



## PERCEPTION AND EXPERIENCE OF DENTAL STUDENTS REGARDING E-LEARNING EDUCATION IN THE UNIVERSITIES OF RIYADH

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### ABSTRACT.

**Introduction:** Dental education has progressed a great deal during the past few years, especially in technology. Students' perceptions should be considered from time to time regarding dental education approaches for better learning outcomes. This study aimed to determine the perception and experience of dental students in Riyadh city regarding e-learning. **Materials and Methods:** The present cross-sectional online survey was conducted among undergraduate dental students in Saudi Arabia regarding e-learning education. **Results:** A total of 496 students participated, out of which 62% were male and 38% were female. Only 19% of the respondents were satisfied with the e-learning others were either dissatisfied or were neutral about its usage. All the survey items showed a statistically significant difference across different years of dental education ( $p=0.001$ ). In contrast, items such as readiness of learner to adopt e-Learning ( $p=0.009$ ), the flexibility of time ( $p=0.001$ ), access to learning resources ( $p=0.001$ ), and impact on dental education ( $p=0.001$ ) showed statistically significant difference across various universities. **Conclusion:** E-learning has positively impacted the students, but they need time to adjust to this change, especially at the beginning of their undergraduate education.

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### Introduction

Dental education has progressed a great deal during the past few years, especially in technological adaptation [1-4]. Paper-based academics are a part of old school now, with the digitalization of books, learning, assessment, and training. Improvisations such as Massive open online courses (M.O.O.C.S.), Moodle, Sakai, and dot LRN have recently revolutionized dental education. Each type of application has its advantages and limitations [5, 6]

E-learning was introduced to teach dental students as they are involved in technology and are aware of the new gadgets. E-learning paved its way into dental education through partial involvement as some universities wanted to test this system before implementing it full time [7, 8]. Several studies have compared the performance of dental students before and after the integration of e-learning in their educational setup. The majority of those studies have provided a positive experience and feedback from the students and the educators [9, 10].

A study conducted in Pakistan assessed the efficacy of e-learning among their students. It was noted from the findings that most dental students were in favor of e-learning and it was being used during distance learning courses as well. They found e-learning to have positively affected their academic performance and results [11]. Another advantage of e-learning is that it is readily available on smartphones and tablets, and instructors can communicate with their students anytime they like [12].

An investigation in King Saud University, Saudi Arabia, two years ago revealed that the students were not ready for this massive change and took their time to adjust to the e-learning environment. They had queries and doubts over the use of some e-learning website features [13].

With the wide-spread use of the e-learning platform during the COVID-19 pandemic, it is essential to assess dental students' attitudes towards it in dental education. Hence, the present study aimed to determine the perception and experience of dental

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students in Riyadh city regarding e-learning. It was hypothesized that the dental students show a positive attitude towards e-learning in their education.

### Materials and Methods:

**Study Design:** This was a cross-sectional study conducted among dental students using an online survey. The research proposal has been approved with the I.R.B. approval number RC/IRB/2019/309.

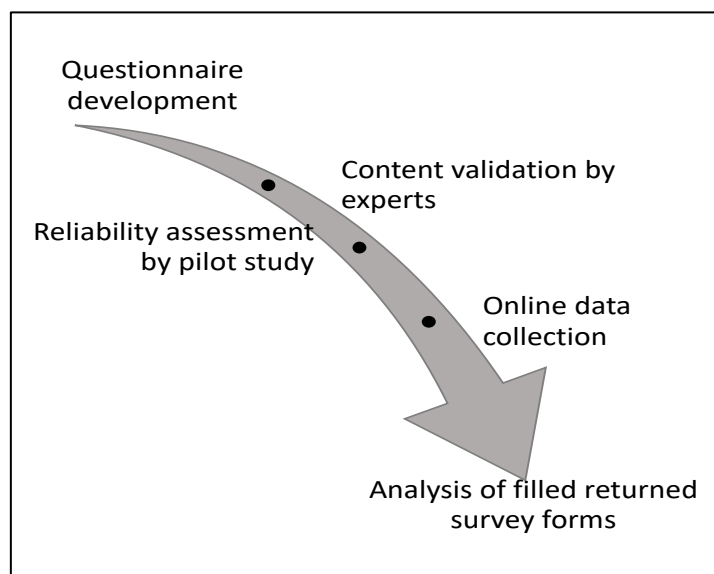
**Study Sample:** A minimum required sample size was calculated by considering the margin of error of 5%, confidence interval of 95%, and assuming a response distribution of 50%. Students from different dental universities in Riyadh, Saudi Arabia, were contacted and requested to fill up the survey. A total of 650 students were targeted, from which 496 responses were received back.

