



Multisource Assessment and Feedback for Skill Building in Caries Excavation

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AIMS

Aim: Self-evaluation alone in formative competency assessment has been questioned in the literature as an effective approach to reflective learning. The aim of this study was to measure: 1. inter-rater agreement in multisource assessment of caries excavation, and 2. the validity of using this assessment tool for improving summative assessment performance and self-evaluation in caries excavation on extracted teeth in a first-year undergraduate dental cohort using experts as the golden standard.

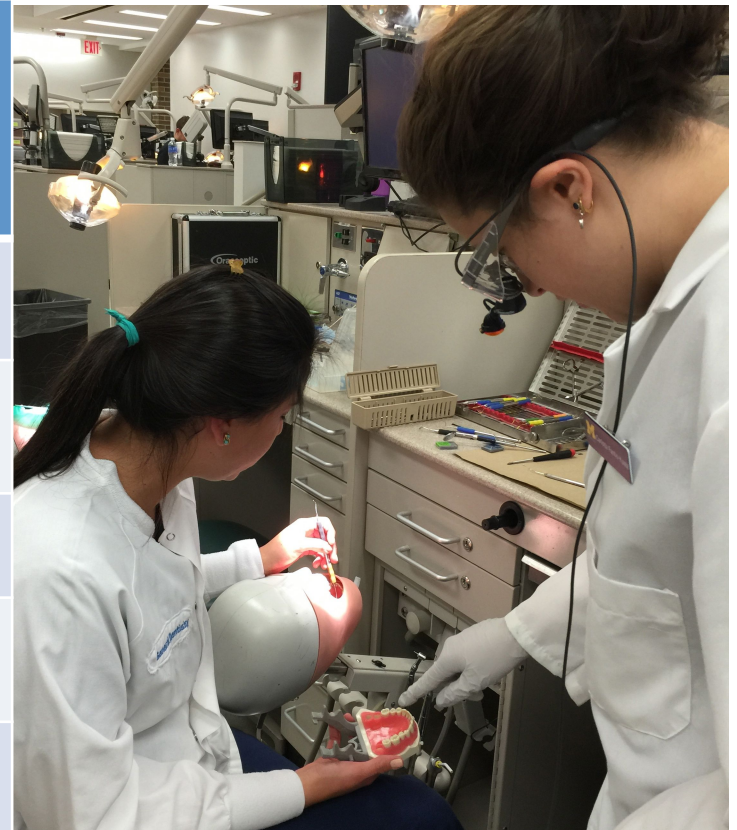
INTRODUCTION

Optimizing assessment strategies, through the incorporation of student-led approaches, to determine dental student competence in clinical tasks has been a key interest in undergraduate dental education over time (1). However, a recent survey of assessment strategies reported that multiple choice question answering is the most widely used assessment tool for assessing student competence in clinical dentistry (2). Today, clinical education literature is encouraging the training of students in reflective practice in order to facilitate life skills that benefit patient and practitioner relationships (3). Student-led approaches are thought to be a vehicle in education to promote reflective learning. Some consider student-led approaches in the curriculum to mean student engagement, student participation, collaborative learning or students as co-producers of learning (4-8). This paper will focus on student-led approaches in assessment strategies of a dental curriculum. Such approaches have been named in the literature and include peer-assessment, peer-group discussion, or self-assessment (9-12). All of these methods may require the training of students so that they can efficiently and effectively carry out their role in the curriculum delivery or assessment process.

RESULTS

Table 1. Inter-Rater Agreement Percentage Agreement between the Student Self-Assessor and the Expert

	Formative	Summative	Change	McNemar's test
Convenience Form	59%	86%	46%	.27(p<.001)
Caries Ex DEJ	59%	71%	20%	.13(p=.05)
Caries Ex Dentin	62%	81%	31%	.19(p<.01)
Total Score	28%	60%	114%	.26(p<.001)



Students (n=104) improved in their caries removal skills substantially by the end of the course as indicated by their own and the expert assessment scores. Inter-rater agreement between the self- and expert-assessors increased significantly in the global-scoring from the formative to the summative assessment, where a 28% agreement in the formative assessment shifted to a 60% agreement in the summative assessment, showing a 114% percentage-change in agreement between assessment periods. Significance in this percentage shift between assessments was demonstrated with a McNemar score of .26 (p<.001) (Table 1).

Finally, descriptive data determined positive shifts for self- and expert-assessor groups in grading classifications (R=clinically ideal, S=clinically satisfactory, T=clinically acceptable after modification, V=not clinically acceptable and must be repeated) for each grading criteria between assessment-periods.

METHODS

Materials and Methods: Methods used in this study were determined to be IRB exempt under the reference number HUM00087187 by the IRB of the University of Michigan. Data collection took place in a simulated dental facility involving a first-year cohort of 104 students in an undergraduate (DDS) program of the 2013-2014 academic year. Assessment-criteria of caries excavation on extract teeth were identical for both formative and summative assessments and included 1) convenience form 2) caries removal at the DEJ, and 3) caries removal in dentin. All participants in this study underwent the same calibration exercises to prepare them for taking on assessor roles in the multisource assessments. Inter-rater agreement was measured between 3 assessor groups (self-, peer- and expert-assessors) in the formative assessment, and 2 assessor groups (self- and expert-assessors) in the summative assessment for the same cohort of students 3 weeks apart. This allowed for student reflection on independent feedback from each assessor type. All students being assessed acted as both self- and peer-assessors for each assessment period, allowing self-assessors to also critically evaluate their peers in the same assessment period. After this reflective process, students were asked to produce a self-generated study plan that they could follow for the purpose of personal skill improvement between assessment-periods. Inter-rater agreement was determined through calculation of percentage-agreements in scoring between self- and expert-assessors for both formative and summative assessments. Validity of using the assessment tool to improve summative scores and skill in self-evaluation was determined by measuring significance of positive shifts in assessor-agreement with McNemar’s test. Furthermore, descriptive data was collected to determine any change in grade classification between formative and summative assessments for all assessor groups.

SUMMARY

Conclusions: Student self-evaluation moved closer to the expert’s golden standard after they were given the opportunity to reflect on independent feedback from 3 assessor types (self, peer, expert) provided in a formative multisource assessment of caries excavation. Inter-rater agreement showed significant shifts toward improved summative assessment performance in caries excavation for first year undergraduate dental students. Validity of using the formative multisource assessment tool described for the purpose of improving summative assessment performance and self-evaluation in an undergraduate dental cohort was established.