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Evaluation of Online Orthodontics Course Perceptions and Learning Levels of Dentistry Faculty Students

Esra ÇİFÇİ ÖZKAN[1], Şirin HATİPOĞLU[1], Ayşe KARKAÇ[2]

Abstract

Aim This study aimed to evaluate the perceptions, learning levels, and overall experience of dental school students regarding the online Orthodontics course

Material and method In this cross-sectional study, 145 participants answered a 25-question survey using Google Forms. The questionnaires were sent to the study participants via e-mail. The findings were analyzed by the Pearson Chi-Square test when the sample size assumption was met (n>5) and Fisher's Exact test when it was not met. Multiple Chi-Square test was used to investigate the relationship between multiple-choice questions.

Results A total of 145 participants answered 25 survey questions between February 2022 and May 2022. It was determined that 62.1% of the participants were female and 75.9% were 4th-grade students. It was determined that 57.9% of the participants attended all online courses. Although most of the participants thought that online orthodontic education was well structured (53.1%), well understood (53.8%), had good audio-visual quality (60%), was a good option for orthodontic theoretical learning (54.5%), and provided motivation (42.8%), only 36.7% preferred online education to face-to-face education. It was found that the majority of the participants (37.2%) thought that the amount of online education in the future curriculum should be in the range of 0-25%, regardless of the pandemic.

Conclusion Although students' perceptions and evaluations of online courses were found to be positive, they prefer face-to-face education.

Keywords Dental students, Learning level, Online learning, Orthodontic education, Undergraduate

Introduction

Online learning is a system where education can be obtained through Internet access (1). Although online education and courses are organized in various branches of the field of education, online education has become mandatory due to the restriction measures implemented to slow down the transmission rate of the virus, especially during the pandemic period experienced worldwide in recent years (2). During this period, the field of education has undergone a major transformation from face-to-face classes to online learning (3).

Dental schools have also suspended preclinical and clinical activities and switched to online education as part of pandemic restrictions (4). In dental schools, students should be trained through both theoretical and clinical courses in order to have the necessary competencies. Hands-on training with mannequins in the preclinical phase and patient care in the clinical phase is essential. In clinical education, dental students learn about the patient approach, intervention method/time, and evaluation of treatment results (5). As in all branches of dentistry, clinical education is essential in orthodontics. Although the pandemic period is considered to have created a chance for new developments in theoretical and clinical education by accelerating digital transformation in online learning, online education could only be applied to theoretical learning content (6).

Although online learning encourages flexibility and allows students to learn wherever they want, the sudden shift to online learning has raised a variety of worries and questions (7,8). While online learning has advantages such as eliminating place and time barriers and introducing new trends in learning, it has several disadvantages including social isolation, additional costs, and technical problems (9). Although the anxiety of being away from the motivation provided by being together with the lecturer and other students during face-to-face education and the necessity to continue their education effectively in a new system by moving away from the system they are used to are worrying for students, research has reported that well-designed online education may increase willingness and perseverance to learn (8,10-12). It was aimed to evaluate the students' perspectives towards the online orthodontics course and to provide data for the development of online learning with this study.

Material and Methods

This cross-sectional survey was conducted between February 2022 and May 2022 with 145 participants, who were 4th

Correspondence: Esra ÇİFÇİ ÖZKAN, ecifci@biruni.edu.tr

[1] Biruni University, Faculty of Dentistry, Department of Orthodontics, Istanbul, Türkiye

[2] Atlas University, Faculty of Dentistry, Department of Periodontology, Istanbul, Türkiye

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and 5th-year students of the Faculty of Dentistry of different Universities, who consented to participate in the study and who had taken Online Orthodontics course during the pandemic period on properly completed questionnaire forms. The questionnaires were sent to the participants as online Google forms. Participants who did not want to participate in the study, students who did not attend the online Orthodontics course, and questionnaires that were not answered properly were excluded from the study. The questionnaire consisted of a total of 25 questions, including 3 personal information questions including gender, nationality, and the class they attended, 7 questions about the frequency of participation in the online orthodontics course, 7 questions about the evaluation of the online orthodontics course, 9 questions about the comparison of face-to-face education and online education, 4 questions about the device they used for online connection, internet connection, the place where they participated in online education, and 4 questions about what percentage of orthodontic education should be included in their education.