**Study Instrument:** An online questionnaire was designed using Google Forms with questions about personal and demographic information, followed by perception and experience-related questions regarding e-learning.

**Instrument Validity and Reliability:** The questionnaire's validity was tested by sending it to experienced researchers in R.E.U. but no changes were made. A pilot study was conducted by sending the survey to 20 participants and the data was inserted in S.P.S.S. version 22 to determine the reliability by using Cronbach's coefficient alpha (0.876). The questionnaire development and testing is shown in Figure 1.

### Statistical Analysis:

All the questionnaire responses were downloaded and coded into the excel program. All the data was then transferred into the statistical analysis software (S.P.S.S. version 22, Armonk, NY, U.S.A.). Descriptive statistics of frequency distribution and percentages was calculated for the questionnaire items and demographic variables of the study participants. All the categorical variables were analyzed by applying a Chi-square test. The level of significance was set at  $p \leq 0.05$ .



**Figure 1:** Flowchart of Study Methodology

### Results

The conducted survey had 496 respondents who were undergraduate dental students, from which nearly 62% were male, and 38% were females. Participants were a combination of students belonging to varied years in their education; 5% were from the first year, 10% were from the second year, 16% were from the third year, 20% were from the fourth year, 28% were from the fifth year, and the rest of 22% were in their final year of education. The study included participants from different universities. Among all the participants, 43% were from the Riyadh Elm University, 22% were from the King Saud University, 13% were from the Prince Sultan University, 17% were from the Farabi, and the rest 4% were from other universities (Table 1).

From the surveyed participants, only 19% were satisfied with the e-learning, and the rest were either dissatisfied or were neutral about its usage. The distribution of the responses to the questionnaire items is displayed in Figure 2.

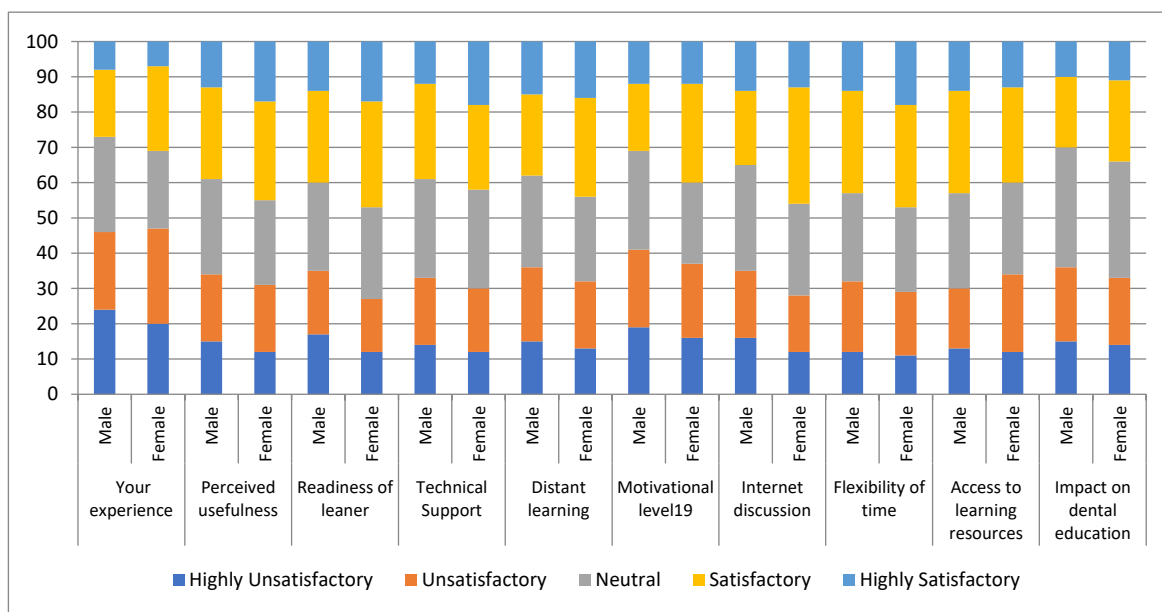
Study participants in different years of dental education showed statistically significant difference with regards to the experience of e-learning ( $p=0.001$ ), perceived usefulness ( $p=0.001$ ), readiness of learner ( $p=0.001$ ), technical support

