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Standard setting for dental knowledge tests: reproducibility of the modified Angoff and Ebel method across judges

By Ho, TK (Ho, Ting Khee) ; Abu Kassim, NL (Abu Kassim, Noor Lide) ; O'Malley, L (O'Malley, Lucy) ; Roudsari, RV (Roudsari, Reza Vahid)

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Abstract

Introduction Criterion-referenced standard setting methods establish passing scores based on predefined competency levels. The credibility of these scores must be supported by validity evidence. This study evaluated the reproducibility of modified Angoff and Ebel standards across different test formats and panels in dental assessments. Inter-rater reliability for each method was also assessed. Methods Twelve judges, selected via purposive sampling, were divided into two equal groups representing various specialisms. Each panel applied modified Angoff and Ebel methods to set standards for one-best answer (OBA) and short answer question (SAQ) items. Method replicability across panels was assessed using the Mann-Whitney U-test to compare passing scores between Groups A and B. The Wilcoxon signed-rank test compared passing scores between modified Angoff and Ebel within groups. Inter-rater reliability was estimated using the intraclass correlation coefficient for modified Angoff and Fleiss' kappa for Ebel. Statistical analysis was conducted using IBM SPSS, with significance set at $p < 0.05$. Results The median (IQR) years of teaching experience were 14.0 (17.0) for Group A judges and 21.5 (18.0) for Group B judges. In Group A, median (IQR) passing scores using modified Angoff were 49.75 (3.31) for OBA and 51.75 (6.13) for SAQ, with statistical no significant differences ($p > 0.05$) from Ebel OBA 47.38 (2.02), SAQ 49.50 (5.38). In Group B, modified Angoff passing scores were significantly higher than Ebel ($p < 0.05$): modified Angoff OBA 66.12 (3.31), SAQ 58.00 (7.50); Ebel OBA 55.92 (2.73), SAQ 49.50 (8.25). Passing scores were consistent across panels for SAQ but not for OBA. Inter-rater agreement, intraclass correlation coefficients (ICC) and Fleiss' kappa were higher in Group A across both methods.

Conclusion Reproducibility of modified Angoff and Ebel standards across

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panels was mixed. Passing scores were consistent across judges for SAQ but varied for OBA in both methods. Group A showed consistency between modified Angoff and Ebel standards, whereas Group B had differing passing scores between both standards. These findings should be carefully considered when establishing defensible and reliable passing standards for dental knowledge assessments.

Keywords

Author Keywords: Dental education; Education measurement; Standard setting; Angoff; Ebel; Passing score; Passing mark; Reproducibility of results; Malaysia
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Addresses

▼ ¹ Univ Manchester, Sch Med Sci, Manchester Acad Hlth Sci Ctr, Div Dent, Fac Biol Med & Hlth, Oxford Rd, Manchester M13 9PL, England

▼ ² Univ Kebangsaan Malaysia, Fac Dent, Dept Restorat Dent, Jalan Raja Muda Abdul Aziz, Kuala Lumpur 50300, Malaysia

▼ ³ Int Islamic Univ Malaysia, Kulliyah Educ, Jalan Sungai Pusu, Gombak 53100, Selangor, Malaysia

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