PHARMACY PRACTICE

Pharmacy Examining Board of Canada Revises Blueprint for Qualifying Examination

K. Wayne Hindmarsh, John Creasy and Sheila Kelcher

In 1956, a committee of the Canadian Conference of Pharmacy Faculties (now known as the Association of Faculties of Pharmacy of Canada), chaired by W.C. MacAulay, submitted a report to the Canadian Pharmaceutical Association (CPhA) suggesting a National Pharmacy Examining Board was "a most feasible method of certification for any plan of interprovincial licensing." The committee recommended CPhA make a start toward setting up the machinery for a self-financed National Board. On December 21, 1963, Royal Assent was granted for the birth of the Pharmacy Examining Board of Canada (PEBC).[1] The advantages of this National Board were stated as: (i) it will assure the development and maintenance of uniformly high academic standards for pharmacy across Canada; (ii) it will place pharmacy, in one more respect, on the same basis as its sister professions, medicine and dentistry; (iii) it will give pharmacy added prestige in the eyes of governments, of the Canadian public and, in fact, internationally, and; (iv) it will provide the best possible process for the transfer of the few pharmacists who at some time move from one province to another.[1] Today, except for the provinces of British Columbia and Quebec, PEBC certification is required (or is part of new draft legislation) of all for licensure. A similar process exists in the United States. Most states require NABPLEX certification which is achieved through examinations provided by the National Association of Boards of Pharmacy.

Since the birth of PEBC in 1963, the examination process has undergone numerous changes. For example, the first sitting held in May 1965 was composed of six written examinations and one practical. These included three hour examinations in Pharmaceutics, Pharmaceutical Chemistry, Pharmacology, Pharmacognosy, Pharmacy Administration, Basic Sciences Comprehensive, and Compounding and Dispensing (Practical). Only 25 candidates from across Canada, sat for these first examinations. In 1966, 1967, and 1968 the numbers did not increase noticeably - 35, 22, and 34, respectively. It was apparent that Canadian graduating students in those years did not feel the necessity for PEBC registration. Unfortunately for many who later wished to move to another province, it was then necessary to qualify by passing the examinations some years after they had graduated. In 1970, the number of examinations decreased to three - Pharmacy I (Pharmaceutics and Pharmacy Administration), Pharmacy II (Pharmacology, Pharmaceutical Chemistry, and Pharmacognosy) and Pharmacy III (Pharmacy Practice). The latter was an open book "practice oriented" examination. This format was responsible for an improved acceptability by students. In 1974, there were three examinations - Pharmacy I, Pharmacy II, and Pharmacy III (Pharmacy Practice) written as four parts. All three examinations were multiple choice papers with Pharmacy III having an additional section containing eight pre-

K. Wayne Hindmarsh, Ph.D. is Dean, Faculty of Pharmacy, University of Manitoba, Winnipeg, Manitoba and Chair of the Panel of Examiners of the Pharmacy Examining Board of Canada (PEBC).
John Creasy, B.Sc. (Phm) is Registrar-Treasurer of PEBC, Toronto, Ontario.
Sheila Kelcher, B.Sc. (Pharm) is President of PEBC and Lecturer, Faculty of Pharmacy and Pharmaceutical Sciences, University of Alberta, Edmonton, Alberta.
Address Correspondence to: K.W. Hindmarsh, Ph.D., Faculty of Pharmacy, University of Manitoba, Winnipeg, Manitoba R3T 2N2.

scriptions for which the responses were hand-written and subsequently manually graded. This marked the introduction of the first computer scored examinations and the first introduction of clinical - "case or patient profile-type" questions, i.e., the patient history was given and questions were directed towards the therapy of that patient. The next year, 1975, marked the end of the short and long answer component. There are now only three examinations composed of multiple choice questions. In 1980, there were two examinations, but three papers - Pharmaceutical Sciences (formerly Pharmacy I and Pharmacy II) and Professional Pharmacy Practice (an open book "case study" examination). Finally, in May 1986, one examination, consisting of three papers, was introduced. This examination was also referred to as the "Qualifying Examination" (the qualifying examination of the Pharmacy Examining Board of Canada (PEBC) is intended to evaluate the ability of the candidates to apply their knowledge and understanding of current pharmaceutical education to practice situations). Many of the old Pharmaceutical Sciences questions, used up to this point in time, were transferred to what became known as the "Evaluating Examination". This latter examination is used to assess the equivalency of foreign pharmacy graduates to graduates of pharmacy programs in Canada, i.e., are their undergraduate programs similar to those obtained in the Faculties of Pharmacy in Canada?

