Setting Competency Standards in Optometry for Ocular Disease Module

Abstract

The General Optical Council (GOC) regulates the profession of optometry in the United Kingdom. It is responsible for setting the standards of optometric education including the specific clinical competencies required for optometric practice. However, employing a fixed rate approach to determine academic achievement does not directly translate as being clinically competent. In this study, we introduced standard-setting procedures into a second year module within our BOptom (Hons) course, with the aim of designing a fairer, more robust and standardised method of assessment.

High quality, coloured still images, covering GOC core ocular disease requirements, were reviewed by a panel of subject matter experts. We used a modified Angoff method to determine cut-off scores for each image and create a new, twenty still-image assessment. The new assessment was presented to second year undergraduate students as a mock-assessment, the results of which were compared against an initial non-standardised mock assessment. Our results indicate that the modified Angoff standard-setting approach to assess ocular pathology knowledge, not only allowed for a more robust method of assessment, but improved the students’ overall performance.

Keywords

Setting Standards, Competency, Angoff Method

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Introduction

Standard setting is a methodology used to derive performance levels in achievement assessments for education, certification and registration (Cizek, 2004). Performance levels are synonymous with competency standards (Kane, 1994; Cizek, 2004), which are classified as pre-defined, specialised criteria, quantified and defined by professional and/or educational bodies.

The optometric profession in the UK is regulated by one of twelve health and social care regulators, the General Optical Council (GOC). It first came into existence in 1958, through parliamentary legislation and has four primary functions, one of which is setting standards for optical education and training, performance and conduct. It provides institutional guidance and defines the knowledge and skills that optometrists must achieve and maintain to meet registration standards, which are referred to as ‘core competencies’ (GOC, 2014). In the ocular disease element, there are 15 defined core competency components, which must be assessed so that the trainee and/or student can demonstrate they meet the specified standard. However, the assessment formats by which competencies is demonstrated, are not pre-defined by the GOC and therefore, are individual to each educational and training institution.

Currently, our optometry students undertake an introductory ocular disease module, in the second semester of their second academic year. It is a 15-credit module, structured around weekly two-hour lectures with two assessment elements. The first assessment is a two-hour, closed book, written exam, which focuses on assessing the students’ knowledge on clinical decision-making, clinical investigation, differential diagnosis, and management. The second assessment is a one-hour slide assessment, which assesses the students’ ability to correctly recognise and identify a variety of ocular conditions in accordance with the competency guidelines. However, the traditional fixed rate approach to assess academic achievement does not inherently infer or translate to clinical competence. Thus, a pass mark of 40% may not represent the appropriate standard needed to achieve competency, highlighting a discrepancy in assessment methodology and interpretation. Introducing performance standard setting procedures in the assessment design removes this inconsistency and provides a more defensible route to assess and demonstrate clinical competency. The ultimate aim of this study was therefore to introduce standard-setting practices to design a balanced, fairer and more robust method of assessing disease recognition competency.

Method

Old Assessment Procedure (Non-Standard)

The traditional assessment design approach relied solely on the module leader to choose relevant coloured still images that reflected the core competency guidelines. Each chosen still image depicted a different ocular pathology. The assessment comprised of 20 still images, which were presented to the students (n = 49) on a computer display as a mock assessment (Mock 1). The task for the students was to recognise and document the clinical signs and to correctly identify the ocular condition. Answers were recorded on anonymous written booklets and graded by the module leader.

New Standard Setting Approach

Unlike the traditional single-person assessment design methodology, a systematic, documented, focus group approach to setting standards for the slide recognition assessment was adopted for the study (Mock 2). Referred to as the modified Angoff method, it is a widely used and accepted procedure, first described in 1971 (Cizek, 2004). It is a five-step process, commencing with the selection of an expert panel. Each expert panel member (n = 5) was first asked to take the test by identifying the ocular condition depicted in newly sourced coloured still images. Feedback about image quality and relevance to core competency was obtained and images were revised or removed accordingly. The remaining approved still images underwent a further evaluation process. Each expert rated each of the images by estimating the proportion of minimally qualified (just competent) clinicians out of 100 that would correctly identify the ocular pathology. Each expert was instructed to rate in increments of 5% and not to award lower than 20% or higher than 90%. The answers were recorded on a Test Image Rating form (see Table 1).
The individual rated values were collated and averaged for each image, to determine a cut-off score or performance score and inform assessment design. Twenty rated slides were chosen and presented to the same cohort of students (Mock 2) with the same defined task as in Mock 1. The students were blind to the purpose of the new assessment. Answers were recorded on anonymous written booklets and graded by the module leader. The results of Mock 1 and Mock 2 were then analysed and compared.

**Results**

**Old Assessment Procedure (Non-Standard)**

The mean result for the optometry students in the non-standardised Mock 1 exam was 40 +/- 16%, and a range from 8% to 70%. Using the university accepted fixed rate pass mark of 40%, 27 of the 49 students passed the exam, yielding a Mock 1 pass rate of 55% (see Figure 1).

