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An Investigation on Self-assessment Skills of Second Year Dentistry Students in Restorative Treatment Preclinical Practices

Objective: Self-assessment is a crucial skill for dentists and healthcare professionals as it allows them to engage in critical thinking and develop effective treatment strategies. Therefore, the objective of this study was to assess the self-assessment skills of second-year dental students and to explore whether these abilities are influenced by gender differences and students' grade point averages (GAP).

Materials and Methods: In this study, 100 second-year dental students who participated in a preclinical practical exam performed class II amalgam cavity preparation and restoration. They were asked to self-assess their own work. Two faculty members independently graded all procedures. The data were analyzed in terms of the student self-assessment scores, faculty scores, and the gap score (S-F) as difference between self-assessment (S) and faculty assessment (F).

Results: The answers of 51 (31 females, 20 males) out of 100 students were analysed (51%=participation ratio). There was a statistically significant difference between the students' assessments and faculty assessments ($p<0.05$). Both males and females had positive S-F gap, which means that the students generally overestimated their performance. Also, there was not any statistically significant difference in S-F gaps in terms of gender and GPA ($p>0.05$). Only the females had negative correlations between their GPA-faculty scores and GPA-self assessment scores ($p<0.05$).

Conclusion: Overestimation was generally common among the second year dental students. However, it was not statistically significant in terms of gender and GPA. To be able to improve students' skill, self-assessment may be integrated into curriculum and practiced more frequently within more extended time.

Key Words: Self-assessment, restorative dentistry, preclinical skill

Restoratif Tedavi Preklinik Uygulamalarında Diş Hekimliği İkinci Sınıf Öğrencilerinin Özdeğerlendirme Yetenekleri Üzerine Bir Araştırma

Amaç: Öz değerlendirme, eleştirel düşünme ve uygun tedavi stratejilerini sağladığı için diş hekimleri ve sağlık hizmeti sağlayıcıları için çok önemli bir beceridir. Dolayısıyla bu çalışmanın amacı, diş hekimliği ikinci sınıf öğrencilerinin öz değerlendirme becerilerini belirleyip cinsiyet farklılığı ve öğrencilerin not ortalamalarından etkilenip etkilenmediğini değerlendirmektir.

Gereç ve Yöntem: Bu çalışmada preklinikteki uygulamalı sınava katılan ikinci sınıftaki 100 diş hekimliği öğrencisi sınıf II amalgam kavite preparasyonu ve restorasyonunu gerçekleştirdi. Öğrencilerden işlemlerini değerlendirmeleri istendi. İki tam zamanlı akademik personel de tüm prosedürleri bağımsız olarak değerlendirdi. Veriler, öğrencinin öz değerlendirme puanları, fakülte puanları ve öz değerlendirme ile fakülte değerlendirmesi arasındaki fark puanı (S-F) açısından analiz edildi.

Bulgular: 100 öğrenciden 51'inin (31 kız, 20 erkek) yanıtları analiz edildi (%51=katılım oranı). Öğrencilerin değerlendirmeleri ile fakülte değerlendirmeleri arasında istatistiksel olarak anlamlı bir fark olduğu belirlendi ($p<0.05$). Hem erkeklerde hem de kızlarda öğrencilerin genellikle performanslarını olduğundan fazla olarak değerlendirdikleri pozitif notlandırmanın olduğu gözlemlendi. Ayrıca cinsiyet ve genel not ortalamasına göre bu notlandırmada istatistiksel olarak anlamlı bir fark elde edilmedi ($p>0.05$). Sadece kızların genel not ortalaması-fakülte puanları ile not ortalaması-öz değerlendirme puanları arasında negatif korelasyon belirlendi ($p<0.05$).

Sonuç: İkinci sınıf diş hekimliği öğrencilerinin öz değerlendirme puanlarının fakülte değerlendirmesine göre genel olarak yüksek olduğu belirlenmiştir. Ancak cinsiyet ve genel not ortalaması açısından istatistiksel olarak anlamlı bir fark gözlenmemiştir. Öğrencilerin bu yeteneklerini geliştirebilmek için öz değerlendirme müfredata entegre edilebilir ve daha uzun bir süre içinde daha sık uygulanabilir.