Confidentiality regarding the participants' responses was maintained throughout the study. Institutional ethics committee approval (2021/63-06) was obtained before starting the study.

Statistical analysis

The g-power analysis of the study was conducted. According to the g-power analysis of the study, the effective rate was calculated as 0.2 and 60 people were expected to participate in the survey. Since there is no upper limit for participation in the study, the total sample size in this study was taken as 145 people and t-test was applied with α= 0.05 at 95% confidence level.

The Pearson Chi-Square test was used to look at how categorical data related to one another when the sample size assumption was met (n>5) and by Fisher's Exact test when it was not met. Multiple Chi-Square test was used to investigate the relationship between multiple-choice questions. Analyses were performed in IBM SPSS 25 (IBM Corp. Armonk, NY, USA) program.

Results

In the study, it was found that 62.1% of the participants were female and 75.9% were 4th-grade students. It was observed that 57.9% of the participants attended all online courses, while 3.4% did not attend any online courses.

The majority of participants found online orthodontic education to be well organized (53.1%), well understood (53.8%), and of good audiovisual quality (60.0%), making it a good option for learning orthodontic theory (54.5%). It was discovered that a significant portion of participants preferred in-person instruction to online instruction (46,9%- who think otherwise: 35.8%), and a significant portion felt that online orthodontic education did not adequately prepare them for orthodontic practice (46.2% - who think otherwise: 27.5%).

When the participants compared face-to-face education with online education, it was found that the majority of the participants thought that online education was easier to participate in (76.6%), required less effort (67.6%), and was more modern (56.6%). On the other hand, when better knowledge transfer (57.9%), easier-to-ask questions (55.2%), more fun (66.2%), more understandable (55.2%), and better learning (54.5%), were compared, it was determined that the majority preferred face-to-face courses.

Table 1: The relationship between the participants' answers to the question "How often have you participated in online Orthodontics courses" and their answers to the question "Online learning was well structured"

		None	Very little	half the lessons	To all of them	No answer	Test Statistics	p
I strongly disagree	n	1	3	4	4	1	23,172**	,044*
	%	7,7	23,1	30,8	30,8	7,7		
	%S.	20	21,4	11,4	4,8	14,3		
I do not agree	n	0	2	1	3	0		
	%	0	33,3	16,7	50	0		
	%S.	0	14,3	2,9	3,6	0		
I'm undecided	n	4	5	10	29	1		
	%	8,2	10,2	20,4	59,2	2		
	%S.	80	35,7	28,6	34,5	14,3		
I agree	n	0	3	19	34	4		
	%	0	5	31,7	56,7	6,7		
	%S.	0	21,4	54,3	40,5	57,1		
Absolutely I agree	n	0	1	1	14	1		
	%	0	5,9	5,9	82,4	5,9		
	%S.	0	7,1	2,9	16,7	14,3		

**p<0,05 **Fisher's Exact test*

It was found that the majority of the participants (37.2%) thought that the amount of online education should be in the range of 0-25% in the upcoming curricula, 64% of the participants participated in online education with a laptop, 73.8% of the participants used LAN (Local Area Network) for connection, and 63% of the participants rarely experienced connection problems.

Table 2: Relationship and cross-tabulation between the participants' answers to the question "How often have you attended online Orthodontics courses" and their answers to the question "Easier participation"

		None	Very little	half the lessons	To all of them	No answer	Test Statistics	p
Face-to-face education	n	1	3	5	15	0	22,371**	,011*
	%	4,2	12,5	20,8	62,5	0		
	%S.	20	21,4	14,3	18,1	0		
Equal	n	1	1	1	1	1		
	%	20	20	20	20	20		
	%S.	20	7,1	2,9	1,2	14,3		
Online education	n	1	10	28	66	6		
	%	0,9	9	25,2	59,5	5,4		
	%S.	20	71,4	80	79,5	85,7		
No answer	n	2	0	1	1	0		
	%	50	0	25	25	0		
	%S.	40	0	2,9	1,2	0		

**p<0,05 **Fisher's Exact test*

A statistically significant relationship was found only between the answers given to the question "What type of internet connection did you use the most?" and the gender of the participants (p<0.05). When the observations were analyzed for the reason of the relationship, it was determined that the people using

WLAN (Wireless Local Area Network) were mostly female and the people using LAN were mostly male. In other questions, gender and the provided answers had no statistically significant correlation (p>0,05).