(p=0.001), distant learning (p=0.001), motivational level (p=0.001), internet discussion (p=0.001), flexibility of time (p=0.001), access to learning resources (p=0.001), and impact on dental education (p=0.001) (Table 2).

Items related to the readiness of learner to adopt e-learning (p=0.009), the flexibility of time (p=0.001), access to learning resources (p=0.001) and impact on dental education (p=0.001) showed statistically significant difference across various universities as shown in (Table 3).

**Table 1:** Demographics of study participants

Variables		Frequency (%)
Gender	Male	307 (62%)
	Female	189(38%)
Dentistry Year	First Year	23(5%)
	Second Year	48(10%)
	Third Year	79 (16%)
	Fourth Year	98 (20%)
	Fifth Year	136 (28%)
	Sixth year	111 (22%)
University	Riyadh Elm	214 (43%)
	King Saud	111 (22%)
	Prince Sultan	67 (13%)
	Farabi	87 (17%)
	Others	18 (4%)



**Figure 2:** Gender Wise Comparison of the Perception of e-learning among the Study Participants

**Table 2:** The Comparison of E-learning Items across Different Years of Dental Education

Item	Responses	1 <sup>st</sup> Year	2 <sup>nd</sup> Year	3 <sup>rd</sup> Year	4 <sup>th</sup> Year	5 <sup>th</sup> year	6 <sup>th</sup> year	P- Value
How has your experience of e-learning been so far?	Highly Unsatisfactory	59	27	34	22	13	17	0.001*
	Unsatisfactory	32	35	25	33	21	10	
	Neutral	9	21	18	26	30	28	
	Satisfactory	0	17	16	12	26	32	
	Highly satisfactory	0	0	6	6	10	13	
Perceived usefulness	Highly Unsatisfactory	35	19	13	15	6	15	0.001*
	Unsatisfactory	35	35	20	20	15	12	
	Neutral	17	17	28	30	28	22	

