

Original Article

Variability in Assessment of Preclinical Prosthodontics Work of Undergraduate Student

Mohamed Elmaroush*, Sarra Ben Hamida, Zieneb Elgarboae, Narjes Mohsen

Department of Prosthodontics, Faculty of Dentistry, University of Tripoli, Tripoli, Libya.

Corresponding Email. m.elmaroush@uot.edu.ly

ABSTRACT

Background and objective. Clinical professions are often concerned not just on the knowledge acquisition, but achievement of skills and their application. Assessment tools employed in preclinical prosthodontic training vary widely, the two most common being used are the glance and grading method and the objective check list criteria, and any assessment procedure employed should be transparent in manner with both the staff and students informed of the purpose and the process adopted. This study was undertaken to examine whether introduction of an objective scoring criteria can improve the validity of scoring in assessment of preclinical prosthodontics (bite block) that done by students. **Methods.** The study evaluated 240 undergraduate students who were in second year of study at dental school Tripoli University, performing a bite block (trial denture base with wax rim) performed on ideal stone cast. The preclinical work (bite block) were evaluated and allotted marks by four blinded independent examiners using two methods of scoring, glance and grade method and objective checklist scoring method. **Results.** The data were parametric and met the normal distribution. Therefore, the scores were presented by mean and standard deviation. There was a significant difference (p value less than 0.005) between two scoring methods of preclinical prosthodontics work (glance and grade and objective checklist methods). **Conclusion.** This study concludes by recommending that preclinical prosthodontics work of students be assessed by objective checklist criteria scoring and it should be introduced after sufficient training and calibration sessions to induce examiner reliability.

Keywords: Variability, Assessment, Prosthodontics, Undergraduate Student.

Citation: Elmaroush M, Ben Hamida S, Elgarboae Z, Mohsen N. Variability in Assessment of Preclinical Prosthodontics Work of Undergraduate Student. Khalij-Libya J Dent Med Res. 2022;6(2):129-133. <https://doi.org/10.47705/kjdmr.2262007>

Received: 01/11/22; **accepted:** 29/11/22; **published:** 30/11/22

Copyright © Khalij-Libya Journal (KJDMR) 2022. Open Access. Some rights reserved. This work is available under the CC BY-NC-SA 3.0 IGO license <https://creativecommons.org/licenses/by-nc-sa/3.0/igo>

INTRODUCTION

Students are exposed to a range of teaching methods during the pre-clinical and clinical years of medical school, although education from a student perspective is largely driven by assessment. Assessment is an integral part of the educational process at any level and in any discipline. It is a process during which “consideration is given to the amount, level, worth, value or quality of outcomes or products of the learning process” [1]. Optimal assessment concept should have outstanding characteristic such as

reliability, validity, accountability, flexibility, comprehensiveness, feasibility, timelines, and reliance [2,3]. The process involves the assessor drawing inferences and making estimates about the value of that product [4]. However, it is not possible to satisfy all of those requirements when assessing student, practical skills and several timely assessment concepts in use do not fulfill all of these criteria [5].

An assessment is designed to evaluate the level of attainment of knowledge, behavior or skills of students. They can be used to facilitate learning and

provide information to the student about their performance in addition to formal recognition of attainment of knowledge or skills. Assessments are usually the main focus for students, and the driving force for them to engage in the learning process.

Clinical professions are often concerned not just on the knowledge acquisition, but achievement of skills and their application. Miller's pyramid [6], attempts to explain how students in professions such as Medicine and Dentistry develop such skills (Figure 1).

