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## Perceptions of Dental Students toward Dentistry and Difficulties They Face during Preclinical Operative Dentistry Education

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### Cover Page Footnote

CONFLICT OF INTEREST The authors report that there are not any financial, economic or professional interests that may have influenced the design, execution or presentation of the scholarly work.

## **ORIGINAL ARTICLE**

# **Perceptions of Dental Students toward Dentistry and Difficulties They Face during Preclinical Operative Dentistry Education**

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## **ABSTRACT**

**Objective:** The aim of this study is to assess the attitudes of dental students toward dentistry and the difficulties they face during their preclinical operative dentistry education, especially its practical aspect. **Methods:** About 100 third-year dental students answered a paper-based survey questionnaire (response rate = 90.90%), which was prepared and distributed in April 2019. The data were analyzed using SPSS version 22 (IBM SPSS, Turkey), and a one-way ANOVA test was used to determine the students' competence for patient treatment based on their difficulty scores. **Results:** No statistically significant relationship was identified between the participants' difficulty scores and grade point averages ( $p > 0.05$ ). The students who felt ready for their clinical dental education phase—due the following year—had statistically significant lower difficulty scores than those who felt incompetent and uncertain ( $p: 0.005; p < 0.05$ ). Notably, there was no statistically significant difference in the difficulty scores ( $p > 0.05$ ) between the participants who felt incompetent and uncertain. **Conclusion:** Dental practice plays an important role in preclinical operative dentistry education. Therefore, dental students should be adequately prepared for operative preclinical practice, which can be achieved by offering more preclinical practice through collaboration with educators.

**Key words:** curricula, competence, dental education, dental equipment, operative dentistry

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## **INTRODUCTION**

Choosing a profession is a turning point that affects one's entire future.<sup>1</sup> Among all professions in the healthcare industry, dentistry is one that is not only more preferred but is also immensely demanding.<sup>2,3</sup> There are many factors that motivate students to choose dentistry<sup>1,4,5</sup>—economic, professional, vocational, social, and personal.<sup>6</sup>

Dental education comprises both preclinical and clinical dental experiences.<sup>7</sup> While preclinical dental education combines theoretical teaching with practical exercises in the laboratory, clinical dentistry entails a large amount of knowledge that needs to be combined with clinical skills and problem-solving competencies. Notably, clinical skills include oral physical examinations, patient consultations, and performing other responsibilities related to dental practice. For

an accurate clinical diagnosis and treatment, dentists must combine their knowledge and experience with the information obtained from their patients.<sup>8,9</sup>

Preclinical operative training plays an important role in making dental students feel confident and prepared for clinical operative dentistry education. One of the most important aims of preclinical dentistry is to enhance dental students' motor skills and enable them to deliver effective patient care.<sup>10</sup> During preclinical operative dentistry education, students begin to study and perform dental practice with artificial teeth or extracted human teeth. In addition, theoretical lectures are delivered in conjunction with practical courses. Students are evaluated in terms of their assignments, theoretical examinations, and practical examinations.

Dental students whose strengths lie in theoretical knowledge, be it due to their previous educational background or otherwise, tend to face difficulties with preclinical dental education because of its practical aspect.<sup>11</sup> These difficulties may affect students' education and clinical performance in the future. During the clinical performance of operative dentistry, dental students are required to know and demonstrate certain crucial competencies, such as knowledge of how to properly remove all dental caries without perforating the pulp tissue, using rotary instruments in a controlled manner, and knowing the difference between enamel and dentin during treatment, among others. These basic and vital principles are learned during preclinical operative dentistry education. However, to our knowledge, only a limited number of articles have explored the difficulties that dental students face during their preclinical operative dentistry education. Therefore, this study aims to fill this research gap by evaluating the relationship between students' operative dentistry difficulty scores and their grade point averages, as well as their readiness for clinical operative dentistry education.

## **METHODS**

### **Subjects' recruitment**

Approval for this study was granted by the Karadeniz Technical University Medical Research Ethics Committee on 19 February 2019 with reference number 2019-61. The participants were 110 third-year dental students who were provided with informed consent forms for their voluntary participation in the research. Additionally, it was emphasized that they could withdraw from the research at any time.