Since 1987, the Qualifying Examination has been entirely closed book and is comprised of a single response format. The questions are either "Type A" or "Type K" format. For both types of questions only one response is recorded on the answer sheet. With Type A there are five options and the candidate marks the most appropriate statement, whereas in Type K, one or more of the three given statements are correct and candidates have the option of marking one of the following five options: Statement I only; Statement III only; I and II only; II and III only; or I, II, and III are correct. Approximately 90% of the 600 current Canadian graduates writing the PEBC Qualifying Examination each year obtain a passing grade. Foreign graduates who pass the Evaluating Examination perform equally as well as the Canadian graduates when they subsequently sit for the Qualifying Examination.

The progression of the development of what is now known as the Qualifying Examination, although interesting, did not provide for an effective process of evaluation. Was the Qualifying Examination focusing on what the pharmacist is required to be able to do on the job and was it assessing the competence to practice safely, and not just assessing academic achievement? A consultant (Ph.D.), with expertise in testing and measurement, was hired to assist PEBC in this process. In 1987, Dr. Lawrence W. Klein submitted his final report to the Board - "An Evaluation of Two Examinations Developed by the Pharmacy Examining Board of Canada."[2] Dr. Klein confirmed our impressions and summarized his findings as follows: "The single most important observation that I can offer is that both examinations (i.e., the Qualifying and Evaluating Examination) currently appear to be collections of questions, rather than purposefully assembled examinations."[2] It was obvious, from his report that there was a lot of work to do.

Dr. Klein provided recommendations for consideration by PEBC. These recommendations were summarized under seven headings:[2]

1. **Test Plan**: A competency-based test plan needed to be developed that reflects what an entry-level pharmacist is required to do on the job and that relates to protection of the public.
2. **Item Development**: Care should be taken to ensure that the questions are practice related.
3. **Item Refinement**: Newly developed questions should be edited to eliminate ambiguity, grammatical flaws, and stylistic inconsistencies, in order to ensure the candidates will not be confused or tricked by the questions.
4. **Test Assembly**: Each examination should be assembled to meet the specifications of the approved test plan.
5. **Pass/Fail Standards:** A criterion-referenced pass/fail standard should be established.
6. **Maintaining the Pass/Fail Standard**: After the criterion-referenced pass/fail standard has been established it may be maintained over time by equating each new version of the examination to one or more previous examinations, as long as a sufficient number of candidates take the test.
7. **The Item Bank**: The existing item bank should be supplemented by storing the statistical history of each question (i.e., how well the students did on each question each time it was included in the examination) in addition to the text.

METHODOLOGY

The Committee of Examinations and the Board of PEBC agreed to proceed with the recommendations of the Klein report. A document delineating the major tasks performed by entry-level pharmacists in Canada was developed and circulated to provincial Pharmacy licensing bodies, Faculties of Pharmacy, as well as other professional Pharmacy organizations. This resulted in the development of a survey tool. The StratQuest Group Limited (Mississauga) was subsequently contracted to conduct a survey of pharmacists across Canada.

A pilot study of the PEBC Board members was initially conducted in order to "fine tune" the survey tool. A stratified random sample of 1,000 pharmacists from the approximately 19,000 registered in Canada was then surveyed. The sample was selected randomly from practicing pharmacists according to the following criteria: a) by province - proportions based on 1992 data provided by the provincial registrars; b) by employment - community versus hospital (3:1 ratio) and c) by year of licensure - registered within the last 10 years. As it was desired to target the younger professional (so that it was possible to determine the tasks performed by a pharmacist entering the profession), the sample was stratified according to year of licensure using the file data from the provincial registrars. Of the surveys returned, a random sample of 468 was selected and processed.