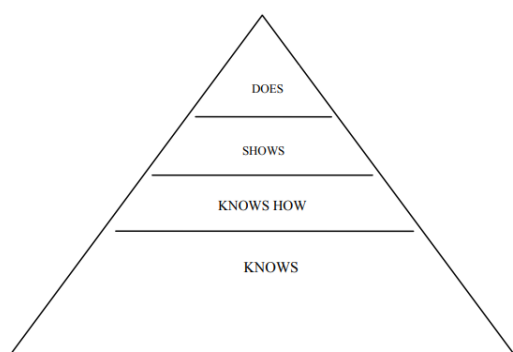


Figure 1. Miller's pyramid

Begin from the base of the triangle, the student should first understand the knowledge only. At this stage they simply know but cannot apply the information. Progression to the "knows how" level is achieved when the student can use that information and can apply it. Further progression up the pyramid is achieved when the student can demonstrate this ability, thus they are deemed to be competent at that particular procedure. When the individual achieves the tip of the pyramid they can perform the procedure. Many studies have reported attempts to develop reliable clinical evaluation systems. On reviewing the literature, there is lack of data concerning evaluation and grading of pre-clinical procedures for construction of removable prostheses. Removable Prosthodontics preclinical study is technical work, which involve construction of bite block (trial denture base with wax rim). The dental student should know and practice the technique of bite block construction to get the skill of evaluation of the technician work in

clinical level. Assessment tools employed in preclinical prosthodontic training vary widely, the two most common being used are the glance and grading method and the objective check list criteria, and any assessment procedure employed should be transparent in manner with both the staff and students informed of the purpose and the process adopted [7,8].

Although traditional "signing-off" assessment like a glance and grading method with little feedback does not encourage learning among the students [9], the well-established 'glance and grade' method still seems to be the most widespread approach to assess dental student's practical performance [10,11]. Nevertheless, these method presents various difficulties, mostly based on the lack of objectivity, and numerous investigation have been conducted in recent years to develop marking systems focused on specific criteria and checklists, as an alternative to this method [12,13]. This study was undertaken to examine whether introduction of an objective scoring criteria can improve the validity of scoring in assessment of preclinical prosthodontics (bite block) that done by students.

METHOD

The study evaluated 240 undergraduate students who were in second year of study at dental school Tripoli University, performing a bite block (trial denture base with wax rim) performed on ideal stone cast. The student use light cure acryl for construction of trial denture base, and pink wax sheet for the wax rim. The students performed these procedures after theory of removable prosthodontics' lectures and demonstration sessions in addition to preclinical training under supervision of prosthodontics lecturer and technician. The students performed the prescribed preclinical performance for this study, as they would be required to perform in a preclinical prosthodontics dentistry university examination. The preclinical work (bite block) were evaluated and allotted marks by four blinded independent examiners using two methods of scoring, glance and

grade method and objective checklist scoring method [Table 1]. The examiners in this study were not subjected to any specific calibration methods except for the briefing of the scores distribution and scoring criteria to be employed. The objective cheek list method in this study was designed and developed by the authors, in such a way that the marks awarded under each criterion will be able to the student to understand why their preclinical work (bite block) has been accepted/rejected, and for better feedback which would greatly encourage them in their learning.

Table 1 objective checklist in objective checklist scoring method

Criteria	Score (1-5)
Trial denture base	
The outline (extension)	
Extension.	
Finishing.	
Wax rim	
Labial inclination.	
Height (occlusal plane)	
Width of the wax rim.	
Cutting end.	
Sealing.	

Scoring criteria:

1. Poor to be redone.
2. Not accepted.
3. Acceptable with minor modification.
4. Acceptable.
5. Excellent work.

Four examiners with different levels of experiences were selected, to understand the influence of two different scoring methods in scoring of preclinical work. The examiners were university teachers and faculty members who had experience of handling preclinical prosthodontics dentistry students with experience of 5_9 years.

The student work has been divided to four groups each group contains of 60 bite block. To reduce the bias of evaluating the bite block by using one method of scoring system prior to using another system of

scoring, the examiners were shifted so two examiners do first evaluate the bite block by glance and grading method followed by objective checklist criteria scoring method. The other two examiners first evaluated the preparations by objective checklist criteria followed by the glance and grading method. In addition to reduce the bias the examiners take time between assessments by two scoring methods about 1 week.