Table 3: The relationship between the participants' answers to the question "How much online learning should be related to the theoretical part of Orthodontic education in the future curriculum " and their answers to the questions in the section "To what extent does it apply to online Orthodontic learning" and cross table

			0-25%	26-50%	51-75%	76-100%	Test Statistics	p
1. Online learning was well structured.	I strongly disagree	n	8	3	1	1	25,760**	,004*
		%	61,5	23,1	7,7	7,7		
		%S.	14,8	11,1	2,9	3,4		
	I do not agree	n	4	0	1	1		
		%	66,7	0	16,7	16,7		
		%S.	7,4	0	2,9	3,4		
	I'm undecided	n	22	11	13	3		
		%	44,9	22,4	26,5	6,1		
		%S.	40,7	40,7	37,1	10,3		
	I agree	n	18	10	17	15		
		%	30	16,7	28,3	25		
		%S.	33,3	37	48,6	51,7		
	Absolutely I agree	n	2	3	3	9		
		%	11,8	17,6	17,6	52,9		
		%S.	3,7	11,1	8,6	31		
2. The level of understanding of online learning was good.	I strongly disagree	n	12	5	1	4	41,255**	,000*
		%	54,5	22,7	4,5	18,2		
		%S.	22,2	18,5	2,9	13,8		
	I do not agree	n	8	0	0	3		
		%	72,7	0	0	27,3		
		%S.	14,8	0	0	10,3		
	I'm undecided	n	16	6	10	2		
		%	47,1	17,6	29,4	5,9		
		%S.	29,6	22,2	28,6	6,9		
	I agree	n	17	14	20	9		
		%	28,3	23,3	33,3	15		
		%S.	31,5	51,9	57,1	31		
	Absolutely I agree	n	1	2	4	11		
		%	5,6	11,1	22,2	61,1		
		%S.	1,9	7,4	11,4	37,9		
3. The image and sound quality of online learning was good.	I strongly disagree	n	9	3	2	4	29,226**	,002*
		%	50	16,7	11,1	22,2		
		%S.	16,7	11,1	5,7	13,8		
	I do not agree	n	5	2	0	1		
		%	62,5	25	0	12,5		
		%S.	9,3	7,4	0	3,4		
	I'm undecided	n	15	8	6	3		
		%	46,9	25	18,8	9,4		
		%S.	27,8	29,6	17,1	10,3		
	I agree	n	23	11	23	9		
		%	34,8	16,7	34,8	13,6		
		%S.	42,6	40,7	65,7	31		
	Absolutely I agree	n	2	3	4	12		
		%	9,5	14,3	19	57,1		
		%S.	9	3	2	4		
4.In the current situation, online learning was a good option to learn the theoretical part of education.	I strongly disagree	n	15	7	4	0	48,188**	,000*
		%	57,7	26,9	15,4	0		
		%S.	27,8	25,9	11,4	0		
	I do not agree	n	7	0	0	3		
		%	70	0	0	30		
		%S.	13	0	0	10,3		
	I'm undecided	n	16	8	5	1		
		%	53,3	26,7	16,7	3,3		
		%S.	29,6	29,6	14,3	3,4		
	I agree	n	13	6	16	11		
		%	28,3	13	34,8	23,9		
		%S.	24,1	22,2	45,7	37,9		
	Absolutely I agree	n	3	6	10	14		
		%	9,1	18,2	30,3	42,4		
		%S.	5,6	22,2	28,6	48,3		
5. By participating in online learning, I feel well-prepared for the practical part of education.	I strongly disagree	n	16	11	7	3	36,885**	,000*
		%	43,2	29,7	18,9	8,1		
		%S.	29,6	40,7	20	10,7		
	I do not agree	n	15	4	6	5		
		%	50	13,3	20	16,7		
		%S.	27,8	14,8	17,1	17,9		
	I'm undecided	n	17	7	9	4		
		%	45,9	18,9	24,3	10,8		
		%S.	31,5	25,9	25,7	14,3		
	I agree	n	6	3	11	5		
		%	24	12	44	20		
		%S.	11,1	11,1	31,4	17,9		
	Absolutely I agree	n	0	2	2	11		
		%	0	13,3	13,3	73,3		
		%S.	0	7,4	5,7	39,3		