The instrument design asked respondents to rate firstly the Criticality of all practice statements (i.e., what degree of harm, or potential for harm, would result from the failure of an entry-

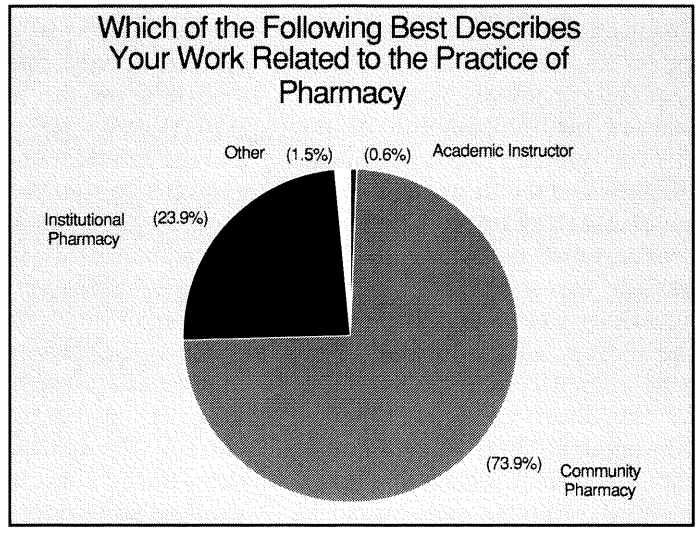
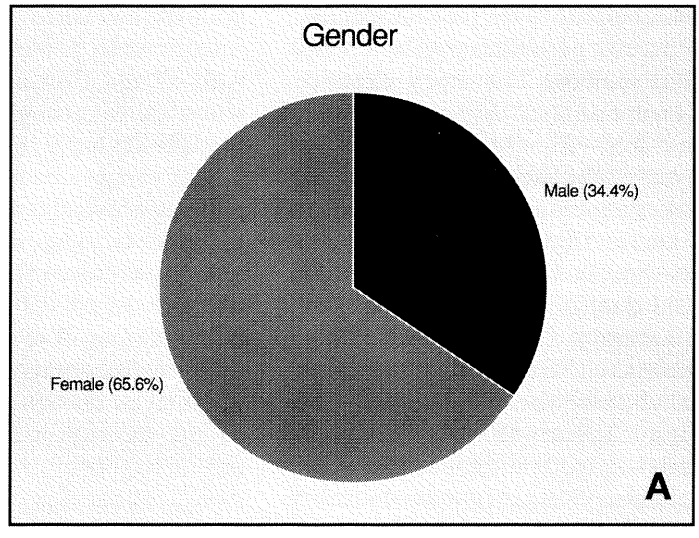
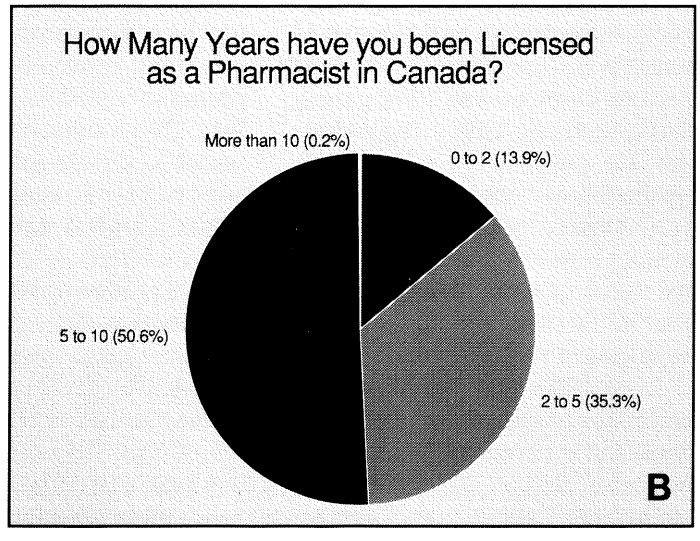
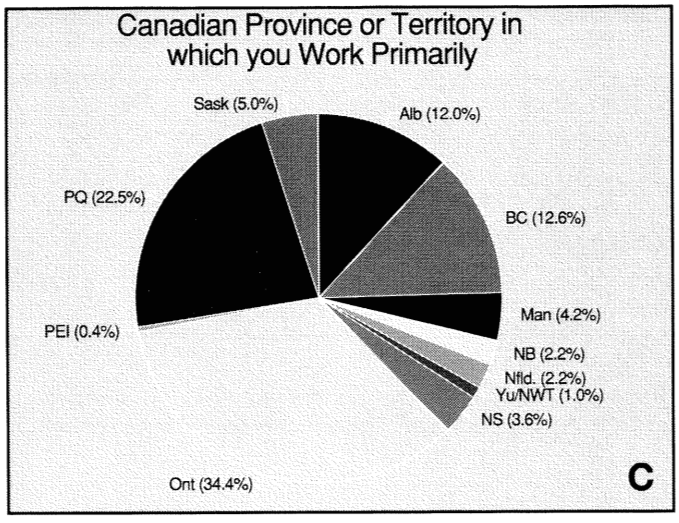


