate's ability. Due to this potential unreliability, it is highly likely that inaccurate decisions are being made on a candidate's ability for at least one of the six stations. NACO is encouraged to explore this issue.

A second issue that was identified during the course of the two-day meeting is that the examination needs to be studied again to ensure that there is standard terminology throughout the examination that can be clearly understood by all candidates across Canada.

Finally, when establishing the standard, there were several discussions regarding whether or not a candidate could receive part marks and what would they need to do to receive partial credit. Station 6 presented a few examples where the committee disagreed with what was required to get part marks (i.e., the fitting component) resulting in a very low standard for this section. Furthermore, it would appear that the decision is left to the discretion of the scorer without any concrete guidelines. Again, NACO is encouraged to explore this issue and reach a resolution that is acceptable for all interests.

Conclusion

The Standard Setting Committee was extremely effective in defining the minimally competent candidate and openly participated in all areas of the standard setting process. As a result of their efforts, NACO has a defensible standard that is more closely linked to acceptable performance when compared to previous standards. NACO is encouraged to continually monitor this standard and revisit it when new information becomes available that could improve the accuracy of the decisions made.

*The Angoff Method of Standard Setting
for Licensure and Certification Examinations*

Introduction

Many health and health related agencies require licensure for their professionals as one means of assuring the quality of practice. As a standardized examination is often a requirement for licensure, determination of an appropriate pass mark for the examination is essential to the effectiveness of the process.

Relevant Issues

Setting a pass mark for an examination is setting a standard of performance on which decisions will be made about an individual's level of competence in a given field of practice. The pass mark determination is a judgment made by informed individuals (i.e., experts in the field of practice). It is determined through a rational discussion of the field of practice as well as an awareness of the consequences involved when a decision affecting individuals is made.

The Pass Mark and Consequences

Whenever a pass mark is determined for a licensure examination, there are a number of potential consequences that must be anticipated: an inappropriately low pass mark will allow non-competent candidates to practice, perhaps at the expense of the public welfare; an unrealistically high pass mark will exclude competent candidates from being licensed.

The accuracy and precision of the measuring instrument (i.e., examination validity and reliability) must also be considered. Examinations are not perfect: they cannot include all the knowledge and skills in a given field of practice. An examination can only sample the field. Furthermore, if it were possible to repeatedly administer the same examination to a single candidate 100 times, the candidate's score would likely not be exactly the same each time. The inconsistency of the scores is a result of the reliability of the examination and the variables affecting candidate performance (such as anxiety level and health).

The Angoff Method

The Angoff method requires expert judges to discuss the issues involved in determining a pass mark and to evaluate the examination by using a well-defined and rational procedure.

1. Competence and the Borderline Candidate

The Angoff method is based on the concept of the borderline or minimally competent candidate. The minimally competent candidate can be conceptualized as the candidate possessing the minimum level of knowledge and skills necessary to perform at a licensure level. This candidate performs at a level "on the borderline" between acceptable and unacceptable performance. It is essential that each judge arrive at a clear and specific definition of the minimally competent candidate.

To better understand the concept of the minimally competent candidate, it is often helpful to think of the people you work with everyday; a few of them are the "superstars" performing at a level well above the majority, while others perform rather poorly and perhaps should not be practising. Somewhere between these two extremes is the group that performs at the level of minimum competence. The borderline candidate belongs to the group that just qualifies for licensure.

2. Rating the Items

The Angoff method requires the judges to independently rate each item in the examination in terms of the minimally competent candidate. For each item, each judge answers the question: "In your opinion, what percentage of minimally competent candidates will answer this item correctly?" Alternately phrased, "Given 100 minimally competent candidates, how many will answer this item correctly?" The judge then indicates the appropriate percentage on the rating form and proceeds with the next item.

One common error made when rating items is to base the rating on the average candidate or the exceptional candidate rather than on the borderline candidate. Another potential error involves the interpretation of the question asked for each item. The items are to be rated in terms of how many borderline candidates will answer the item correctly. In a large group of borderline candidates, only some may actually know the correct response. It should not be assumed that all borderline candidates will know the answer. Finally, although item statistics may be used to provide additional information to the judges, the ratings should not be based solely on these statistics; item statistics are calculated on the entire candidate population, not on the borderline group alone.

3. Determining the Pass Mark

Once all the judges have rated each item in the examination, the ratings are collated and tabulated. The ratings for any single item should be in agreement. By agreement it is meant that the ratings for an item must all be within a certain percentage range (e.g., a 30% range). If the range of the ratings is greater than the specified range, the judges providing the extreme ratings are asked to explain why they rated the item in that fashion. The other judges should explain why they rated the item as they did. If a brief discussion of these reasons does not cause any of the judges to change their ratings, the ratings should be left as they are. Once the discussion has ended, the average rating is calculated for each item and then for the total examination. This results in a percentage value which is the percentage score expected to be achieved by the borderline candidate. In addition to the expert ratings, a variety of relevant data is carefully considered to ensure that the standard that examinees will be required to achieve is valid and fair. This can include information on the preparation of new graduates, data on the performance of examinees on previously administered examinations, and pertinent psychometric findings. Based on all of this information, a point is set on a measurement scale that represents the minimum acceptable standard.