Anahtar Kelimeler: Özdeğerlendirme, restoratif diş hekimliği, preklinik yetenek

Introduction

Assessment can be categorized fundamentally as formative and summative. Formative assessment is used to describe learning gaps, shaping the future learning and encouraging reflection whereas summative assessment evaluates the learning, knowledge and competence at the conclusion of a learning process (1). One-sided

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teacher assessment, which can be characterised as a quick grading method, may be unstable, subjective, and commonly utilised by many assessment methods. However, these methods do not involve reflection, lifelong learning and critical thinking capacities. Because these assessments are considered as the endpoint of a learning process instead of a beginning, they do not provide students to improve their own learning (2, 3). Furthermore, students can not adequately realize the importance of the effect of the assessments on their learning (3).

Self-assessment, also known as self-appraisal, is a method that actively involves learners in an interactive process aimed at achieving learning objectives by fostering personal responsibility (4). Health care providers are moving, or being moved, to a place where they should set a goal and regularly evaluate their performance (5). Self-assessment and critical thinking are essential for health care providers to reflect their knowledge and skills (6). It helps understand their learning gaps, performance and shortcomings (7). In dental education, self-assessment is generally accepted as the best practice, performed after preclinical or clinical procedures, in the form of laboratory exercises or clinical practices. The primary aim of dental training programs is to improve students' self-assessment skills. The Commission on Dental Accreditation reported that "graduates must demonstrate their ability to self-assess" (4). Thus, all graduates must be competent in the knowledge, skills, and values needed to be able to practice as a new practitioner (6).

As self-assessment ability is limited during health education, it should be implemented throughout the curricula and developed to supply an adequate environment for the learners (8). Students may adjust their abilities where necessary with self-assessment (9). They can improve their reflection and see their progress (10). Also, self-assessment ability may decrease the discrepancy between assessment of students and faculty members (11). According to the results of some studies gender differences and academic performance, accordingly grade point averages (GPA) have some effects on self assessment ability (12, 13). Thus, the aim of present study is to assess self-assessment skills of second-year dental students, evaluating its relation with gender differences and GPA.

Materials and Methods

Research and Publication Ethics: This study was conducted at Karadeniz Technical University Faculty of Dentistry in 2022 (Ethical approval number 64529847/12). A total of 100 second-year dental students were informed for their voluntary participation in the research. Moreover, it was emphasized that they could withdraw from the research when they wished.

Study Design: Present study took place at the end of the second clinical semester of 2022 (among second-year dental students) in preclinical laboratory of Karadeniz Technical University, Faculty of Dentistry. At

the end of the year a preclinical practical exam was conducted and 100 second year dental students attended to the exam. In the practical exam in preclinical laboratory, the students were asked to drill out a class II amalgam cavity on a plastic tooth, number 46. The criteria for including students in the research was on voluntary basis. The final restorations were evaluated out of 100 points as cavity preparation, base application, wedge and matrix application and amalgam restoration separately (14).

This study was conducted by two calibrated instructors at the end of the course. Two full-time faculty members (KD and INÇA) who participated in a calibration exercise before grading were responsible for the assessment of the students in the study. Following didactic instruction, they came to a consensus regarding the cavity principles, assessment of cavity preparation and criteria before proceeding with the grading rubric. S (self assessment) and F (faculty assessment) were the main variables of the study. The students were informed about the criteria how to evaluate the treatment steps with specific instructions and they were asked to grade the restorative steps they had made in the same way.

