

Comparison of the Assessment of Dental Students' Laboratory Performance through MCQ and DOPS Methods

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Abstract

Background and purpose: Training in laboratory for clinical procedural skills is considered an important part of the core undergraduate dental curriculum. There is some evidence that junior dentists are not adequately trained in these skills. The present study was conducted to compare the assessment of dentistry students' competence and performance through direct observation of procedural skills (DOPS) and MCQ methods in fixed prosthesis course.

Method: This cross-sectional study was conducted on dental students in Shiraz in 2007. The subjects of this study consisted of 54 students who underwent the current format of assessment (DOPS). The instructors evaluated the students' activity weekly by checklists and evaluation forms provided by the authorities in the administrative and education development office of dental school. They were also assessed by a 20 item MCQ test. The data were analyzed by SPSS software, using frequency distribution mean.

Results: The findings revealed that 86.7% of the students in different fields of dentistry had desirable performance and 13/3 % of them had undesirable practical performance, not functioning satisfactorily in their workplace. In this study, there was a direct relationship between the graduates' average scores and the quality of their performance.

Conclusion: DOPS is a useful tool for assessment of dental students' practical laboratory competence. It is believed that we now have a system for workplace assessment of dental trainees in the laboratory.

Key words: DIRECT OBSERVATION, PROCEDURAL SKILLS, FIX PROSTHESIS, DENTISTRY UNDERGRADUATE TRAINING

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Introduction

Training clinical and procedural skills in laboratory is considered an important part of the core

undergraduate dental curriculum. A dental practitioner requires a mastery of skills and a significant body of basic knowledge to graduate. Therefore, dental education is a complex combination of didactic and motor skill learning processes. (1) To effectively complete dental training, a student is required to complete a series of procedures, fine motor skills in laboratory and a series of patient care plans. (2) All steps of the care plans are re-

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viewed and agreed to by teacher clinicians. This process also ensures the trainer that the compact is carried out in a clinically acceptable manner. (3) It requires direct observation of the tutor who may complete the procedure.

It is acknowledged that some dental procedures are more complex than others. For example, crown and bridge work are not conducted by the students until they acquire a mastery of simple procedures. However, students who advance rapidly in their skill base may achieve this earlier. (4) Dental students require considerable supervision and academic intervention to ensure that appropriate skills are developed within the training time or the course available. The development of appropriate tools to measure the students' clinical performance to allow the provision of timely feedback and target interventional strategies is an essential part of the dental education. Dental schools have undertaken their student assessment through the use of objective structured clinical exam, supervisor feedback, logbooks, student self-assessment, and DOPS. (5-8) DOPS is a method of assessment developed specifically for assessing practical skills. It requires an educational supervisor to directly observe the trainee performing a certain procedure, make judgments about specific components of the procedure, and grade the trainee's performance. However, the high variation between individual assessors can often influence the efficacy of the results unless rigorous standardization of assessors is undertaken. (9-10) Continuous assessment is an important component in a competency-based dental curriculum. Several workers have published details of the assessment performance used in their own institutions. (10-13) There are reasons to assume that junior dentists are not adequately trained in these skills. (1,4,13,14) The aim of this study is application of DOPS as a formative evaluation and a supportive tool that facilitates the early prediction of the students' errors and misunderstanding. Of course, it is not designed to be a summative assessment tool.

Methods

This cross-sectional study was conducted on dental students in Shiraz in 2007. The subjects of this study consisted of 54 students (30 % female and 70 % male). Their average age was 23 years. (SD_+1.9) The fourth-year fixed prosthesis dentistry course consists of both laboratory and didactic studies. Laboratory practice involves one instructor who supervises the session per week.

The instructors supervising the sessions in this study had to evaluate the students' daily activity by a checklist developed by the faculty and aimed at guiding the students as a formative assessment tool. A checklist scheme of assessment was devised, consisting of a series of questions covering the key stages of the majority of procedures in fixed prosthesis dentistry. A demonstrator indicated whether each aspect had been completed satisfactorily or not (yes/no). They gave written comments to enhance the level of immediate feedback. So, the students had to study the study guide on learning activity based on formative assessment. In the study guide, a list of procedures of the course was provided and the students were asked to register their daily experience on it. The first pages of the guide contained an explanation of how it should be used.

Moreover, an MCQ test was used for assessment of the students at the end of the course. This test was developed with twenty questions with only one correct answer. The questions were categorized into two groups comprising 5 questions about general information on fixed prosthesis and fifteen questions on most common practical applications in this course. There was one positive point for each correct answer and a zero point for wrong answer. Therefore, there was a minimum score of zero, and a maximum score of 20.

