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Research / Araştırma Makalesi

Evaluation Of Agreement Between Peer and Faculty Assessments in Preclinical Endodontic Education: A Pilot Study

Klinik Öncesi Endodonti Eğitiminde Akran ve Öğretim Üyesi Değerlendirmeleri Arasındaki Uyumun İncelenmesi: Pilot Çalışma

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ABSTRACT

Objective: This pilot study aimed to evaluate the agreement between peer and faculty assessments of dentistry students' performance in a preclinical endodontic practical course.

Method: Data were collected from second-year dentistry students enrolled in the preclinical endodontics practical course at Near East University. Participation in the study was voluntary. Following a theoretical explanation of the endodontic access cavity course by the course coordinator, a demonstration was conducted on preparing endodontic access cavities in both upper and lower premolars. The scoring rubric was then explained to the students in detail. Students were then asked to evaluate their peers' performances anonymously based on the endodontic access cavities prepared during the course. After the peer evaluations, a faculty member graded the students' performances using the same scoring scale. The agreement between peer and faculty evaluations was analyzed using Wilcoxon signed-rank tests, with a significance level set at 0.05.

Results: A significant difference was found between peer and faculty scores for access cavities opened in upper and lower premolars ($P < 0.05$). Faculty evaluation scores were significantly lower than those given by peers. The most common error found by peers was the access cavities being opened too small, whereas the most frequent mistake identified by faculty members was failing to completely remove the pulp chamber roof or horns.

Conclusion: Disagreement was observed between faculty and peer assessments regarding the access cavity preparation during the preclinical endodontic course. Peer evaluation skills of dentistry students can improve through practical training and feedback, aligning them more closely with faculty evaluations.

Keywords: Endodontic, Peer assessment, Dentistry student, Endodontic Curriculum

ÖZ

Amaç: Bu çalışmanın amacı, diş hekimliği öğrencilerinin klinik öncesi endodonti pratik dersindeki performansları ile ilgili akran ve öğretim üyesi değerlendirmeleri arasındaki uyumu incelemektir.

Materyal ve Metot: Veriler, Yakın Doğu Üniversitesi'nde klinik öncesi endodonti pratik dersine kayıtlı olan ve çalışmaya gönüllü olarak katılan 2. Sınıf diş hekimliği öğrencilerinden toplanmıştır. Ders koordinatörünün endodontik giriş kavitesi dersini teorik olarak anlatmasının ardından alt ve üst premolar dişlerde endodontik giriş kavitesi preparasyonu için elde bir demonstrasyon yapılmıştır. Daha sonra açılan kavitelerde dereceli puanlama anahtarı kullanımı öğrencilere detaylı bir şekilde açıklanmıştır. Öğrencilerden, derste açılan endodontik giriş kavitesi ile ilgili akran performanslarını anonim bir şekilde değerlendirmeleri istenmiştir. Akran değerlendirmelerinden sonra, bir akademik personel de aynı dereceli puanlama anahtarını kullanarak öğrenci performanslarını değerlendirmiştir. Akran ve öğretim üyesi değerlendirmeleri arasındaki uyum 0,05 anlamlılık düzeyine sahip Wilcoxon işaretli sıralar testi kullanılarak karşılaştırılmıştır.

Bulgular: Alt ve Üst premolar dişlere açılan giriş kavitelerinde akran ve öğretim üyesi değerlendirme sonuçları arasında anlamlı bir farklılık bulunmuştur ($P <0.05$). Öğretim üyesi değerlendirme notları, akran değerlendirmesi notlarına kıyasla anlamlı derecede daha düşük bulunmuştur. Tespit edilen hataların türü ve sıklığı incelendiğinde, akranlar tarafından en sık görülen hata, giriş kavitelerinin çok küçük açılması olurken; öğretim üyeleri tarafından en sık tespit edilen hata, pulpa odası tavanı veya boynuzunun tamamen uzaklaştırılmaması olmuştur.