For glance and grading method of scoring the bite blocks were generally evaluated by the examiners on their own, depended on their experience without any preset determined criterion. In objective scoring system the bite block was accepted/ rejected on averaging the scores allotted for each individual criterion and totaled to 40 marks (table 1).

Statistical analysis for intra examiner variability (two methods of scoring, glance and grade method and objective checklist scoring method) was tested using T-test with value of significance at 5 percent using SPSS statistical software.

RESULTS

The data were parametric and met the normal distribution. Therefore, the scores were presented by mean and standard deviation. The intra examiner variability (two methods of scoring, glance and grade method and objective checklist scoring method) are presented in table2 and figure 1. There was a significant difference (p value less than 0.005) between two scoring methods of preclinical prosthodontic work (glance and grade and objective checklist methods).

Table 2 The intra examiner variability in two different scoring methods:

Items	X	SD
Glance and grading scoring method	10.73	2.9
Objective checklist criteria scoring method.	10.26	1.5
dependent samples t-test (p value)	<.005*	<.005*

X: mean, SD: standard deviation. * p is significant at 5% level.

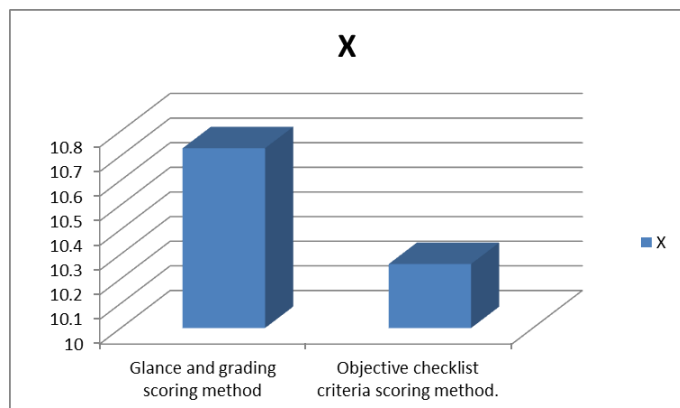


Fig 1 The intra examiner variability

DISCUSSION

Assessment for learning is an educational concept that motivates both the educator and learner to actively improve the learning process and facilitate a positive attitude towards future learning [14]. In Even though there are many methods of assessment apart from that used in this study, like peer assessment and self-assessment which has been shown to greatly improve in learning, in a university examination set up faculty based assessment is widely followed and needed [15]. In our study there was significant difference between glance and grading scoring method and objective checklist scoring method, this is in accordance to study by Sherwood I A and Douglas GV where it has recommending that preclinical operative work of students should be assessed by objective checklist criteria scoring [16]. Moreover, Scott et al. reported that introduction of a criteria list in scoring method does help to achieve a more objective result [17]. Many studies have found that by utilizing objective check list scoring intra examiner variation was significantly reduced, and the intra examiner reliability was greatly improved whereby the same examiner was able to assign scores in a more predictable manner, this increase in reliability was achieved without any prior calibration of examiners (18, 19). These studies result is going with this study result as the scores of objective list scoring method showed lower stander deviation in compare with the glance and grading method. However, one of the

limitations in using objective scoring method is scoring scale has to be developed and customized for every different procedure.

On the other hand, there were studies found that no difference between glance and grading scoring method and objective checklist scoring method in assessing operative procedures performed in plastic teeth [20,21].

CONCLUSION

Within the limitation of this study, it showed that there was a significant difference between two scoring methods of preclinical prosthodontic work (glance and grade and objective checklist methods) and it concludes by recommending that preclinical prosthodontics work of students be assessed by objective checklist criteria scoring and it should be introduced after sufficient training and calibration sessions to induce examiner reliability.

Funding

This study was funded by the Faculty of Dentistry, University of Tripoli

Conflicts of Interest

The authors declare no conflict of interest.

