ORIGINAL ARTICLE

Reliability of rubrics in the assessment of orthodontic oral presentation

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Abstract *Aims:* The aim of this study was to evaluate the reliability of using rubrics in dental education, specifically for undergraduate students' assessment in orthodontic oral presentation.

Methods: A rubric-based case presentation assessment form was introduced to three contributing instructors. In each instructor's group, the course director, along with the assigned instructor, assessed 8 randomly selected fourth year male dental students utilizing the same assessment form (total of 24 students). The two final scorings made by the assigned instructor and the course director were then gathered for each student. The data of this prospective comparative study then was analyzed using paired *t*-test to look for any significant differences in the scoring of the course director and each instructor in each group.

Results: No significant statistical differences were detected in grading variables between the instructors and the course director. Furthermore, the data showed no significant correlations between the students' final course grade, and their case presentation grades scored by instructors'/course director.

Conclusion: Despite the elaborate nature of the routine orthodontic case presentation, the use of rubrics was found to be a promising reliable assessment element.

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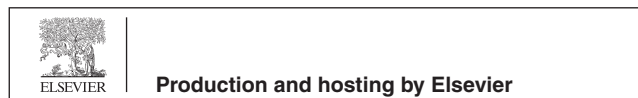
1. Introduction

Teaching and healthcare practice are interrelated. This is due to the service delivery system that requires the attendance of different personal with different levels of knowledge and experience. Teaching in the clinical environment is defined as teaching and learning focused on, and usually directly involving, patients and their problems (Spencer, 2003). And it is interesting to know that the word 'doctor' is derived originally from the Latin word "docere", which means "to teach" (Shapiro, 2001).

Whether in healthcare profession teaching or not, the process of learning and student comprehension is complicated. Many methods have classically proposed ways of thinking behaviors that is believed to be important to the process of learning. Bloom's taxonomy was among the earliest and focused on the knowledge (cognitive) domain (Bloom and

Krathwohl, 1956). Other domains focused on the attitude (affective) domain (Krathwohl and Bloom, 1964) and skills (psychomotor) domain (Simpson, 1972). Curry Onion-Model of learning described further the different aspects (i.e. as layers of onion) of learner and how they learn (Curry, 1983). Each style is characterized by specific features including the ability to acquire knowledge, sort and store information, learners' interaction with peers and society. Making an assessment to test the learner should touch and consider these styles.

Based on the various domains incorporated into the leaning system, an ideal process of student assessment should cover the attitude, skills and knowledge domains. This can be a complex task, however, the awareness of the importance of these aspects in the assessment process is essential.

Assessment can be formative or summative. Formative assessment is essential for monitoring performance during a program of study, while summative assessment usually done at the end of a program such as competency and licensing examinations. Whether formative or summative, methods of assessment vary and require critical planning where any chosen method of assessment must reflect on the nature of the acquired knowledge being tested.

Many evaluation models were proposed based on each learning domain. The objectives approach (Tyler, 1949) provide a consistency between goals, experience, and outcomes. It includes pretest and posttest design that students' progress can be measured from. The Goal-Free Assessment model (Scriven, 1991) advocates the implementation of an external evaluator whom is unaware of the stated goals and objectives. The value of a program will be determined based on the outcomes of a program and its quality. Unlike the CIPP model (context, input, process, and product), where the information for assessment is being gathered from a variety of sources to provide basis for making better decisions (Stufflebeam, 2003). Other models were also proposed such as the Hierarchy of Evaluation model (Kirkpatrick, 1979), and the Naturalistic model (Guba, 1978). Additional assessment method that was found to be reliable in clinical setting for health care professional is the RIME method (Pangaro, 1999). It has four stages of students' development beginning with being a reporter, interpreter, manager, and then educator that leads to professionalism in medicine.

The assessment is the curriculum, as far as the students are concerned (Ramsden, 1992). And whether or not any these assessment models are being adopted, the assessment process has to be undertaken properly to be reflective of the actual students' actual learning. One of the tools used in assessment nowadays is the use of rubrics. Rubrics can be defined as: a scoring guide or scale consisting of a set of criteria that describe what expectations are being assessed/evaluated and descriptions of levels of quality used to evaluate students work or to guide students to desired performance levels.

The use of rubrics has many advantages such as enhancing the quality of direct instructions, save the time used for explanting the assignment, and increases the efficiency of marking (Hancock and Brundage, 2010), and produce grading calibration(Turbow et al., 2016). It improves the quality of students' projects outcomes by providing clear guidelines regarding the expected criteria. It simply fulfills the required need of shifting the assessment methods from being subjective, to fairly objective.

Rubrics are mainly of two types, analytic and holistic. The analytic type is a more of detailed version of rubrics that identifies and assesses the individual components of a completed project. While the holistic assesses student work as a whole. There are also some subtypes of rubrics such as weighting rubrics. Weighting rubrics is an analytic rubric in which certain concepts are judged more heavily than others (Dong et al., 2011).

The process of formulating rubrics can be initially difficult; thus, it requires support, time, and practice. It mainly consists of three major steps. First, the evaluation criteria and the concept being taught have to be chosen. This step is followed by organizing these criteria, and developing a grid and inserting criteria.

In the last decade, rubrics were incorporated in the teaching curriculum of many fields. Recent literature shows its wide applicability and acceptance in the teaching of medicine (Baldwin et al., 2009; D'Antoni et al., 2009), nursing (Daggett, 2008), and pharmacy (Blommel and Abate, 2007). In dentistry, Assessment rubric was used for third year dental student in developing a course toward mastering sound communication skills with patients (White et al., 2008). Also, scoring rubric was implemented to evaluate dental student portfolios as a mean of student competency assessment (Gadbury-Amyot et al., 2003).

Oral case presentation typically included in most of healthcare taught courses. The task allows for initiation of self-learning process, and assess clinical reasoning competency (Wiese et al., 2002), thus requires a crucial assessment tools to reflect student's comprehension. Peer assessment is widely used in this felid as an effective formative assessment tool (Speyer et al., 2011). Other methods including the use of rating scale (Lewin et al., 2013). Whatever the assessment method used, objective reliability stands as important requirement. Although proposals to control such variability was introduced earlier (Kroboth et al., 1992), a continued effort and search shall continue to ensure consistency and reproducibility of such process in the teaching and assessment of each discipline.

Oral case presentation is a vital component of teaching in the discipline of orthodontics. Due to the multiple elements required in its case presentations, the ambiguous level of knowledge display expected, and the increase number of students requiring multiple assessors, a form of rubric is needed to control the process of assessment. The primary aim of this study was to evaluate the reliability of using such a method in dental education, specifically for orthodontic oral case presentation for undergraduate students' assessment. As a secondary aim, potential correlations between instructors'/course director grading and the students' final course grade were investigated.

2. Materials and methods

During a series of three weeks orthodontic case presentation sessions, a new rubric-based case presentation assessment form (Fig. 1) was designed and introduced to three contributing instructors (Instructor A, B, and C). The form included three major categories concerning the quality of records, accuracy of data, and display of understanding the materials being presented. Each category was subdivided for two items for the ease of grading. A simple grading scale (grid) was displayed