Sonuç: Klinik öncesi endodonti eğitimi sırasında giriş kavitesi preparasyonu konusunda öğretim üyeleri ve akran değerlendirmeleri arasında farklılık gözlemlenmiştir. Öğretim üyesi değerlendirmelerine daha yakın olması için uygulamalı eğitim ve geri bildirim yoluyla diş hekimliği öğrencilerinin akran değerlendirme becerileri geliştirilebilir.

Anahtar Kelimeler: Endodonti, Akran değerlendirmesi, Diş hekimliği öğrencisi, Endodonti Müfredatı

Introduction

Dental education aims to ensure that students acquire the knowledge, skills, and attitudes necessary for practicing professional dentistry independently [1]. This encompasses general skills, subject-specific skills, and attitudes [2]. Successfully teaching endodontic procedures, such as opening endodontic access cavities, should enable students to develop psychomotor skills in addition to theoretical knowledge [3]. To provide the best dental care to patients, students must acquire these skills, which can be achieved by effectively completing preclinical courses [4,5].

In dental education, accurate assessment of students' learning processes by both faculty and students is essential to measure students' knowledge and skills [6]. Besides, assessment also enhances students' learning processes if immediate feedbacks are provided [7]. The validity and reliability of assessments can be ensured, particularly through consistent evaluations by faculty members. However, alternative assessment methods, such as peer assessment, can be employed in dental education to assess students' progress more effectively [8].

Peer assessment is one of the assessment tools in which students rate the work or performance of their peers according to specific criteria [9]. This method is grounded in the philosophies of active learning and the development of critical thinking [10]. A meta-analysis study highlighted that peer assessments in the medical field tend to be consistent with instructor assessments. It was also noted that introducing assessment criteria to students is a crucial factor for the successful implementation of the assessment process [11]. Other studies provided evidence that incorporating peer assessment into medical student curricula fosters the development of students' learning skills and yields measurable improvements in professionalism, particularly in clinical skills, which can be maintained in the medium and long term [12,13]. However, peer assessment has rarely been implemented in dentistry training [14]. Endodontics is a challenging and intricate subject, and numerous students often feel unprepared when taking endodontic training [15]. Introducing peer assessment into the dental curriculum could enhance the understanding of endodontic procedures [16]. Therefore, this pilot study aimed to evaluate the skills of opening endodontic access cavities among dental students in a preclinical endodontic practice course through anonymous peer and faculty assessments, as well as the agreement between these evaluations. The null hypothesis of this study was that faculty and peers demonstrate similar agreement in the assessment of access cavity preparation during the preclinical endodontic training.

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Materials and Methods

This pilot study received approval from the Human Resources and Ethics Committee (approval number: YDU/2024/131-1938) and was conducted using data collected from second-year dental students (n:25) enrolled in the preclinical endodontics practical course at Yakın Doğu University. Students were selected from those continuing the preclinical endodontics course who voluntarily agreed to participate in this study. The evaluation of students' skills in opening endodontic access cavities was carried out by their peers and a faculty member.

After the course coordinator theoretically explained the endodontic access cavity course, a hands-on demonstration was provided for both upper and lower premolars. The course coordinator designed a rubric to assess the students' work on a 10-point scale and then shared it with students (**Table 1**). The scoring method using the rubric for endodontic access cavities was explained to the students in detail. To provide students with easy access, the scoring key was created using Google Forms, where points were deducted for each error or deficiency.

Table 1. Instructions that include a scoring method of access cavity in the preclinical endodontic course.