Figure 1: Demographic Summary for respondents (n=468)







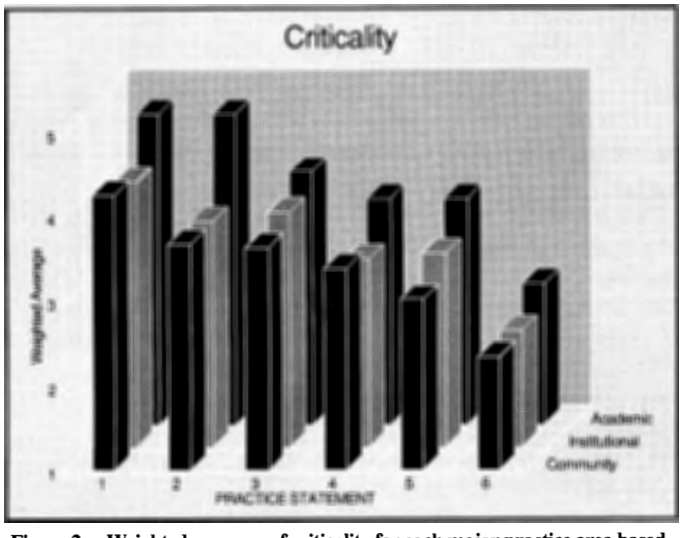


Figure 2: Weighted averages of criticality for each major practice area based upon employment.

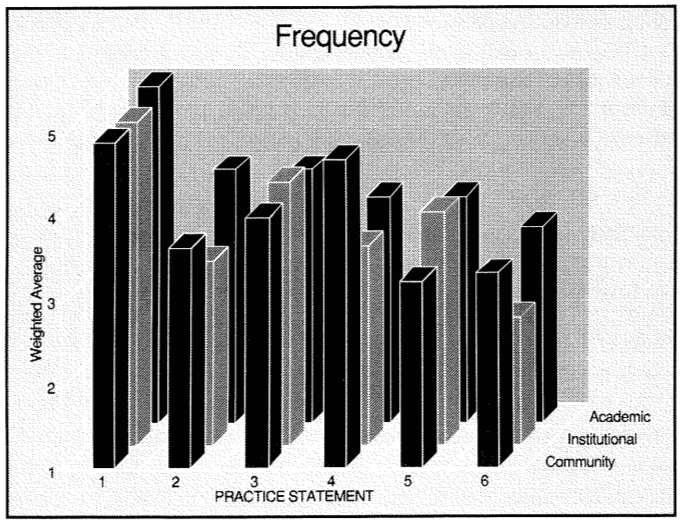


Figure 3: Weighted averages of frequency for each major practice area based upon employment.

level pharmacist to demonstrate competence in applying the knowledge, skill, and abilities reflected in the task statement?), and then the Frequency of each activity (i.e., How frequently would an entry-level pharmacist be required to perform the task?). The final survey instrument identified six major Practice Areas and 21 individual task statements that characterize pharmacy practice in Canada (Table I).[3]

RESULTS AND DISCUSSION

The overall survey response rate was 63%. The ratio of female to male respondents was approximately 2:1 (Figure 1-A). The pharmacists participating in the survey were relatively recent graduates (Figure 1-B). Based on other demographic information gathered, the respondents represented a good cross-section of pharmacy practitioners from across Canada (Figures 1-C).

The ratings of Criticality (Figure 2) and Frequency (Figure 3) were combined statistically to create a third variable, Importance (Figure 4) by the method originally described by Kane[4] and reported by Klein.[5] The Importance variable was then used as a basis for generating test specifications in which the most important tasks received the greatest weight, and the least important tasks the least weight.[4] The basic purpose was to delineate the major tasks and activities associated with pharmacy practice, to assess their relative importance in serving the public health and welfare and, to establish weights that reflected their relative importance.