Following the explanation, the instructors addressed any questions from students, aiming to ensure all students had the same level of knowledge before evaluation. Students completed their self-assessments retrospectively after completing the procedure. The students also stated their gender and GPA. Then, faculty members assessed students. The steps were evaluated and graded independently and blindly by the researchers. The average of the researchers' scores and the students' scores were calculated. The data were analysed statistically. The difference between the self-assessment scores and the mean faculty assessment scores was defined as the gap (S-F), calculated as self-assessment scores minus faculty assessment scores. A gap score of 0.0 would indicate that there was no difference between the students' assessment and the faculty assessment. A positive gap score would indicate that students assessed their performance more positively than the faculty members did (15).

Statistical Analysis: The data were analyzed using IBM SPSS V23. Normal distribution was assessed using the Shapiro-Wilk test. For normally distributed data, the independent samples t-test was employed. The Wilcoxon test was utilized to compare differences between exam scores and individual grades. Spearman's rho coefficient was used to explore correlations. A significance level of $p < 0.05$ was adopted for all analyses.

Results

A total of 100 second year dental students attended to the exam. After eliminating the missing informations and the students who did not want to participate, 51 (31 females, 20 males) students' answers were analysed (participation ratio=%51).

Table 1. The difference between the students' faculty exam scores and their self-scores

	Females (n=31)		Males (n=20)		Total	
	Mean±Std.d	Median (min-max)	Mean±Std.d	Median (min-max)	Mean±Std.d	Median (min-max)
Faculty exam scores	73±5.2	75 (58-80)	71.3±4.5	72 (61-78)	72.4±5	73 (58-80)
Students' self scores	87.5±6.3	89 (70-100)	86.2±8.5	85 (65-97)	87±7.2	88 (65-100)
Test statistics*		-4.844		-3.784		-6.0128
p		<0.001		<0.001		<0.001

*Wilcoxon test Std.d: Standart deviation p<0.05

Table 2. Correlation analysis of students' GPA and their faculty and self exam scores by gender

Sex	Indicator	Faculty exam scores	Students' self-scores
Female	r	-0.440	-0.507
	p	0.013	0.004
Male	r	0.314	0.292
	p	0.178	0.212
Total	r	-0.094	-0.193
	p	0.514	0.174

r: Spearman's rho correlation value p<0.05

Table 3. Comparison of the differences between students' self scores and faculty exam scores (S-F gap) by gender

	n	Mean±std.d**	Median(min-max)	Test sta.*	p
Females	31	14.5±6	15(-2:30)	-0.180	0.858
Males	20	14.9±8.5	14.5(-2:31)		
Total	51	14.6±7	15(-2:31)		

*Independent samples t test; ** Self scores–Faculty exam scores std.d: standart deviation p<0.05

The difference between the students' exam scores and their self-scores is shown in Table 1. When females were evaluated within themselves, the median exam score was 75 and their self-score median was 89. The difference between the obtained values from the formative and self evaluation was statistically different (p<0.001). Similarly, when males were evaluated within themselves, the median exam score was 72 and their self score median was 85. The obtained values showed statistical difference (p<0.001). When the scores for all cases were evaluated, regardless of males or females, the median faculty exam score value was 73, while the median self score value was determined as 88, and the difference was statistically significant (p<0.001).

Correlation analysis of GPA and students' scores in terms of gender is presented in Table 2. A negative relationship was detected between GPA and faculty exam scores in females, and the correlation value obtained was statistically significant (r=-0.440; p=0.013). A negative relationship was also detected between GPA and their self scores in females, and the correlation value obtained was statistically significant (r=-0.507; p=0.004). For males, no statistically significant relationship was detected between GAP and their scores (p>0.05). When all participants were examined,

regardless of males or females, no significant relationship was found between GPA and exam scores (p>0.05).

The comparison of differences between the students' exam scores and self-scores by gender is presented in Table 3. According to the results of the analysis, the mean of the differences in females was 14.5, while it was 14.9 in males, and the differences obtained did not differ according to gender (p=0.858). In total the mean value was 14.6.

The correlation analysis of (S-F gap) and GPA in terms of sex was shown in Table 4. The correlation relation between (S-F gap) and GPA was not found to be statistically significant in terms of sex and in total (p>0.05).