Assessment scores based on detected errors		
Proper access cavity (10 Points)	**Moderate deviation from proper (-1 Point for each error)**	**Unacceptable access cavity (-10 Point)**
1. Entire roof of the pulp chamber was removed 2. Direct straight-line access to the apical third of the root canals was achieved 3. Sound tooth tissue was conserved	1. Access cavity is too large 2. Access cavity is too small 3. Incomplete deroofing/pulp horn removal 4. Pulp Chamber Walls are not Smooth 5. improper outline/shape 6. Access in the wrong location	1. Perforation on the floor/walls 2. Destroying the cusp tip

Following the completion of the opening access cavities on upper and lower premolar teeth, anonymous peer and faculty evaluation stages were carried out. Evaluations were conducted through the Google Forms platform, which was a Data Collection Tool. The form included assessment stages focused on identifying errors and allowed every student to evaluate using a 10-point scoring scale. The evaluation processes occurred in the following order:

Anonymous Peer Evaluation

Students who have completed the opening of their access cavities moved on to the peer evaluation stage, which was organized anonymously by faculty staff. A masked (anonymized) evaluation process was implemented. Students evaluated the access cavity prepared by another student without knowing their identity and scored their peer's work using the scoring scale. During this process, students focused solely on the quality of the work, with the identity of the evaluated student remaining confidential. Faculty staff also did not disclose which student evaluated which cavity, promoting objectivity and reducing biases stemming from personal interactions.

Faculty Member Evaluation

Finally, a faculty member evaluated the access cavities opened by students using the same scoring method without knowing the students' identities. Maintaining anonymity ensured objectivity in the evaluation process. Following the evaluation of each student's performance, constructive feedback was provided to support students' ongoing development.

Data Analysis

Statistical analysis was conducted using SPSS software version 24.0 (IBM Corp, Armonk, NY, USA). The Wilcoxon signed-rank test was used to compare two assessment data: anonymous peer assessment and faculty assessment, with a significance level set at 0.05, as the obtained data do not conform to a normal distribution. Agreement between faculty and peer assessment was evaluated using Intraclass Correlation Coefficient (ICC) analysis. Additionally, performance variations related to identified errors within each assessment category were analyzed using descriptive statistics.

Results

A significant difference was observed between peer and faculty scores for access cavities opened in upper and lower premolars ($P < 0.05$). Faculty evaluation scores were significantly lower than those provided by peers ($P < 0.05$) (**Figure 1**). The findings of ICC revealed a weak reliability and a low level of agreement between peer assessment scores and those provided by faculty when evaluating both upper (ICC = 0.164, 95% CI = -0.102 to 0.466) and lower (ICC = 0.163, 95% CI = -0.172 to 0.493) premolar access cavities. When examining the frequency of errors identified in the evaluation of the opening access cavities of both lower and upper premolar teeth, the most common error found by peers was the access cavities being opened too small, whereas the most frequent mistake identified by faculty members was failing to completely remove the pulp chamber roof or horn (**Figure 2**).

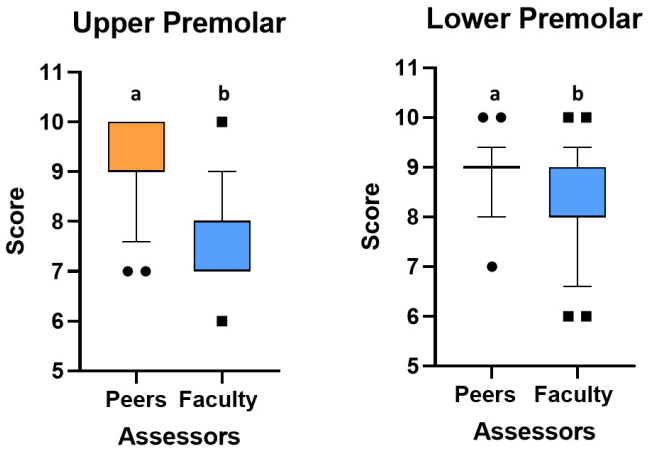

Figure 1. Scores attributed by students and a faculty member regarding tooth type and access cavity preparation. Box plots represent the interquartile range. The line inside each box marks the median, and the whiskers extend to the 10th and 90th percentiles. Different lowercase letters indicate significant differences between groups ($p<0.05$, Wilcoxon signed-rank tests).