REFERENCES

1. Topping, K. Peer assessment between students in Colleges and Universities. Review of Educational Research. 1998;68:249-276.
2. Mays KA, Levine E. Dental student's self-assessment of operative preparation using CAD/CAM: a preliminary analysis. J Dent Educ 2014;78:1673-1680.
3. Turnbull J, Gray J, Improving in -traning evaluation programs. J Gen Intern Med 1998;13: 317-323.
4. Manogue M, Kelly M, Bartakova Masaryk S, et al. 2.1 Evolving methods of assessment. Eur J Dent Educ. 2002;6 Suppl 3:53-66. doi:10.1034/j.1600-0579.6.s3.8.x
5. Taylor CL, Grey N, Satterthwaite JD. Assessing the clinical skills of dental students: a review of literature. J Educ Learn 2013;2:20-31.

6. Miller, G. The assessment of Clinical Skills/ Competence/ Performance. *Academic Medicine*, 1990;65(9):563-567.
7. Manogue M, Brown G, Foster H. Clinical assessment of dental students: Values and practices of teachers in restorative dentistry. *Med Educ* 2001;35:36470.
8. Vann WF, Machen JB, Hounshell PB. Effects of criteria and checklists on reliability in preclinical evaluation. *J Dent Educ* 1983;47:6715.
9. Satterthwaite JD, Grey NJ. Peer group assessment of pre-clinical operative skills in restorative dentistry and comparison with experienced assessors. *Eur J Dent Educ* 2008;12:99102.
10. Mossey PA, Newton JP, Stirrups DR. Scope of the OSCE in the assessment of clinical skill in dentistry. *Br Dent J* 2001;190:323-326.
11. Scott BJ, Evans DJ, Drummond JR, Mossey PA. An investigation into the use of structured clinical operative test for assessment of a clinical skill. *Eur J Dent Educ* 2001;5:31-37.
12. Dhuru VB, Rypel TS, Johnston WM. Criterion-oriented grading system for preclinical operative dentistry laboratory course. *J Dent Educ* 1978; 42:528-531.
13. Gratton DG, Kwon SR, Blanchette DR, Aquilino SA. Performance of two different digital evaluation systems used for assessing preclinical dental student' prosthodontic technical skill. *Eur J Dent Educ* 2017;21:252-260.
14. Mohamed El-Kishawi , Khaled Khalaf , Dana Al-Najjar, Zahra Seraj, and Sausan Al Kawas. Rethinking Assessment Concepts in Dental Education *International Journal of Dentistry* 2020; 5: 8672303.
15. Sherwood I A, Douglas GV. A study of examiner variability in assessment of preclinical class II amalgam preparation . *J Educ Ethics Dent* 2014;4:12-7.
16. Scott BJ, Evans DJ, Drummond JR, Mossey PA, Stirrups DR. An investigation into the use of a structured clinical operative test for the assessment of a clinical skill. *Eur J Dent Educ* 2001;5:3137.
17. Future use of materials for dental restoration. Report of the meeting convened at WHO HQ, Geneva, Switzerland Geneva, Switzerland: WHO document production services; 2009. p. 278.
18. Park RD, Susarla SM, Howell TH, Karimbux NY. Differences in clinical grading associated with instructor status. *Eur J Dent Educ* 2009;13:318.
19. Gansky SA, Pritchard H, Kahl E, Mendoza D, Bird W, Miller AJ, al. Reliability and Validity of a manual dexterity test to predict preclinical grades. *J Dent Educ* 2004;68:98 594.
20. Sharaf AA, AbdelAziz AM, El Meligy OA. Intra and Inter examiner variability in evaluating preclinical pediatric dentistry operative procedures. *J Dent Educ* 200771:5404.
21. D G Gratton , S R Kwon , D R Blanchette , S A Aquilino. Performance of two different digital evaluation systems used for assessing pre-clinical dental students' prosthodontic technical skills. *Eur J Dent Educ*. 2017 Nov; 21(4):252-260.