Table 4. Correlation analysis of the students' self-scores and faculty-scores (S-F gap) and GPA by gender

Sex	r	p
Female	-0.252	0.172
Male	0.120	0.613
Total	-0.131	0.359

r: Spearman's rho correlation value p<0.05

Discussion

Dental education covers significant amount of practical learning. Self-assessment may support students to discover new knowledge and skills which can be applied towards patient care during practical learning. Thus, it is important for the students how to learn and apply self-assessment in dental education (16). After dental education, an essential factor for becoming a successful dentist in clinical procedures is the ability to effectively self-assess clinical competence, as it helps in understanding skills and identifying areas of weakness (17). Thus, self-assessment should be implemented from the initial stages of preclinical practices and maintained throughout clinical procedures with a consistent structure to facilitate improvement (4).

This study aimed to assess the self-assessment skills of second-year dental students based on their practice in the final exam at the end of the academic year. The results indicated a statistically significant difference between the students' self-assessments and the faculty formal assessments. Both male and female students showed positive gaps (S-F), indicating that they tended to rate their own performance more favorably compared to the faculty evaluations ($p < 0.001$, Table 1). This means that the students generally overrated their performance (15). Also, there was no statistically significant difference in S-F gaps in terms of gender and GPA ($p > 0.05$; Table 3 and Table 4). Only the females had negative correlations between their GPA-faculty scores and GPA-self assessment scores ($p < 0.05$; Table 2). This may be explained that women with high GPA might not have performed well in the practical exam and they could self-assess it. On the other hand, females with low GPA might have performed better and they could self-assess it.

When related studies were considered, it is evident that overestimation is a common occurrence among students, and there is often a negative correlation between self-assessment and performance of the students. Kornmehl *et al.* observed that students tended to overestimate their skills compared to faculty members (12). Male students exhibited a more significant tendency to overestimate, particularly in class II amalgam preparation. However, when analyzing the gaps (S-F) across all procedures, male students consistently overestimated their performance in comparison to females (12). Tuncer *et al.* observed that lower performing students were in tendency to overrate their performance while the higher performing students were in tendency to underrate it in the second year dental education (16). Lee *et al.* noted that students in

preclinical operative dentistry often overestimated their performance in comparison to faculty evaluations (15). Self-assessment accuracy showed a strong correlation with actual preclinical performance. Students with lower performance levels tended to significantly overestimate their own assessment scores compared to their peers, whereas higher performing students were more accurate and even tended to underestimate their abilities. Interestingly, academic performance did not strongly influence either self-assessment accuracy or preclinical performance (15). Gordon stated that self-assessment corresponds with a student's level of confidence rather than actual performance (18). In contrast to these studies and our study, it was stated that students' assessments were reliable with the assessments of the faculty members (19). This condition was explained with the long examination time with different training periods, in order to query also the skills of advanced students and so to see their progress about the development of competencies.

There are some barriers in self-assessment. These barriers may be the highly competitive study environment and the impression that it might be negative to reveal too many deficiencies to the faculty members (20). Also, students might have difficulty in grading their work. Grading might reduce the effect of self-assessment (3). These factors might have increased the overestimation in present study.

There were some limitations in this study. The sample size was small. The self assessment was only measured during one exam, in a restricted time. Only the second year dental students were included. These students just experienced dental self-assessment. They did not gain practical experience directly from treating patients, but instead received theoretical training through various classes and practical training in a phantom head course. Different simulators may be used for the students to improve their self assessments (21). It may be useful to extend the self-assessment time. Also, different classes may have different self assessment skills. The assessment of the peers is another important factor to improve the assessment skills of the students (22). These points should be considered in the future studies.

In conclusion, the results of this study showed that overestimation was generally common in the second year dentistry students. However, it was not statistically significant in terms of gender and GPA. To be able to improve students' ability, self-assessment may be integrated into curriculum and practiced more frequently within more extended time.

