Continuous Assessment of Undergraduate Students at a Dental College in India

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Abstract: The purpose of this retrospective study was to evaluate the quantitative assessment of a structured essay and standardized oral examination and its correlation to the final-year graduating exam in the Department of Pediatric Dentistry, Meenakshi Ammal Dental College and Hospital, Chennai, India. The records of 531 students from 2005 to 2009 were collected. Students were categorized based on their “completion” and “grading” in a structured essay and standardized oral examination, which is a continuous assessment of dental students in the college. The grades obtained by continuous assessment were compared to students’ final-year examination scores. The assessment showed that students who completed all tasks and had desirable performance in their written assessment and standardized oral examination also scored better on their final examination. Therefore, the continuous assessment by written assessment and standardized oral examination had a direct relationship to students’ performance on the final examination and is useful for evaluation.

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Dental education involves a complex combination of didactic and motor skill learning processes. A class of dental students is not homogeneous. Within a class there will be a mix of students, with some more advanced and some slower in their mastery of curricular components. The educational process being a continuum for at least four years, multiple examinations are required. The movement towards competency-based education in dentistry challenges traditional testing techniques because careful measurements of knowledge, attitude, psychomotor, and communication skills are required. New educational methodologies are replacing the teacher-driven pedagogical styles of discipline-based systems. This move from discipline-based to competency-based systems in dental education has required rethinking the entire educational spectrum.

Dentistry rests on an educational foundation, yet must thrive in the competitive milieu of a rapidly changing world that demands continuous quality improvement through both personal and professional growth. In 2005, the American Dental Education Association established the Commission on Change and Innovation in Dental Education (ADEA CCI) to build a consensus within the dental education community about innovative changes that are necessary in the education of general dentists to ensure that graduates enter the profession fully competent to meet the oral health needs of the public.

A substantial number of articles dating back to the 1960s have reported the result of studies on innovative educational and assessment methodologies. Licari and Knight, as well as Taleghani et al., described efforts by U.S. dental schools to design assessment systems for evaluating dental students’ performance in ways that are consistent with the principles of competency-based education using objective structured clinical examinations (OSCEs), portfolios, and student self-assessment and emphasizing formative (nongraded) feedback. Other authors have described the use of OSCEs and standardized patients in dental education, including the findings of research studies designed to assess the use of OSCEs as an evaluation tool. Denney et al. compared students’ performance on OSCEs to traditional assessments, and Schoonheim-Klein et al. analyzed the reliability of a dental school
OSCE and the number of stations needed for optimal reliability.22

In 1994, the National Dental Examining Board of Canada (NDEB) began to include OSCE as part of its certification process.23 Continuous assessment is an important component in a competency-based dental curriculum. Several researchers have published details of the assessment performance used in their own institutions.24-27 Zartman et al. studied the curricular impact of OSCE-based evaluation and found that it is a valuable mechanism to assess the student’s progress towards competence.16 Mossey et al. studied the scope of OSCEs in the assessment of clinical skills in dentistry and found that they are useful in the examination of diagnostic, interpretation, and treatment planning skills.28 Kramer et al. designed a “toolbox” to provide dental educators with a variety of techniques and methods for assessing students’ competence associated with the successful practice of dentistry.29 Assessment methods in this toolbox range from familiar and frequently used techniques such as multiple-choice and short-answer essay items to newer and less familiar methods such as OSCEs, portfolios, and triple-jump exercises.

The purpose of our study was to evaluate three techniques used for assessing the performance of a group of undergraduate dental students in India. The study’s methods were to evaluate this group’s completion of tasks and grades on written assignments and standardized oral exams and correlate them with the multicompetency comprehensive assessment in the final-year graduating exam.

Materials and Methods

This retrospective study was conducted in the Department of Pediatric Dentistry at Meenakshi Ammal Dental College, Meenakshi Academy of Higher Education and Research, Meenakshi University, Chennai, India. The records of students’ performance from 2005 to 2009 were collected. The total number of students included was 531; eighteen were excluded because of incomplete data.

The third-year undergraduate dental students were assigned to the Department of Pedodontics for clinical training in a periodic rotational system. The students were divided into eight to ten groups of twelve to fourteen students each. The students had five to six four-day postings per year. All important fundamental concepts were introduced early in the pre-final period to prepare student to enter the clinics as safe beginners so they can focus on all areas of pediatric dentistry. Topics of graded difficulty from basics to clinical topics were presented as the students progressed to the final year. Once the students started attending the clinical postings, they were told to write structured essays on given topics by the end of each posting. The topics for these structured essays were as follows. Task 1 involved chronology of primary dentition, difference between primary and permanent dentition, extraction and its complications in children.

Similarly, the fourth-year (final-year) students were assigned to the Department of Pedodontics for clinical training in a periodic rotational system, consisting of three or four twelve-day rotational system. These students were expected to focus on correct concepts regarding any clinical procedures that they performed and to interact with the children to treat their needs. The students were given topics and instructed to write structured essays on them by the end of each posting. The topics for structured essays in the final year were divided as follows. Task 4 involved pulpal therapies, traumatic injuries to the tooth, and supporting structures. Task 5 addressed pit and fissure sealants, preventive resin restoration, and drugs for pediatric patients. Task 6 involved psychology and behavior management techniques.