6. The use of new digital teaching methods motivates me to learn.	I strongly disagree	n	18	5	1	3	47,174**	,000*
		%	66,7	18,5	3,7	11,1		
		%S.	33,3	18,5	2,9	11,1		
	I do not agree	n	9	1	1	1		
		%	75	8,3	8,3	8,3		
		%S.	16,7	3,7	2,9	3,7		
	I'm undecided	n	18	9	12	3		
		%	42,9	21,4	28,6	7,1		
		%S.	33,3	33,3	34,3	11,1		
	I agree	n	9	8	15	10		
		%	21,4	19	35,7	23,8		
		%S.	16,7	29,6	42,9	37		
	Absolutely I agree	n	0	4	6	10		
		%	0	20	30	50		
		%S.	0	14,8	17,1	37		
7. I think online learning is useful and I will prefer it to "normal" face-to-face learning in the future.	I strongly disagree	n	13	7	5	3	88,859**	,000*
		%	46,4	25	17,9	10,7		
		%S.	24,1	25,9	14,3	10,7		
	I do not agree	n	33	2	2	3		
		%	82,5	5	5	7,5		
		%S.	61,1	7,4	5,7	10,7		
	I'm undecided	n	5	9	8	2		
		%	20,8	37,5	33,3	8,3		
		%S.	9,3	33,3	22,9	7,1		
	I agree	n	3	7	18	7		
		%	8,6	20	51,4	20		
		%S.	5,6	25,9	51,4	25		
	Absolutely I agree	n	0	2	2	13		
		%	0	11,8	11,8	76,5		
		%S.	0	7,4	5,7	46,4		

*p<0,05 **Fisher's Exact test

When the relationship between the answers to the question "How often did you participate in online Orthodontics courses?" and the answers to the question "Online learning was well structured" was analyzed, a statistically significant relationship was found between the answers (p= .044). When the observations were analyzed for the reason of the relationship, it was observed that the people who attended "none" and "very little" of the courses gave the answers "undecided" and "strongly disagree", and the people who attended half and all of the courses mostly gave the answers "agree" and "strongly agree" (Table 1).

A statistically significant relationship was found between the 'frequency of participation in online courses' and the answers to the question "Easier participation" (p= .011). It was determined that the people who thought that online participation was easy mostly attended half and all of the courses (Table 2).

It was determined that the people who used the mobile network mostly connected via telephone and the people who used WLAN mostly connected via laptop (p= .000). A statistically significant relationship was found between the devices used and the frequency of having problems with the connection (p= .029). It was determined that the people who had 'very rarely' or 'never' problems mostly used laptops.

The answers given regarding the structuring of online orthodontic learning (p= .004), level of comprehension (p= .000), image and sound quality (p= .002), whether it is a good option to learn the theoretical parts of the lesson (p=.000), whether it provides good preparation for the practical parts of the lesson (p= .000), whether it provides learning motivation (p= . 000), whether it is preferable to face-to-face education (p= .000) are given in Table 3. Statistically significant relationships were found between the answers given to the question "How much online learning should be related to the theoretical part of Orthodontic education in the upcoming curricula "(Table 3).

The answers given regarding 'easier participation' (p= .001), 'better knowledge transfer' (p= .000), 'easier to ask questions' (p= .000), 'more fun' (p= .000), 'more modern' (p= .000), 'more understandable' (p= .000), 'better learning' (p= .000), 'better focus' (p= . 000) and the answers to the question "What should be the amount of online learning related to the theoretical part of orthodontic education in the upcoming curricula" are given in Table 4.