![Figure 1: Graphical scatter plot illustrating individual student marks for Mock 1](image)

The shaded blue box in Figure 1 represents poor academic achievement (< 40%). Each point lying within this shaded area represents a ‘fail’ student (n = 22). Each point outside the shaded area represents a ‘pass’ student (n = 27) of varied academic achievement, with a maximum mark of 70%.

**New Standardised Assessment**

A total of 32 high quality coloured still images were collated and reviewed by each expert panel member. Of the original 32 images, four were removed due to poor image quality or size, three images depicted the same ocular condition of varying severity and therefore, only one image was chosen for the final set, and two images were removed due to diagnosis ambiguity. Therefore, 24 images remained which were independently rated, 20 of which made up Mock 2. Figure 2 contains three of the selected images.
The mean student performance for the new balanced Mock 2 exam was 55 +/- 14%, an overall improvement in student performance of 15% when compared to the traditional assessment method (see Figure 3). The benchmark 40% mark was used as the default pass mark in Mock 2, so that an ‘equivalent’ pass rate could be determined and used for comparison. In total, 39 of the 49 students passed the Mock 2 assessment (see Figure 3), a pass rate of 80%, and an improvement of 25% when compared to the non-standard assessment (Mock 1).

**Discussion**

Standard setting is integral to ensuring a fair, more balanced assessment design, which constructively aligns with the academic / module learning outcomes and reflect professional core competencies (Bejar, 2008). Although a widely accepted method, the Angoff approach is however, not without limitations and considerations. The validity of this approach depends greatly on the decisions of the subject expert, which influences the cut-off score for each still image and, therefore, the interpretation of an appropriate competency level (Sizmur, 1997; Wheaton & Perry, 2012). The selection of appropriately qualified and experienced experts is an important yet confounding factor to the process. Ideally a varied background of experts is preferred, so that each discipline is represented on the panel, which reduces over-representation or ‘selective’ bias. However, this inclusive approach to panel selection results in greater measurement variability, as each expert interprets the material differently based on his or her expert knowledge and skill set (Sizmur, 1997). To reduce this variance, a large number of experts should be recruited. However, this was not achieved in this study. The number of experts engaged in this study was limited to five, which inherently resulted in large rating / estimate differences between experts for some still
images. Ideally the level of agreement between experts should be reflected as a low standard deviation of less than ten (Wheaton & Parry, 2012). The consistency and estimate accuracy for each expert should also be reviewed and assessed. In this study, expert panel members were not required to re-estimate a still image on a separate occasion, which is necessary to ensure assessment reliability and robustness. Ideally, expert members would rate the repeat image within +/- 5% of the original rated value.

Aside from recruiting a large number of panel members of diverse yet appropriately qualified backgrounds to reduce variance and ensure assessment validity, the number of slides to be reviewed and rated also needs to be large in number. The images also need to be of high quality and representative of the core competency as specified by the regulatory body, for the Angoff approach to be valid. Although the image quality of the still images was considered high and appropriate by the expert panel members, and reflected the pre-defined professional core competencies, the breath of conditions depicted and the number of still images to be rated was relatively low. Since the assessment design is weighted on cut-off scores, a large bank of images with established cut-off scores is required. Experts were tasked with rating a limited number of still images (n = 24) in this study, 20 of which were presented as a mock assessment (Mock 2) to the students. Due to the limited number of still images available in the study, the assessment design was restricted and not truly structured as a balanced assessment, which is necessary to verify the assessment performance score. The established performance score, which is the average cut-off score for all the assessment still-images, would normally be used as the ‘pass-mark’, which distinguishes between competent and incompetent performance (Cizek, 2004). However, the performance score should only be used to determine competency on a balanced, weighted design assessment, which the Mock 2 did not fulfil, and therefore was not analysed against this reference. Recruiting more panel experts that will rate a greater number of high quality still images multiple times, that depict different ocular pathology of varying severity is an essential requirement to ensure a more accurate, valid, balanced and robust assessment is achieved in the future.

Although the Mock 2 assessment was not perfectly refined compared to the ideal assessment design, the students’ mean performance still improved by 15%, with an overall increase of 25% in the pass rate. This provides confidence in standard setting methodology, which provides a more defensible, empirically verified route to demonstrate clinical competency, which in turn, can better inform the GOC.

Conclusions

The use of standard-setting procedures, such as the Angoff method, in the assessment of optometric knowledge and skills, ensures a robust and fairer assessment is achieved. Based on our results, introducing standard-setting processes can lead to improved student performance and support student learning and instils confidence that an appropriate level of clinical knowledge is achieved. However, more research is needed to ensure appropriate repeatability and validity is attained using this approach.

References