Based on the mean Criticality ratings, the six Practice Areas were seen as having substantially different levels of consequence

Table I: Major Practice Areas for Qualifying Examination[1]

Area	Topic	Number of Questions
1.00	Interpreting, Assessing, and Dispensing Prescriptions/Medication orders.	90
2.00	Calculation and Compounding Extemporaneous Preparations of Prescriptions/ Medication Orders	50
3.00	Monitoring Drug Therapy	80
4.00	Patient Communication/Information	50
5.00	Interprofessional Communication/Information	20
6.00	Ethics and Legislation	10

[1]within these six broad areas are 21 individual Task Statements:

1.01 Given a prescription or medication order, the candidate shall demonstrate the ability to gather, accurately interpret and evaluate relevant information, and to make a professional judgement whether or not the prescription/medication order should be dispensed.

1.02 The candidate shall be able to determine the rationale of the dosage regimen.

1.03 The candidate shall demonstrate the ability to use proper techniques for dispensing a prescription/medication order (e.g., identify appropriate storage and/or handling conditions).

1.04 Given a prescription/medication order, the candidate shall be able to select the proper labelling, including auxiliary/ cautionary labelling, and to demonstrate knowledge of why such labelling is appropriate.

1.05 The candidate shall identify patient and pharmacokinetic factors that affect either the efficacy or safety of individual drug therapy.

1.06 The candidate shall be able to assess the bioequivalency and interchangeability of multisource drugs.

2.01 The candidate shall demonstrate competent professional judgement and proper technique in calculation, ingredient selection, compounding and dispensing.

2.02 The candidate shall demonstrate the ability to perform specialized pharmaceutical calculations (e.g., isotonicity, molarity, solubility, ionization, enteral and parenteral nutrition.

2.03 The candidate shall demonstrate knowledge of proper aseptic technique and the ability to prepare sterile products.

2.04 The candidate shall demonstrate knowledge of proper stability, storage and labelling (including auxiliary/precautionary labelling) of extemporaneous preparations.

3.01 Given a set of prescriptions/medication orders and relevant patient information (e.g., medical history, medication record, drug therapy history), the candidate shall be able to monitor the patient's therapy.

3.02 Given relevant patient information (e.g., medical history, medication record, drug therapy history), the candidate shall be able to recommend appropriate action regarding the use and monitoring of non-prescription products.

3.03 The candidate shall demonstrate the ability to recognize major precautions, warnings, adverse/side effects, and toxicity associated with a prescription or non-prescription drug in a patient's regimen.

4.01 The candidate shall demonstrate the ability to counsel patients on the indications, administration, storage, precautions, contraindications and management of adverse effects or prescription medications.

4.02 The candidate shall demonstrate the ability to counsel patients on the indications, administration, storage, precautions, contraindications and management of adverse effects of nonprescription products.

4.03 The candidate shall demonstrate the ability to assist consumers in the selection of, and counsel on the proper use of home health care products (e.g., convalescent aids, diagnostic and monitoring aids, orthotics, ostomy products, surgical supplies).

4.04 The candidate shall be able to provide information regarding emergency care.

5.01 The candidate shall demonstrate the ability to retrieve and evaluate scientific literature, statistical data, recognized reference texts, professional papers/articles and/or manufacturer's labelling/promotional material (e.g., pharmacology and therapeutics, pharmacokinetics, pharmacodynamics, toxicology, product selection, monitoring parameters, drug allergies and interactions).

5.02 The candidate shall demonstrate the ability to provide information to healthcare professionals as it pertains to pharmacology and therapeutics, pharmacokinetics, pharmacodynamics, toxicology, product selection, monitoring parameters, drug allergies and interactions.

6.01 The candidate shall demonstrate the ability to understand and apply principles of ethics and professional responsibility to patient care.

6.02 The candidate shall demonstrate the ability to apply relevant federal legislation concerning the role of the federal government in providing health care to citizens of Canada.