As an illustration of the rating process, consider a fictitious application of the Angoff method, with a panel of six judges setting the pass mark on a four-item exam. Following the orientation session, the judges provide independent ratings on each of the items in the exam. The ratings obtained are presented in Table 1. With a 30%-rule specified to define the target level of agreement, items 1, 2, and 4 require no post-rating discussion (i.e., for each of these items, the extreme ratings do not differ by more than 30%). Item 3, however, is identified as requiring discussion because of the 40% difference in the ratings of Judge 3 and Judge 5 on this item. As a result of the discussion, Judge 3 decreases her rating from 85% to 75% and Judge 5 increases his rating from 45% to 50%. The average ratings are then calculated for each item, and the average of these values is calculated, to arrive at an overall pass mark of 69%.

Table 1: Example of the Angoff Method

Item #	Judges' Ratings (%)						Average Rating
	Judge 1	Judge 2	Judge 3	Judge 4	Judge 5	Judge 6	
1	65	70	65	65	70	65	67
2	85	70	60	80	70	80	74
3	70	65	85→75	70	45→50	70	67
4	75	60	65	70	75	70	69
Overall Average Rating							69

4. Factors for Successful Implementation

A number of factors contribute to the successful implementation of the Angoff method. An effective training session is essential in orienting the judges to the concept of the minimally competent candidate. As well, discussion and modification of extreme ratings help ensure that a defensible and valid cutoff score is established.

Summary

The Angoff method allows expert judges to determine an appropriate pass mark for an examination, based on a discussion of the issues involved in licensure and their assessment of the examination. A major advantage to this methodology is that the determined pass mark is based on the content of the examination and not on group performance.

National Accreditation Committee of Opticians

Standard Setting Meeting
Minto Suites
September 19 - 20, 1998

STANDARD SETTING

OPTICIAN

- The Domain

THE OPTICIAN

- Roles and Responsibilities

THE COMPETENCE CONTINUUM

- Competence, Incompetence, and Minimal Competence

STANDARD SETTING

STANDARD SETTING

- Minimal Competence and the Borderline Candidate

THE ANGOFF METHOD

- Determining the Passing Score

THE DOMAIN OF OPTICIANS

Providing Health Care to the Client
Through:

Assessment

Planning

Intervention and Maintenance

Evaluation/Outcomes

Advocacy

Quality Assurance

THE DOMAIN OF OPTICIANS

Providing Health Care to the Client
Through:

Ethics

Research

Referral/Collaboration

Education

Community Development

Optometric Issues

ROLES AND RESPONSIBILITIES

The Optician Beginning to Practice:

Health Care Provider

Counselor

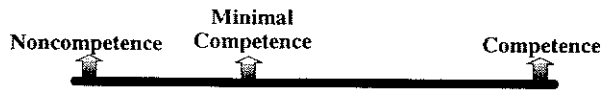
Administrator/Manager

Multidisciplinary Team Member

Researcher

Marketing Representative

THE COMPETENCE CONTINUUM



COMPETENCE/MASTERY

Opticians Beginning to Practice Fulfill Their Role Professionally by:

- predicting outcomes
- anticipating complications
- respecting confidentiality
- seeking knowledge and integrating it into practice
- working collaboratively with the client and other members of the health care team
- teaching the client
- making decisions independently (selecting the most appropriate option)
- mastering communication skills
- initiating education of other health professionals

COMPETENCE/MASTERY

Opticians Beginning to Practice Fulfill Their Role Professionally by:

- promoting health and safety
- setting/performing/maintaining high standards of care
- performing confidently within their limitations
- having awareness/complying with regulatory standards
- thinking critically
- adapting to change
- implementing creative solutions
- translating science into practice

NONCOMPETENCE

Opticians Beginning to Practice Do Not Fulfill Their Role Professionally by:

- making errors without recognizing them
- making errors without learning from them
- not applying past experience
- avoiding/not making decisions
- not recognizing/reporting changes in client health status
- not being able to work collaboratively
- not asking for help when needed
- not being able to perform technical skills safely
- demonstrating inappropriate communication skills
- practicing unethically

NONCOMPETENCE

Opticians Beginning to Practice Do Not Fulfill Their Role Professionally by:

- not recognizing their own deficiencies/limitations
- not being receptive to advice/criticism
- not upgrading skills/pursue further learning
- lacking/disregarding quality assurance
- lacking knowledge/skills
- not being able to apply knowledge to new situations
- failing to assess outcomes
- lacking the ability to recognize self-limitations/knowledge deficits

MINIMAL COMPETENCE

Opticians Beginning to Practice Fulfill Their Role Professionally by:

- learning from/seeking experiences
- demonstrating potential for growth
- developing counseling skills
- asking for help and support in decision-making
- providing health care through maintenance and minimal promotion and education
- practicing within the standards/scope of practice
- basing practice on caring

MINIMAL COMPETENCE

Opticians Beginning to Practice Fulfill Their Role Professionally by:

- understanding obvious points, but missing subtle points
- evaluating own performance with assistance/feedback
- applying basic knowledge
- managing/organizing time somewhat effectively
- accepting accountability
- documenting according to standards/legal requirements

THE ANGOFF METHOD

Determining the Passing Score

THE BORDERLINE CANDIDATE

- Possesses the qualities of a minimally competent optician beginning to practice.

ASSIGNING PERCENTAGES TO TEST ITEMS

- In your opinion, what percentage of minimally competent opticians beginning to practice will be able to answer the target test item correctly?

THE ANGOFF METHOD

AGREEMENT AMONG RATERS

- Percentages across raters should not exceed a 30% range (e.g., 60% to 90%; 65% to 95%)

CALCULATING THE PASSING SCORE

- Take the average across raters and the average across items.