### **Survey instrument**

After a comprehensive literature review and obtaining experts' opinions on each question, a 22-item survey questionnaire was originally developed. The questionnaire was pretested by three students to ensure its comprehensibility. The questions were divided into three sections. The aim of the first section was to assess the participants' gender and grade point averages. Participants were also asked whether they had any dentists in their families. Meanwhile, the fourth question asked respondents to assess whether they willingly chose dentistry as their profession. This question was further divided into two subgroups depending on whether the participants answered positively or negatively. The subgroups of the fourth question inquired about the reasons behind their choice

to pursue dentistry and their current attitude toward the profession.

In the second section, the participants were asked to grade the difficulty they were currently experiencing in their preclinical practice. The participants' difficulty scores were grouped into three categories—low, medium, and high—based on two cut-off points. The third section assessed the participants' knowledge about dental tools, dental practice, and their competence in treating a patient. The paper-based questionnaire was conducted in April 2019. Notably, the participants were not asked to indicate their names to maintain their anonymity.

### **Data analysis**

The gathered data were analyzed using SPSS version 22 (IBM SPSS, Turkey). Besides descriptive statistical methods, a one-way ANOVA test was deployed to determine the students' feelings of competence toward patient treatment practices by utilizing their difficulty scores. Moreover, a Pearson correlation analysis was conducted to measure the correlation between the students' difficulty scores and their grade point averages, with p-value of <0.05 considered significant.

## **RESULTS**

Reliability of the questionnaire was assessed by means of Cronbach's alpha, for which a value of 0.858 was obtained, suggesting that the scale was a reliable tool for studying the population. Furthermore, the values (CMIN/DF = 1.726, CFI = 0.939, GFI = 0.901, IFI = 0.941, TLI = 0.914, SRMR = 0.071) were within acceptable limits for the validity analysis of the questionnaire.

A total of 100 third-year dental students answered the questionnaire (with a response rate of 90.90%), among whom 52% (n = 52) were females and 48% were males (n = 48). Their grade point averages varied between 2 and 3.6 (2.79 ± 0.29). Moreover, about 11% of the participants (n = 11) reported having a dentist in their family, while 89% (n = 89) did not.

The responses revealed that 35% (n = 35) of the participants had chosen dentistry as their profession unwillingly, the reasons for which included the belief that it would lead to good business opportunities (34.3%, n = 12), high income (28.6%, n = 10), the concept of it being a respectable profession (17.1%, n = 6), being influenced by family (11.4%, n = 4),

**Table 1.** The percentages of the participants' difficulty scores during dental practice.

	<b>Not difficult</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>Too difficult</b>
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
<b>Drill selection</b>	27 (27)	27 (27)	20 (20)	14 (14)	6 (6)	3 (3)	2 (2)	1 (1)	-	-
<b>Deciding if dental caries was removed sufficiently</b>	11 (11)	26 (26)	17 (17)	20 (20)	13 (13)	6 (6)	5 (5)	2 (2)	-	-
<b>Restorative material selection</b>	17 (17)	23 (23)	23 (23)	15 (15)	14 (14)	6 (6)	2 (2)	-	-	-
<b>Placing ivory matrix</b>	14 (14)	25 (25)	24 (24)	10 (10)	14 (14)	4 (4)	5 (5)	3 (3)	-	1 (1)
<b>Placing tofflemire matrix</b>	12 (12)	36 (36)	16 (16)	15 (15)	9 (9)	6 (6)	1 (1)	4 (4)	-	1 (1)
<b>Placing dental wedge</b>	17 (17)	27 (27)	18 (18)	13 (13)	10 (10)	5 (5)	4 (4)	4 (4)	1 (1)	1 (1)
<b>Placing dental base cement</b>	6 (6)	15 (15)	29 (29)	15 (15)	18 (18)	10 (10)	3 (3)	1 (1)	2 (2)	1 (1)
<b>Placing composite restoration</b>	13 (13)	23 (23)	24 (24)	20 (20)	13 (13)	4 (4)	3 (3)	-	-	-
<b>Placing amalgam restoration</b>	4 (4)	7 (7)	23 (23)	14 (14)	15 (15)	15 (15)	11 (11)	6 (6)	1 (1)	4 (4)
<b>Finishing and polishing</b>	7 (7)	19 (19)	20 (20)	14 (14)	20 (20)	11 (11)	6 (6)	1 (1)	2 (2)	-

and hesitation after completing university entrance examinations (8.6%, n = 3). Furthermore, although 65% (n = 65) of the participants stated that they chose dentistry willingly, 44.6% (n = 29) pointed out that their attitude toward the profession during preclinical education had become negative. The most significant factors that contributed to this negative attitude were inability to understand and perform dental practices and feelings of stress (75.9%, n = 22), inability to understand lectures (17.2%, n = 5), and feeling that they lacked sufficient skills for dentistry (6.9%, n = 2).