References

1. Van der Vleuten C. The assesment of professional competence: Developments, research and practical implications. *Adv Heal Sci Educ Theory Pr* 1996; 1: 41-67.
2. Birenbaum M, Breuer K, Cascallar E, et al. A learning integrated assessment system. EARLI (European Association for Research on Learning and Instruction) series of position papers. G. IWRN, editor. 2005. 1–8 p.
3. Burrows R. Understanding self-assessment in undergraduate dental education. *Br Dent J* 2018; 224(11): 897-900.
4. Mays K, Branch-Mays G. A systematic review of the use of self-assessment in preclinical and clinical dental education. *J Dent Educ* 2016; 80(8): 902-913.

5. Evans A, McKenna C, Oliver M. Self-assessment in medical practice. *J R Soc Med* 2002; 95(10): 511-513.
6. Tucker C, Efurud M, Turley S. e-Portfolios and self-assessment in dental hygiene education: A pilot study. *J Allied Heal* 2019; 48(3): 217-219.
7. Kornmehl D, Ohyama H. Self-assessment in dental education: A decade of insights and perspectives in preclinical operative dentistry. *J Dent Educ* 2024; 1-5.
8. Davis D, Mazmanian P, Fordis M, et al. Accuracy of physician self-assessment compared with observed measures of competence: A systematic review. *J Am Med Assoc* 2006; 296(9): 1094-1102.
9. Manogue M, Rohlin M, Mattheos N et al. A need to clarify the outcome of dental education in terms of competence. *Eur J Dent EducDental Educ* 2014; 18(2): 69.
10. Garrison C, Ehringhaus M. Formative and summative assessments in the classroom. Association for middle level education. National Middle School Association; Measured Progress. 29 July 2011. 2012. p. <http://www.amle.org/publications/webexclusive/asse>.
11. Huth K, Baumann M, Kollmuss M, et al. Assessment of practical tasks in the phantom course of conservative dentistry by pre-defined criteria: A comparison between self-assessment by students and assessment by instructors. *Eur J Dent Educ* 2017; 21(1): 37-45.
12. Kornmehl D, Patel E, Agrawal R, et al. The effect of gender on student self-assessment skills in operative preclinical dentistry. *J Dent Educ* 2021; 85(9): 1511-1517.
13. Mould M, Bray K, Gadbury-Amyot C. Student self-assessment in dental hygiene education: A cornerstone of critical thinking and problem-solving. *J Dent Educ* 2011; 75(8): 1061-1072.
14. Jokstad A, Mjör I. Cavity designs for class II amalgam restorations. A literature review and a suggested system for evaluation. *Acta Odontol Scand* 1987; 45(4): 257-273.
15. Lee C, Asher S, Chutinan S, et al. The relationship between dental students' assessment ability and preclinical and academic performance in operative dentistry. *J Dent Educ* 2017; 81(3): 310-317.
16. Tuncer D, Arhun N, Yamanel K, et al. Dental students' ability to assess their performance in a preclinical restorative course: Comparison of students' and faculty members' assessments. *J Dent Educ* 2015; 79(6): 658-664.
17. Fitzgerald J, White C, Gruppen L. A longitudinal study of self-assessment accuracy. *Med Educ* 2003; 37(7): 645-649.
18. Gordon M. A review of the validity and accuracy of self-assessments in health professions training. *Acad Med* 1991; 66(12): 762-769.
19. Ciardo A, Möltner A, Rüttermann S, et al. Students' self-assessment of competencies in the phantom course of operative dentistry. *Eur J Dent Educ* 2019; 23(2): 204-211.
20. Westberg J, Jason H. Fostering learners' reflection and self-assessment. *Fam Med* 1994; 26(5): 278-282.
21. Rodrigues P, Nicolau F, Norte M, et al. Preclinical dental students self-assessment of an improved operative dentistry virtual reality simulator with haptic feedback. *Sci Rep* 2023; 13(1): 2823.
22. Ellakany P, El Tantawi M, Al-Eraky D, et al. Self-assessment and peer-assessment of the psychomotor skills in preclinical prosthodontics: A prospective study. *Eur J Dent Educ* 2023; 27(3): 601-609.