In the structured essay, the provided stimulus material poses a question or involves a clinical scenario/problem, and the response is given by the student. The material requires the student to provide a logical and detailed response to the question or problem. This method is used to evaluate the student’s ability to clearly identify the salient elements of the problem and logically present a solution or resolution. The method addresses a full range of competencies that do not involve clinical demonstration. The strength is that this method addresses most of the competencies associated with patient care, but its limitation is that the evaluation of the response is subjective even though the raters are calibrated.

In the standardized oral examination, a set of stimulus questions are developed that address the critical area of knowledge. All students are given the same set of questions and are expected to respond orally in their own words; this allows the raters to assess the student’s depth of comprehension and capacity to apply knowledge and insights to various situations. Responses to the questions are rated on a
0 to 10 scale. This is a useful tool that is well suited for evaluation of critical thinking competencies and areas of professionalism. Its strength lies in the rater’s ability to examine the underlying logic of the student’s response, assuming that probing for further information is allowed by the design of the examination. However, it is limited in also being susceptible to subjectivity on the part of the raters.

Eight faculty members evaluated the student’s written assessment and conducted the standardized oral exam on the same topics on different days. A score between 0 and 10 was given for the written assessment and standardized oral examination. The faculty members also used a rating scale of 0 to 10 to grade students’ performance on their written assessment and standardized oral examination. A score of 80 percent and above was given 8 to 10 points on the rating scale; a score of 60 to 79 percent was given 6 to 7 points on the rating scale; a score of 40 to 59 percent was given 4 to 5 points on the rating scale; and a score of less than 40 percent was given 1 to 3 points on the rating scale. This grading was done to make the evaluation more objective and minimize random grading.

Satisfactory progress was required on all the written assessments and standardized oral examinations. Students who failed to obtain 50 percent were assigned to a faculty member or other appropriate designee, who reviewed the areas in which the student had not shown satisfactory progress and assigned him or her a stipulated time to improve in that specific chapter. However, when students performed well, their written assessment and standardized oral examination grades were displayed on the notice board to give them appreciation and motivation to perform with more zeal and enthusiasm in subsequent postings. It was a general observation by all the faculty members that students performed better in the subsequent posting when they were socially reinforced.

The students were evaluated in two stages (Figure 1). First was a grouping of students to evaluate their grades obtained on the written assessment and standardized oral examination. The second objective was to compare the grades obtained on the written assessment and standardized oral examination to the final-year examination score. Undergraduate students will be awarded their degrees only if they pass their qualifying final-year examination, which consists of the following parts: theory (100 marks; structured essay, short answers, and multiple-choice questions); clinical (50 marks; case history taking and any one of the clinical procedures); standardized oral exam (20 marks); and internal marks (30 marks). The final examination score of a maximum 200 marks was converted to 100 marks, and groupings of students based on their grades on the WA and SOE was as follows: Grade I—grade of more than 75 percent; Grade II—grade of 50 to 74 percent; and Grade III—grade of less than 50 percent (Table 3).

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Results

Out of 531 students’ data, 513 were deemed complete and therefore usable. Among these students, 24.17 percent completed all six tasks, 68.42 percent completed three to five tasks, and 7.40 percent completed one or two tasks in the written assessment (Table 2). The percentages of students who completed their tasks on the standardized oral examination were as follows: 18.71 percent completed all six tasks, 42.88 percent completed three to five tasks, and 38.40 percent completed one or two tasks. The grouping of students to evaluate their grades was based on
completion of the tasks in the written assessment and standardized oral examination.

Out of 124 Group I students (with all six tasks completed in the written assessment), 4.03 percent fell into the Grade I category, 88.70 percent into the Grade II category, and 7.25 percent into the Grade III category. Of the 351 students in the Group II category (three to five tasks completed), 21.08 percent fell into the Grade II category, 78.91 percent into the Grade III category, and none in Grade I category. Thirty-eight Group III students (one or two tasks completed) fell into the Grade III category, with none in the Grade I and II categories.

Out of ninety-six Group I students on the standardized oral examination, 84.37 percent fell into the Grade II category, 15.62 percent into the Grade III category, and none in Grade I category. Thirty-eight Group III students (one or two tasks completed) fell into the Grade III category, with none in the Grade I and II categories.

Figure 1. Two stages of student evaluation used in study
category, and none in the Grade I category. Of the 220 students in the Group II category, 7.72 percent fell into the Grade II category, 92.27 percent into the Grade III category, and none in the Grade I category. All 197 students in the Group III category fell into the Grade III category.

The grades of the students on the written assessment and standardized oral examination were correlated with the final examination (Table 4). In the comparison of grades on the written assessment with the final examination, only seven students fell into the Grade I category, while 113 fell into the Grade II category and none into the Grade III category. There were variations when comparing the grades on the standardized oral examination to the final examination: six students fell into the Grade I category, ninety fell into the Grade II category and none into the Grade III category.