The percentages of the participants' difficulty scores are presented in Table 1. To determine the difficulty levels of the participants, each of their scores was first summed up. Subsequently, the sum of their scores ranged from 10 to 65 (35.10 ± 12.16%). About 63% (n = 63) of the participants scored below 40, while the rest (n = 37) scored between 40 and 65. Notably, none of the participants scored above 65 points. This indicated that

there is no statistically significant relationship between the participants' difficulty scores and their grade point averages (r = -0.042, p > 0.05).

The questions that aimed to determine the participants' knowledge levels about restorative dentistry are noted in Table 2. As shown in Table 3, there is a statistically significant difference between the feeling of readiness for the clinical education phase in the following year, as well as performing patient treatment practices, and the participants' difficulty scores (p: 0.002; p < 0.05). The students who felt ready for their clinical dental education phase in the following year had statistically significant lower difficulty scores than those who felt incompetent and uncertain (p: 0.005; p < 0.05). However, no statistically significant difference was identified between the participants who felt incompetent and uncertain in terms of their difficulty scores (p > 0.05).

**Table 2.** The questions that aimed to determine participants' knowledge level about restorative dentistry.

Questions	n	%
<b>Knowing why you use the dental matrix and mylar strip</b>		
Yes	99	99
Uncertain	1	1
<b>Knowing why you use dental wedge</b>		
Yes	98	98
Uncertain	2	2
<b>Knowing the names of dental equipment and their areas of usage</b>		
Yes	86	86
Uncertain	14	14
<b>Knowing the relationship between cavity shape and restoration material</b>		
Yes	88	88
Uncertain	12	12
<b>Knowing the relationship between the shape of the dental drill and cavity shape</b>		
Yes	90	90
No	4	4
Uncertain	6	6
<b>Believing in the improvement brought about by preclinical dental practice</b>		
Yes	95	95
No	3	3
Uncertain	2	2
<b>Feeling competent about patient treatment in the following year</b>		
Yes	29	29
No	33	33
Uncertain	38	38
<b>Reasons for feeling incompetent for patient treatment in the following year (n = 33)</b>		
I lack manual skills	3	9.1
I lack of theoretical dental information	4	12.1
I lack dental practice	6	18.2
I am not able to put theoretical information into dental practice	4	12.1
I believe that lectures do not have positive effect on dental practice	3	9.1
I should practice more during preclinical dental education	8	24.2
I feel shy to ask questions, so this affects my development negatively	5	15.2

**Table 3.** The determination of competence in patient treatment practices in terms of participants' difficulty scores.

Feeling competent for clinical education and patient treatment in the following year	Students' difficulty scores
	Mean±Standart deviation
Yes	28.55±13.04
No	37.97±11.06
Uncertain	37.61±10.66
<i>p</i>	<b>0.002*</b>

One-way ANOVA test \**p*<0.

## DISCUSSION

Dental education plays an important role in improving the competence and quality of care provided by dental professionals. Several kinds of teaching and learning methods are utilized during undergraduate dental education, such as didactic teaching and self-directed problem-based learning, in addition to practical learning in laboratories and clinical environments.<sup>12</sup>

Preclinical dental education is an important part of dental students' undergraduate education, as it helps develop their competency and expertise before they step into clinical practice and operative dentistry. In particular, operative dentistry involves the diagnosis, prognosis, and treatment of dental defects.<sup>13</sup> During preclinical education for operative dentistry, students

perform exercises that require a greater amount of time in the laboratory without patient contact,<sup>14</sup> for which they are evaluated in terms of their performance on artificial or extracted teeth.<sup>15</sup>

Difficulties faced by students during their education have been discussed in several studies on endodontic treatments.<sup>16-18</sup> However, to the best of our knowledge, no previous study has investigated the difficulties faced by preclinical dental students with regard to restorative dental treatment. In this study, students were asked to describe the difficulties they experienced in a preclinical restorative environment. It was worth noting that dental students with lower difficulty scores reported feeling more competent in carrying out patient treatment practices.