The validity of MCQ questions was confirmed by specialists and the consensus of four reference texts. The reliability of the test was con-

firmed by alpha cronbach coefficient of 0.84. Also, five more questions were added to assess the students' opinion on this course. The data were analyzed by SPSS software, using frequency distribution, mean, standard deviation, paired T-test and Mann-Whitney test. The quantitative data were summarized as mean, standard deviation and student t test, and $P < 0.05$ was considered as significant. The qualitative data were analyzed using a content analysis method. A formal assessment of each student's work by DOPS was carried out weekly. Each assessment was based on 20 scores.

Result:

54 students underwent the current format of assessment (DOPS). 95% of them were under 24 years of age and 12% over 24 years with an average of 23 years. (SD₊1.9) 30 % of them were female and 70 % male.

The guideline used for calculating the students' scores and standard setting in modified Angoff approach is shown in Table 1. Considering the expert opinion in standard setting, the scores less than 60% of 20 (12) were considered as poor, between 60-80% medium and more than 80% good. (Table 1)

DOPS' overall scores were normally distributed. We determined the Pearson correlation coefficient between the students' mean scores in DOPS and those in MCQ. Comparison of the mean scores, using paired T-test, shows a significant difference between the two methods (11.78 vs. 16.34), ($p < 0.001$) (Table 2) Table 3 displays the mean score and standard deviation of the procedural skills including preparation of the anterior teeth, preparation for fixed partial denture impression, working cast, die preparation and articulating wax-up pattern, spruing and investing, casting, finishing & polishing, and proceeding application. (Table 3)

Discussion and Conclusion:

As the results showed, 13.3% of the students had relatively poor competence in fixed prosthesis by DOPS and 86.7% of them had desirable performance in their working situation or in 'laboratory work', i.e. hands-on work of the type that is incorporated in all medical and paramedical courses. Such work can be evaluated through continuous assessment of the routine work that the students undertake during their laboratory program, or via specially-organized practical tests such as OSCE, DOPS, etc. The findings of the present study reveal that DOPS is a useful tool for assessing dental students' practical laboratory skills. (1,3,14,15)

Our study indicates that written exam results have low overall levels of correlation, particularly in assessing performance that differs substantially from the mean. In this study, the difference between the two methods was significant. ($P < 0.001$) 80% of the students agree that DOPS experience reflects the skills that students should possess, but there is a high agreement that it reflects clerkship-related learning and actual student performance. Both the students and academic staff get insight from DOPS regarding the definition of specific learning needs. The results strongly suggest that DOPS and written exams provide different measures of student performance. The reasons for these differences merit further exploration.

One study on the validity of direct observation of clinical encounter examination in Bahrain showed that DOCEE had good reliability and inter-rater agreement between two independent specialist and non-specialist examiners on scoring, ranking and pass/fail classification of the students' performance. (16)

Another study on students' perspectives of assessment in Manipal, India showed that not a single type of assessment was ranked as the highest for all items, proving the earlier observation that a single assessment does not fulfill all aspects of as-

assessment and that there is a need for an evaluation system with multiple ways of assessment. (17) These comparatively high scores in DOPS in some areas such as proceeding application and finishing & polishing may reflect the large amount of time spent for these skills on laboratory. Also, the students perform these procedures more than other procedures. In courses with a high proportion of laboratory work, the most widely used method of assessing the laboratory content is generally some form of continuous assessment. This has the advantage of providing an ongoing and stepped overall picture of each student's performance and ability, and of providing the students with regular feedback on how they are progressing. (18,19,20) It can, however, be very time consuming for the staff involved par-

ticularly if detailed feedback is given on all the work submitted. Such assessment can be carried out both for formative and summative purposes. (21-24) In conclusion, although the students' procedural skills can be assessed through written tests, DOPS method assesses the students' practical skills more efficiently.

Study limitations

Non-probability sampling in a single university and a single course might limit its generalization to different settings.

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Table 1: Standard setting of DOPS and MCQ

Classification	Assessment Mark	MCQ	DOPS
desirable	Good (100-80%)	1.66%	67.7%
	Medium (79-60%)	30%	20%
undesirable	Poor (>60%)	69.4%	13.33%

Table 2: Mean score and standard deviation in the MCQ exam.

Test	N.	Mean	SD
MCQ	54	11.78	0.83
DOPS	54	16.34	2.9

Table 2: Mean score and standard deviation in the MCQ exam.

N	Criteria	Mean score	SD
1	PFM* preparation on anterior teeth	1.47	+ 0.53
2	Preparation for fixed partial denture	1.04	+ 0.62
3	Impression	1.27	+ 0.49
4	Working cast	1.54	+ 0.18
5	Die preparation and articulating	1.34	+ 0.24
6	Wax-up pattern	0.78	+ 0.61
7	Spruing and investing	1.02	+ 0.47
8	Casting	1.23	+ 0.39
9	Finishing & polishing	1.63	+ 0.15
10	Proceeding application	1.35	+ 0.51

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