Table 4: The relationship and cross-tabulation between the participants' answers to the questions "To what extent should online learning be associated with the theoretical part of Orthodontic education in the future curriculum?" and "Explain whether face-to-face and online Orthodontic education differ according to the following topics"

			0-25%	26-50%	51-75%	76-100%	Test Statistics	p
1.Less effort?	Face to face education	n	11	3	2	1	11,988**	0,154
		%	64,7	17,6	11,8	5,9		
		%S.	20,4	11,1	5,7	3,6		
	Equal	n	5	6	6	8		
		%	20	24	24	32		
		%S.	9,3	22,2	17,1	28,6		
	Online education	n	37	18	25	18		
		%	37,8	18,4	25,5	18,4		
		%S.	68,5	66,7	71,4	64,3		
	No answer	n	1	0	2	1		
		%	25	0	50	25		
		%S.	1,9	0	5,7	3,6		
2.Easier participation?	Face to face education	n	18	3	1	2	21,779**	,001*
		%	75	12,5	4,2	8,3		
		%S.	33,3	11,1	2,9	7,1		
	Equal	n	1	2	2	0		
		%	20	40	40	0		
		%S.	1,9	7,4	5,7	0		
	Online education	n	33	22	30	26		
		%	29,7	19,8	27	23,4		
		%S.	61,1	81,5	85,7	92,9		
	No answer	n	2	0	2	0		
		%	50	0	50	0		
		%S.	3,7	0	5,7	0		

3.Better information transfer?	Face to face education	n	50	14	12	8	59,209**	,000*
		%	59,5	16,7	14,3	9,5		
		%S.	92,6	53,8	34,3	28,6		
	Equal	n	2	8	13	5		
		%	7,1	28,6	46,4	17,9		
		%S.	3,7	30,8	37,1	17,9		
	Online education	n	1	4	7	14		
		%	3,8	15,4	26,9	53,8		
		%S.	1,9	15,4	20	50		
	No answer	n	1	0	3	1		
		%	20	0	60	20		
		%S.	1,9	0	8,6	3,6		
4.Ability to ask questions more easily?	Face to face education	n	43	14	17	6	35,423**	,000*
		%	53,8	17,5	21,3	7,5		
		%S.	79,6	51,9	50	21,4		
	Equal	n	6	8	7	7		
		%	21,4	28,6	25	25		
		%S.	11,1	29,6	20,6	25		
	Online education	n	4	4	10	15		
		%	12,1	12,1	30,3	45,5		
		%S.	7,4	14,8	29,4	53,6		
	No answer	n	1	1	0	0		
		%	50	50	0	0		
		%S.	1,9	3,7	0	0		
5.More fun?	Face to face education	n	48	17	21	10	31,886**	,000*
		%	50	17,7	21,9	10,4		
		%S.	88,9	65,4	61,8	35,7		
	Equal	n	3	5	7	6		
		%	14,3	23,8	33,3	28,6		
		%S.	5,6	19,2	20,6	21,4		
	Online education	n	1	4	5	11		
		%	4,8	19	23,8	52,4		
		%S.	1,9	15,4	14,7	39,3		
	No answer	n	2	0	1	1		
		%	50	0	25	25		
		%S.	3,7	0	2,9	3,6		
6.More modern?	Face to face education	n	22	2	2	1	33,752**	,000*
		%	81,5	7,4	7,4	3,7		
		%S.	40,7	7,4	5,9	3,4		
	Equal	n	10	6	7	3		
		%	38,5	23,1	26,9	11,5		
		%S.	18,5	22,2	20,6	10,3		
	Online education	n	17	18	23	24		
		%	20,7	22	28	29,3		
		%S.	31,5	66,7	67,6	82,8		
	No answer	n	5	1	2	1		
		%	55,6	11,1	22,2	11,1		
		%S.	9,3	3,7	5,9	3,4		
7. More understandable?	Face to face education	n	51	12	11	6	73,171**	,000*
		%	63,8	15	13,8	7,5		
		%S.	94,4	44,4	31,4	20,7		
	Equal	n	2	10	12	8		
		%	6,3	31,3	37,5	25		
		%S.	3,7	37	34,3	27,6		
	Online education	n	0	5	11	15		
		%	0	16,1	35,5	48,4		
		%S.	0	18,5	31,4	51,7		
	No answer	n	1	0	1	0		
		%	50	0	50	0		
		%S.	1,9	0	2,9	0		
8.Better learning?	Face to face education	n	48	13	11	7	56,376**	,000*
		%	60,8	16,5	13,9	8,9		
		%S.	88,9	50	31,4	24,1		
	Equal	n	4	8	12	7		
		%	12,9	25,8	38,7	22,6		
		%S.	7,4	30,8	34,3	24,1		
	Online education	n	1	4	11	15		
		%	3,2	12,9	35,5	48,4		
		%S.	1,9	15,4	31,4	51,7		
	No answer	n	1	1	1	0		
		%	33,3	33,3	33,3	0		
		%S.	1,9	3,8	2,9	0		
9.Better focus?	Face to face education	n	50	16	10	6	68,641**	,000*
		%	61	19,5	12,2	7,3		
		%S.	92,6	59,3	29,4	20,7		
	Equal	n	1	3	7	8		
		%	5,3	15,8	36,8	42,1		
		%S.	1,9	11,1	20,6	27,6		
	Online education	n	1	7	17	15		
		%	2,5	17,5	42,5	37,5		
		%S.	1,9	25,9	50	51,7		
	No answer	n	2	1	0	0		
		%	66,7	33,3	0	0		
		%S.	3,7	3,7	0	0		