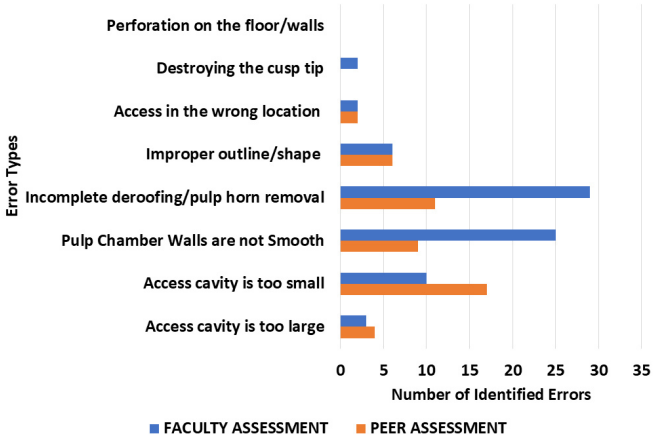

Figure 2. Procedural errors of access cavity recorded by students and a faculty member

Discussion

Peer assessment improves students' assessment skills by enhancing their understanding of assessment criteria and their ability to apply these criteria when evaluating peers' work [17]. Agreement between student and faculty assessments depends on several factors, including clarity and relevance of assessment criteria to the evaluated skill, as well as students' level of conceptual understanding [18]. Consistent with the results of the previous study, our findings revealed disagreement

between faculty and peer assessments regarding access cavity preparation [19]. Therefore, the null hypothesis was rejected. We observed a significant difference between the scores given by peers and faculty members during the evaluation of the access cavity prepared on the upper and lower premolar teeth ($P < 0.05$). Faculty members assigned significantly lower scores compared to peer evaluations. Students tended to overestimate their performances, consistent with a previous study that reported that peers assigned higher scores than faculty members [8]. Literature has similarly shown that evaluations made by faculty members are often lower than student evaluations, particularly regarding preclinical skills [20-22]. To effectively address this discrepancy in dental education, it is essential to implement objective evaluation criteria. This approach will not only enhance the integrity of assessments but also ensure a more consistent and fair learning experience for all students [23].

The results of peer assessment carry important implications regarding the perception of evaluation criteria during the educational process [24]. However, some students may exhibit a more favorable approach to their peers, which contributes to the development of interpersonal relationships and a harmonious environment. This could lead students to rate their peers excessively high, particularly in preclinical or early clinical stages [25,26]. In contrast, faculty members may adopt a more critical stance, adhering to standardized and rigorous evaluation criteria, leading to lower scores in their evaluations. Thus, training, experience, and constructive feedback enhance students' peer assessment skills and attitudes [8].

The findings of our study suggest that peer evaluation processes should be more objective. During the educational process, faculty evaluations can provide a clearer understanding of student development [27]. Therefore, it is advisable to use both evaluation methods in a balanced way within educational programs, establishing detailed feedback mechanisms to help students assess themselves more effectively [16,27]. Moreover, one research has indicated that peer assessment can foster critical thinking skills and enhance self-assessment abilities [28]. However, for peer assessment to be effective, evaluation criteria must be clearly defined, and students should receive proper training beforehand [29]. To reduce biases, such as students' tendency to give each other high scores, assessment processes should be supported by rubrics and guided by faculty members [30].

Several limitations should be considered when interpreting our results. First, the study was conducted at a single dental school with a small number of participants who might be the most motivated and interested in peer assessment. Second, faculty assessments were made by a single investigator, which may introduce bias and limit external validity, making it difficult to generalize findings to all undergraduate dental students. Future research should include a larger cohort of students and faculty members from various universities. Additionally, involving students from multiple universities through random selection would facilitate the analysis of additional variables, such as curriculum type, facilities, time allocated for endodontic education and training, and the staff-to-student ratio, which may help clarify the conflicting results reported in previous studies. Third, we did not analyze the gender of the students, and a previous study has shown differences in assessment ability between male and female students [31]. Future studies should explore whether gender differences are underlying potential reasons. Lastly, we did not assess students' clinical experience since only second-year students were included in this study. Including higher-level students in future research would enable the evaluation of the association between peer assessments and clinical experience.