Furthermore, no correlation was found between the participants' difficulty scores and their grade point averages ( $p > 0.05$ ). One study claimed that academic performance had no connection with preclinical performance, thus not only emphasizing the importance of developing hands-on skills, but also providing an understanding of the three-dimensional components of operative dentistry.<sup>19</sup> These findings are consistent with those of the current study.

During the transition from preclinical to clinical dental education, students may experience what is termed "the shock of practice,"<sup>15</sup> as the lecture modality that they had experienced from the beginning of their education suddenly changes into patient-based learning. This sudden transition requires students to engage in patient contact for the remainder of their course,<sup>14,20</sup> where they are expected to perform simple treatments competently.<sup>21</sup> In the current study, only 29% ( $n = 29$ ) of the participants felt competent about the patient treatment skills they would be practicing in the following year. Among those who did not feel competent (33%,  $n = 33$ ), the most stated reason was a perceived gap in competence between dental practice and theoretical knowledge. Therefore, it is important to ensure that all preclinical dental students are well prepared for patient interactions. To achieve this, the dental curriculum needs to be standardized across all universities.<sup>22</sup>

There are several factors that affect a student's decision of choosing a profession, including the individual's personality, the characteristics of the profession, and the condition of other occupations.<sup>23</sup> In the present study, most of the students (89%,  $n = 89$ ) did not have a dentist in their family, while more than half of them (65%,  $n = 65$ ) had decided to be a dentist willingly. The remaining students (35%,  $n = 35$ ) reported that their decisions were mostly affected by the financial advantages of the profession. Considering this context, multiple studies have also been conducted to determine the reasons behind students' choice to pursue dentistry in other countries. In Bulgaria, for example, 73% of the

students reported self-motivation as their reason for choosing dentistry, while 61% did not have a dentist in their family. Moreover, the most stated reasons for choosing dentistry were independence (59%), financial security (50%), and it being a respectable profession (43%).<sup>4</sup> In Australia, factors such as having time for family (54%) and the ability to be self-dependent (47%) were the most prominent reasons.<sup>24</sup> In contrast, the results from some countries (including Turkey) indicated that the reason behind students' choices may change with regard to economic factors. In Nigeria, for example, dentistry was chosen because of its potential financial gains and the promise of achieving one's personal goals.<sup>1</sup> Furthermore, in Brazil, students chose dentistry for economic (73.5%), vocational (68.3%), professional (67.8%), and personal (56.6%) reasons.<sup>25</sup>

In this study, although more than half of the students (65%,  $n = 65$ ) chose dentistry willingly, nearly half of them (44.6%,  $n = 29$ ) stated that their attitude had shifted from positive to negative during preclinical education. This is consistent with the results of a study conducted in India that revealed how students became increasingly discontented as they progressed in their dental education.<sup>5</sup> The most significant reason for this negative attitude, as stated by the students, was their feeling of incompetence in understanding and performing dental practices (75.9%,  $n = 22$ ), which made them feel stressed. In fact, perceived stress is a common problem in dental education that has been extensively discussed in many research studies related to preclinical and clinical education.<sup>18,26-28</sup> Dental clinical treatments that involve some amount of risk require competence in both technical and ethical approaches. Dental students, therefore, have an imperative responsibility to perform treatments in accordance with ethically effective methods. For students who do not feel competent, more preclinical practice may be required to increase their confidence and ensure patients' safety in their clinical practice.<sup>29</sup> Considering this context, educators may conduct repetitive demonstrations and highlight crucial sections to help decrease stress levels among dental students.

## CONCLUSION

This study suggests that preclinical practice plays an important role in operative dentistry education. Therefore, dental students need to be adequately prepared for their preclinical operative dentistry practice. To ensure this, a more practice-based dental curriculum coupled with new technological equipment must be offered to the students, while encouraging more collaborations with educators. In this context, further research involving more participants needs to be conducted to gain in-depth insights into the difficulties faced by dental students in their preclinical restorative education. Furthermore, students' learning behavior changes, which are closely related to the

difficulty with preclinical operative dentistry, need more research attention.

### **CONFLICT OF INTEREST**

The authors report that there are not any financial, economic or professional interests that may have influenced the design, execution or presentation of the scholarly work.

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