



EBO Diploma Examination

- EBO Diploma Examination
 - Test designed to assess **knowledge** and **clinical skills** requisites to deliver a **European standard** of ophthalmologic care in hospital and private settings.
 - Organised on a yearly basis since its introduction in June 1995



Components of education

- Knowledge

- Textbooks, guidelines, articles, (online) courses, clinical ophthalmological practice, ...

- Skills

- Practical/technical skills → measure of ophthalmological apprenticeship

- Professionalism

- Personal skills: empathy, attitude, relation with related paramedicals, ...

Interaction of educational components





Structure of EBOD

- Written paper
 - 52 MCQs with 5 T/F items each (260 items)
 - 40 percent of total candidate score
 - Languages: English, French, German
 - Assessment of knowledge
- Oral examination (Viva Voce)
 - 4 different topics
 - 60 percent of total candidate score
 - Languages: English (native language)
 - Assessment of knowledge, skills and professionalism



EBOD Written paper (MCQs)

- Topics covered
 - Optics, Refraction & Contact lenses
 - Pediatric ophthalmology & Strabismus
 - External, Corneal & Adnexal disease
 - Glaucoma, Cataract & Refractive surgery
 - Retina, Vitreous & Uvea
 - Neuro-ophthalmology
 - Orbital disease & Oculoplastic surgery
 - General medicine relevant to ophthalmology
 - Ophthalmic pathology, Microbiology & Immunology
 - Pharmacology & Therapeutics



EBOD Viva Voce

- Different panels
 - Optics, Refraction, Strabismus & Neuro-ophthalmology
 - Cornea, External diseases, Orbit & Ocular adnexa
 - Glaucoma, Cataract & Refractive surgery
 - Posterior segment, Ocular inflammation and Uveitis
- Emphasis on
 - Data acquisition
 - Diagnosis
 - Treatment



EBOD vs other (European) exams

- Written examinations exist in different formats
 - All of them use MCQs
 - In Europe there are several formats:
 - True/False (T/F) items
 - Single-Best-Answer (SBA) items
 - Extended Matching Indices (EMI) items



EBOD vs other (European) exams

- Advantages of T/F items
 - Easy to construct
 - Reliable in case of translation
 - Accessibility (e.g. dyslexia)
 - Duration of the examination
 - Relatively easy to process
 - No need to restructure current MCQ-bank
- Disadvantages of T/F items
 - Assessing mainly knowledge
 - Probability of guessing right = 50 %



EBOD vs other (European) exams

- How to overcome the disadvantages of T/F items?
 - Viva Voce examination
 - Covering all components of education: knowledge, skills and professionalism
 - Introduction of negative marking
 - Increase of discriminative power of examination
 - Reduction of guess factor
 - wild guesses will be punished
 - guesses by reasoning (partial knowledge) will be rewarded



EBOD vs other (European) exams

- Increase of discriminative power when using negative marking
 - rewarding able candidates (partial knowledge)
 - punishing unable candidates (wild guess)



Spread of total test scores with negative marking

Spread of total test scores without negative marking

0

260



EBOD vs other (European) exams

	Very Poor candidate		Strong candidate	
Answered correct by knowledge	70	70	210	210
Items left blank by candidate	0	0	50	50
Items answered correctly by guessing	95	95	0	0
Total test score (max = 260)	165	70	210	210
Result on MCQ-test	Pass	Fail	Pass	Pass

- Simulated effect of negative marking
 - Better discrimination (pass/fail) between poor and strong candidates



Statistical analysis of EBOD 2008

- C_iTO

- Examination assessment company established in The Netherlands
- Specialised in organising national examinations
- Provided software tools
 - Design of the MCQ answer sheet
 - Design of the Viva Voce mark sheets
 - Statistical analysis output (TiaPlus[®])



Statistical analysis of EBOD 2009

- From C₂TO to SpeedWell
 - SpeedWell is specialised in organising medical examinations
 - Change to optical reader system
 - continuous and yearly increase of applications
 - Provided software tools
 - Design of the MCQ answer sheet
 - Design of the Viva Voce mark sheets
 - Statistical analysis output (MultiQuest[®]) based on similar statistical techniques



Statistical analysis of EBOD 2008

■ General conclusions

- General reliability of the examination (MCQ): 0.81
- Point biserial correlation coefficient of 0.15
 - individual item score (0 or 1)
 - total test score (max. = 260)
- Assessment of the degree of difficulty
 - Average P-value ≈ 0.70
 - Indication of items answered incorrectly by guessing ≈ 0.30
 - As probability of answering correctly by guessing is equal to probability of answering incorrectly by guessing, it is fair to assume that only 40 percent of candidates on average answered correctly by knowledge



EBOD 2008 Secondary analysis

- Development of EBO analysis tool
 - Validation of MCQs
 - Assessment of degree of difficulty
 - Assessment of discriminative power
 - ...
 - Potential of personalisation of total test score composition by
 - rewarding correct responses of more difficult items
 - Reduction of items marked as being statistically sick items (mainly caused by guessing of candidates)



EBOD 2008 Secondary analysis

- Development of EBO analysis tool
 - Classical analysis techniques (Wilcoxon Rank-Sum)
 - Total test scores of candidates answering a specific item correctly
 - Total test scores of candidates answering a specific item incorrectly
 - Item-response analysis techniques
 - 1-parameter analysis technique (Rasch): item difficulty
 - (2-parameter analysis technique): item + item discrimination
 - 3-parameter analysis technique: item + guess factor



EBOD 2008 Secondary analysis

■ Conclusions

- Classical analysis techniques (Wilcoxon Rank-Sum)
 - Reduction of sick items: 184 → 107
- Item-response analysis techniques vs Classical testing
 - 1-parameter analysis technique (Rasch)
 - correlation coefficient with P-value = 0.90
 - 3-parameter analysis technique
 - correlation coefficient with classical testing = 0.13
 - estimation of 36 percent of candidates answering correctly by guessing



EBOD statistical analysis

■ Conclusions

- Classical analysis techniques and item-response analysis techniques are complementary and correlated to a certain extent
- Correlation between these techniques will be better once negative marking will be introduced
- Statistical analysis tools → items to be verified on clinical content → time-consuming but worthwhile activity → better and validated MCQs



EBOD statistical analysis

- Items remaining for the future
 - Validation of MCQ-bank
 - Standardisation of oral examination
 - ...

... To be continued !