Conclusion

Faculty and peer assessments showed disagreement regarding the access cavity preparation during the preclinical endodontic course, with students overestimating their performance. This suggests that students' peer evaluation skills can be improved through practical training and feedback to become closer to faculty evaluations. Thus, students can graduate with sufficient knowledge and skills to perform endodontic procedures.

Değerlendirme / Peer-Review

İki Dış Hakem / Çift Taraflı Körleme

Etik Beyan / Ethical statement

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It is declared that during the preparation process of this study, scientific and ethical principles were followed and all the studies benefited are stated in the bibliography.

Benzerlik Taraması / Similarity scan

Yapıldı – ithenticate

Etik Bildirim / Ethical statement

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Çıkar Çatışması / Conflict of interest

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REFERENCES

1. Qutieshat A. Active involvement in dental education and the way to meaningful knowledge: The viewpoint of a dental educator. J Dent Res Rev. 2022;9(2):191-193.
2. Escribano N, Belliard V, Baracco B, Da Silva D, Ceballos L, Fuentes MV. Rubric vs. numeric rating scale: agreement among evaluators on endodontic treatments performed by dental students. BMC Med Educ. 2023;23(1):197.
3. Decurcio D, Lim E, Chaves G, Nagendrababu V, Estrela C, Rossi-Fedele G. Pre-clinical endodontic education outcomes between artificial versus extracted natural teeth: a systematic review. Int Endod J. 2019;52(8):1153-1161.
4. Khattak O, Ganji KK, Iqbal A, Altassan M, Khan FH, Anis R. Beyond labs: unveiling dynamics of dental students' transition from pre-clinical to clinical training in a Saudi dental school. PeerJ. 2024;12:e18019.
5. Kucuk M, Ratakonda M, Piasecki L. Teaching a new obturation technique in preclinical endodontic training: assessment of student learning experience, performance, and self-evaluation. J Endod. 2024;50(11):1634-1641.
6. Teich S, Demko C, Lang L. Students' perception of peer-assessment in the context of a treatment planning course. Eur J Dent Educ. 2015;19(1):8-15.
7. Manogue M, Kelly M, Bartakova Masaryk S, Brown G, Catalanotto F, Choo-Soo T, Delap E, Godoroja P, Morio I, Rotgans J, Saag M. Evolving methods of assessment. Eur J Dent Educ. 2002;6(Suppl 3):53-66.
8. Alfakhry G, Mustafa K, Alagha MA, Zayegh O, Milly H, Shwikani FA, Jamous I. Peer-assessment ability of trainees in clinical restorative dentistry: can it be fostered? BDJ Open. 2022;8(1):22.
9. Ibarra-Sáiz MS, Rodríguez-Gómez G, Boud D. Developing student competence through peer assessment: the role of feedback, self-regulation and evaluative judgement. High Educ. 2020;80(1):137-156.
10. Ndoye A. Peer/Self Assessment and Student Learning. Int J Teach Learn High Educ. 2017;29(2):255-269.
11. Li H, Xiong Y, Zang X, Kornhaber ML, Lyu Y, Chung KS, Suen HK. Peer assessment in the digital age: a meta-analysis comparing peer and teacher ratings. Assess Eval High Educ. 2016;41(2):245-64
12. Brierley C, Ellis L, Reid ER. Peer-assisted learning in medical education: A systematic review and meta-analysis. Med Educ. 2022;56(4):365-373.
13. Nofziger AC, Naumburg EH, Davis BJ, Mooney CJ, Epstein RM. Impact of peer assessment on the professional development of medical students: a qualitative study. Acad Med. 2010;85(1):140-147.