*p<0,05 **Fisher's Exact test

Discussion

Online education has taken its place in our educational life with its advantages and disadvantages. Today, online education is a good alternative to face-to-face education to ensure continuity of education in pandemics, natural disasters, or compulsory situations. Due to the importance of online education in our lives, it has become extremely important to structure online education, its validity for orthodontic learning and to investigate whether it differs from face-to-face education. This study aimed to evaluate the perceptions and general experiences of the students of the Faculty of Dentistry regarding the online orthodontics course, and since it did not include the evaluation of the courses academically, the grade of the participants was ignored in the evaluation of the results.

In the findings of the study, although the majority of the participants stated that they thought that online orthodontic education was "well structured" (53.1%), "comprehension level" was

good (53.8%), "audiovisual quality" was good (60%) and "it is a good option for orthodontic theoretical learning" (54.5%); it was found that the rate of those who thought that "new digital teaching methods motivate learning" was 42.8% and only 35.8% preferred online education to face-to-face education. In this study, although the answers of the participants to the comparison of face-to-face education and online education, it was determined that the majority of those who thought that participation in online education was easier, required less effort, and was more modern; when compared in terms of better knowledge transfer, easier to ask questions, more fun, more understandable and better learning, it was determined that the majority of students preferred face-to-face courses. This finding is similar to the findings of Nold et al.. In their study, they reported that the vast majority of the participants, 88.1%, preferred face-to-face education, despite having experience in digital teaching. It has been reported that the disadvantages of online learning, such as eyestrain or lack of motivation caused by working in front of the screen, may be the reasons for this result.13 The main barriers to online learning are technical barriers, the inapplicability of some subjects, and limited interaction (9).

In their study to evaluate academic performance before and during the COVID-19 pandemic in medical education, Istadi et al. reported that students showed low rates of success during the pandemic period and the reason for this was the lack of direct social interaction, lack of practical face-to-face education, technical problems such as unstable internet access, and sudden transition to online learning without adequate technological support quality (14). In our study, in the technical evaluation of online education, they reported that orthodontic education was "well structured", "level of understanding" was good, "audio-visual quality" was good, and they had very few problems with internet connection. No matter how advanced the technological possibilities are, online education lacks hands-on training and interactive discussions (15). In our study, the participating students stated that they preferred face-to-face courses in terms of 'better knowledge transfer', 'easier to ask questions', 'more fun', 'more understandable', and 'better learning'. Dental students are required to acquire both theoretical and practical knowledge to fulfill the necessary competencies. Practical application has an important place in dentistry faculty education. Although online learning lacks practical hands-on training, the use of digital strategies through software that can create and reproduce virtual three-dimensional models accessible to computers and mobile devices can be used as an alternative to online practical applications (16,17). Such digital approaches help students learn techniques applied to different dental specialties but do not replace clinical practice with patients.

Combining online and traditional courses is a consistent design approach that helps students combine the strengths of online and traditional learning to effectively achieve their educational goals. Furthermore, such blended learning supports innovative continuous learning beyond the classroom and has been reported to provide generally positive experiences among undergraduate students (18,19).

Conclusion

Today, online education has assumed an important role in providing students with good academic and psychological support, and in ensuring the continuity of education in case of epidemics, natural disasters, or compulsory situations that may be encountered in the future. Students prefer face-to-face classes instead of online learning and think that online learning does not adequately prepare them for the practical part of education. There is a need for new practices to support and encourage online learning in education models with a practical application pillar.

Declarations

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