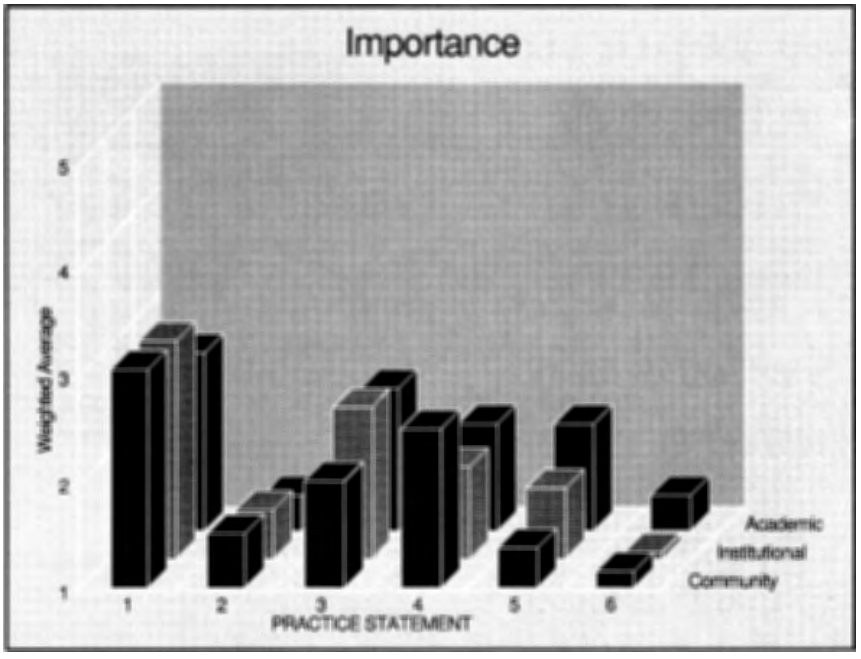


Figure 4: Weighted averages of importance for each major practice area based upon employment.

for patients. Area 1.00, for example, was judged to be the most critical and Area 6.00 was judged to be the least critical (Figure 2). The ratings of Criticality did not always reflect the ratings of Frequency. For example, Area 4.00 was fourth most important in terms of mean Criticality rating, but second in terms of mean Frequency rating (Figure 3). The focus of the PEBC Qualifying Examination is on areas of professional practice that have serious consequences for protecting the health and welfare of the public, or that are performed quite frequently by entry-level pharmacists. When a higher rating is assigned to either Criticality or Frequency for a particular Task Statement, it means it is important for an entry-level pharmacist, and therefore it should be weighted more heavily on the examination. A mean Criticality and Frequency rating was also determined for each of the 21 Task Statements which are components of the six Areas of Practice.[4]

Based on a thorough discussion of the survey results and the various options related to analyzing the data, the Panel of Examiners, and subsequently the Board of PEBC, approved the final specification ('Blueprint') for the Qualifying Examination. Included in this decision was the assurance that the tasks seen as having the most serious consequences for the public health and welfare would be strongly emphasized. It was agreed that the examination would consist of 300 questions with a breakdown based on the importance rating of each task statement and then combined for each Practice Area as depicted in Table I.

Now that a 'blueprint' has been developed, the next task for the Panel of Examiners of PEBC is to assure there are adequate questions for each Practice Area. The Panel of Examiners which is composed of representatives from each province are assigned the duty of developing questions for the examination, analyzing the data and recommending policy changes to the Board of PEBC. All new questions must be pretested. This is done by including them, as extra questions, throughout the Qualifying Examination. These questions are not identifiable to the candidates writing the examination and they are not included in the scoring for that particular examination. Before a pretest question is added to the item bank for future use, its content and statistical characteristics (point by serial correlation and item difficulty, i.e., P value) are reviewed and possibly revised by the Panel of Examiners of PEBC.

It has taken 29 years to get to this important point in the history of the PEBC Qualifying Examination. The changes have always been made in an attempt to improve the examination and to make it more practice oriented. This new "blueprint" is scheduled for implementation in June 1995.

REFERENCES

1. Hughes FN, Mattews AW, Creasy JF. The Pharmacy Examining Board of Canada, the First 25 Years 1963-1988; Toronto, Ont.: *PEBC*, 1990.
2. Klein LW. An Evaluation of Two Examinations Developed by the Pharmacy Examining Board of Canada; Toronto, Ont., *PEBC*, 1987.
3. The StratQuest Group Ltd. Standards of Practice Report (for the Pharmacy Examining Board of Canada); Toronto, Ont., *PEBC*, 1993.
4. Kane MT, Kingsbury C, Cotton D, et al. Combining data on criticality and frequency in developing test plans for licensure and certification examinations. *J. Educational Measurement* 1989; 26:17-27.
5. Klein LW. Developing Test Specifications for the Qualifying Examination; Toronto, Ont., *PEBC*, 1993.