14. Al Mortadi N, Al-Houry SS, Alzoubi KH, Khabour OF. Effectiveness of peer evaluation in learning process: a case from dental technology students. Open Dent J. 2020;14(1)
15. AlRahabi MK, AlKady AM, Ghabbani HM. Agreement between faculty member assessments and student self-assessments in a preclinical endodontic programme. Aust Endod J. 2019;45(3):346-351.
16. Awooda EM, Elzaki WM, Al-Nazhan SA. Agreement between students' self/peer and faculty assessments of the radiographic technical quality of root canal treatment performed during preclinical and clinical endodontic courses. Saudi Dent J. 2025;15(1):53-58.
17. Brkić L, Mekterović I, Fertalj M, Mekterović D. Peer assessment methodology of open-ended assignments: Insights from a two-year case study within a university course using novel open source system. Comput Educ. 2024;213:105001.
18. Alfakhry G, Mustafa K, Ybrode K, Jazayerli B, Milly H, Abohajar S, Hassan H, Alhomsi K, Jamous I. Evaluation of a workplace assessment method designed to improve self-assessment in operative dentistry: a quasi-experiment. BMC Med Educ. 2023;23(1):491.
19. Baracco B, Escribano N, Da Silva D, Belliard V, Ceballos L, Fuentes V. Factors influencing the agreement between teachers and students in the assessment of preclinical endodontics using a rubric. BMC Med Educ. 2025;25(1):1-9.
20. Sojka J, Gupta AK, Deeter-Schmelz DR. Student and faculty perceptions of student evaluations of teaching: A study of similarities and differences. Coll Teach. 2002;50(2):44-49.
21. Wagner ML, Suh DC, Cruz S. Peer-and self-grading compared to faculty grading. Am J Pharm Educ. 2011;75(7):130.
22. Foley JI, Richardson GL, Drummie J. Agreement among dental students, peer assessors, and tutor in assessing students' competence in preclinical skills. J Dent Educ. 2015;79(11):1320-1324.
23. Bizhang M, Adib Shaban H, Vahlenkamp A, Zimmer S, Möltner A, Ehlers J. Reduction of discrepancies between students and instructors in the assessment of practical tasks through structured evaluation sheets and peer feedback. Sci Rep. 2024;14(1):1514.
24. Alzaid JM. The Effect of Peer Assessment on the Evaluation Process of Students. Int Educ Stud. 2017;10(6):159-173.
25. Tandiono R, Limijaya A. Understanding rater bias in self and peer assessment among university students: a cultural psychology perspective. Asia Pac Educ Res. 2025;34(4):1561-1571.
26. Lerchenfeldt S, Mi M, Eng M. The utilization of peer feedback during collaborative learning in undergraduate medical education: a systematic review. BMC Med Educ. 2019;19(1):321.
27. Stančić M. Peer assessment as a learning and self-assessment tool: a look inside the black box. Assess Eval High Educ. 2021;46(6):852-864.
28. Kumar T, Soozandehfar SMA, Hashemifardnia A, Mombeini R. Self vs. peer assessment activities in EFL-speaking classes: impacts on students' self-regulated learning, critical thinking, and problem-solving skills. Lang Test Asia. 2023;13(1):36.
29. Vu TT, Dall'Alba G. Students' experience of peer assessment in a professional course. Assess Eval High Educ. 2007;32(5):541-556.
30. Jonsson A, Svingby G. The use of scoring rubrics: Reliability, validity and educational consequences. Educ Res Rev. 2007;2(2):130-144.
31. Kornmehl DL, Patel E, Agrawal R, Harris JR, Ba AK, Ohyama H. The effect of gender on student self-assessment skills in operative preclinical dentistry. J Dent Educ. 2021;85(9):1511-1517.