Discussion

Most information in the dental education literature concerning curricular assessment concerns either the entire curriculum in preparation for accreditation site visits or individual courses based on student evaluations. An evaluation system with multiple means of assessment is needed to assess students’ performance across the curriculum in order to improve the quality and effectiveness of teaching and thereby produce pediatric dentists who can competently diagnose, manage, and treat children ethically. There is an increase in both the validity and reliability of traditional assessment strategies.

<table>
<thead>
<tr>
<th>Completion of WA</th>
<th>Grade of More Than 75%</th>
<th>Grade of 50-74%</th>
<th>Grade of Less Than 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>5 (4.03%)</td>
<td>110 (88.70%)</td>
<td>9 (7.25%)</td>
</tr>
<tr>
<td>Group II</td>
<td>0</td>
<td>74 (21.08%)</td>
<td>277 (78.91%)</td>
</tr>
<tr>
<td>Group III</td>
<td>0</td>
<td>0</td>
<td>38 (100%)</td>
</tr>
</tbody>
</table>

Note: Percentages may not total 100% because of rounding.
not a matter of using a good test but rather a matter of making a correct decision based on the test. The assessment methods included in our study were the structured essay and standardized oral examination, which have both benefits and challenges.

This study of our school's assessment of students via completion of the written assessment and standardized oral examination came to the following conclusions. There was a nearly equal number of students in the Group I category of written assessment and standardized oral exam. A student who has regularly attended his or her third- and final-year clinical postings can efficiently complete all the tasks of the written assessments and standardized oral examinations. The majority of the students fell into the Group II category of completing their written assessments and standardized oral examinations although some students were absent during the written assessment or standardized oral examination due to inadequate preparation. Students who fell into the Group III category either in written assessments or standardized oral examinations would have been frequently absent for medical or personal reasons.

Among the Group I students in the written assessment, only a small percentage fell into the Grade I category. The probable reasons are that the student understood the subject and had good presentation skills or the student had good content with the latest advances in the field. The majority of the Group I students fell into the Grade II category, probably due to a lack of understanding the subject and average presentation skills. A few of them fell into the Grade III category, which may be due to poor presentation skills. Among the Group II students, the majority fell into the Grade III category and a few into the Grade II category. These students needed the additional attention of thestaff member, so extra discussions and demonstrations were held to help them improve their understanding of the subject. There were only a few Group III students who fell into the Grade III category. The probable reasons for a low grade could have been that the student had very poor knowledge about the subject, lacked good presentation skills, or intended to prepare in depth only for the final examination.

There were differences between students' scores on the standardized oral exam and the written assessment. None of the students fell into the Grade I category of the standardized oral exam in spite of completing all six tasks. Most of the Group II students fell into the Grade III category. Students who were in Group III also obtained similar grades. The reason could be that these students were not able to be accurate regarding facts and were afraid to face the faculty member during the oral examination. To improve themselves, these students should focus on becoming more knowledgeable about facts. Once they feel comfortable about their knowledge, the fear of facing the faculty member diminishes. In comparison of students' grades on the written assessment and standardized oral exam, there were more students with better scores on the written than the oral examinations.

Students who did not complete all six tasks in the written assessment and standardized oral exam did not possess the mind set to become knowledgeable from the beginning of the course. Probably they prepared well only for the final exam, and some of them were irregular in attending their clinical postings. When students do not perform their tasks regularly in the stipulated two years, it has an effect on their final examination. It is not surprising that the grades of students who fell into Groups II and III did not correlate with their final examination grades. However, students in Group I showed correlation with the final examination grades.

Comparing students' grades on the written assessment and final exam with their grades on the standardized oral exam and final exam had the following results. There were seven students in written assessment and six students in standardized oral exam who were in the Grade I category. Students who have genuinely put in hard work to become knowledgeable scored well on the written assessment and standardized oral examination and obtained satisfactory grades on the final examination. The majority of the students fell into the Grade II category on all three assessment techniques. The overall outcomes were quite favorable for assessing students with the written assessment and standardized oral examination as part of a multicompetency, comprehensive assessment, which had a higher reliability value. According to Albino et al., the many potential techniques of assessing students include the triple-jump exercise, critical appraisal tasks (CATs), OSCEs, portfolios, chart-stimulated evaluations, and global assessment. Others have expressed interest in developing further such types of authentic evaluation as ratings, standardized patients, portfolios, and OSCEs. Implementation of systematic evaluation in educational strategies inevitably means change and is vital to the inclusive learning culture each of our organizations must build and nurture.
The results of our study suggest that continuous assessment with written assessment and standardized oral examinations is a good indicator by providing different measures of students’ performance. The results in our study were positive overall, but there were a few drawbacks. One key point is that our traditional grading system has had a tendency to foster leniency in grading. This is overcome as the rater develops a clear set of criteria to apply to responses on the written assessment. In evaluating the standardized oral examination, there is a possibility for the rater to be susceptible to subjectivity. In spite of these limitations, there is sufficient evidence to conclude that a strong relationship exists between written assessment and standardized oral examination for achieving multicompetency, comprehensive assessment.

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