	Satisfactory	13	17	25	22	32	32	
	Highly satisfactory	0	13	14	12	18	19	
Readiness of learner	Highly Unsatisfactory	43	27	16	9	9	14	0.001*
	Unsatisfactory	26	23	19	25	9	13	
	Neutral	22	17	22	22	33	27	
	Satisfactory	9	23	30	31	27	29	
	Highly satisfactory	0	10	13	12	23	17	
Technical support	Highly Unsatisfactory	39	25	14	10	8	11	0.001*
	Unsatisfactory	26	27	27	25	10	10	
	Neutral	0	23	28	24	35	31	
	Satisfactory	30	17	24	26	30	26	
	Highly satisfactory	4	8	8	14	17	22	
Distant learning	Highly Unsatisfactory	57	29	23	10	5	10	0.001*
	Unsatisfactory	26	25	23	23	16	17	
	Neutral	0	25	24	22	30	28	
	Satisfactory	13	15	18	23	33	27	
	Highly satisfactory	4	6	13	20	16	19	
Motivational level	Highly Unsatisfactory	57	33	25	14	8	13	0.001*
	Unsatisfactory	17	40	18	23	18	20	
	Neutral	13	15	29	22	34	25	
	Satisfactory	0	8	20	28	28	24	
	Highly satisfactory	13	4	8	12	12	19	
Internet discussion	Highly Unsatisfactory	52	29	14	8	10	11	0.001*
	Unsatisfactory	17	27	20	16	12	18	
	Neutral	9	33	32	30	29	28	
	Satisfactory	22	6	24	30	29	27	
	Highly satisfactory	0	4	10	15	20	16	
Flexibility of time	Highly Unsatisfactory	48	22	10	8	7	11	0.001*
	Unsatisfactory	22	33	26	21	15	14	
	Neutral	17	21	27	28	26	22	
	Satisfactory	4	27	23	27	35	32	
	Highly satisfactory	9	2	14	15	17	21	
Access to learning resources	Highly Unsatisfactory	43	17	15	4	9	11	0.001*
	Unsatisfactory	26	31	19	22	15	11	
	Neutral	22	23	27	37	26	21	
	Satisfactory	9	25	19	22	38	33	
	Highly satisfactory	0	4	20	14	12	24	
Impact on dental education	Highly Unsatisfactory	48	26	15	15	7	14	0.001*
	Unsatisfactory	17	17	20	29	17	14	
	Neutral	26	32	35	31	39	31	
	Satisfactory	0	23	19	14	26	26	
	Highly satisfactory	9	2	10	10	11	14	

**Table 3:** The Comparison of e-learning Items across Different Universities

Item	Responses	Riyadh Elm	King Saud	Prince Sultan	Farabi	Others	P- Value
How has your experience of e-learning been so far?	Highly Unsatisfactory	20	29	30	19	11	0.060
	Unsatisfactory	20	29	25	28	11	
	Neutral	28	17	18	34	28	
	Satisfactory	24	19	21	12	33	

	Highly satisfactory	9	6	6	8	17	
Perceived usefulness	Highly Unsatisfactory	14	14	13	14	11	0.614
	Unsatisfactory	16	26	22	15	22	
	Neutral	28	20	21	32	17	
	Satisfactory	28	25	25	24	39	
	Highly satisfactory	15	15	18	15	11	
Readiness of learner	Highly Unsatisfactory	18	18	7	10	6	0.009*
	Unsatisfactory	13	19	24	21	6	
	Neutral	26	18	30	23	61	
	Satisfactory	31	28	22	24	17	
	Highly satisfactory	12	17	16	22	11	
Technical support	Highly Unsatisfactory	12	15	10	16	6	0.223
	Unsatisfactory	15	22	24	20	6	
	Neutral	28	22	36	28	44	
	Satisfactory	27	29	18	24	44	
	Highly satisfactory	18	13	12	13	6	
Distant learning	Highly Unsatisfactory	13	21	16	12	6	0.368
	Unsatisfactory	17	19	27	27	11	
	Neutral	29	17	25	23	44	
	Satisfactory	26	28	19	22	22	
	Highly satisfactory	16	15	12	16	17	
Motivational level	Highly Unsatisfactory	17	23	18	16	6	0.209
	Unsatisfactory	19	19	25	26	28	
	Neutral	26	20	30	30	39	
	Satisfactory	24	26	21	15	28	
	Highly satisfactory	14	13	6	13	0	
Internet discussion	Highly Unsatisfactory	15	17	13	11	0	0.470
	Unsatisfactory	15	19	18	21	11	
	Neutral	30	25	31	25	50	
	Satisfactory	23	24	27	30	33	
	Highly satisfactory	16	15	10	13	6	
Flexibility of time	Highly Unsatisfactory	13	17	9	6	0	0.001*
	Unsatisfactory	16	21	33	21	6	
	Neutral	21	21	24	30	67	
	Satisfactory	30	29	23	29	28	
	Highly satisfactory	20	12	11	14	0	
Access to learning resources	Highly Unsatisfactory	11	17	13	8	0	0.001*
	Unsatisfactory	17	23	24	41	28	
	Neutral	23	23	24	41	28	
	Satisfactory	27	29	31	31	17	
	Highly satisfactory	22	10	15	7	6	
Impact on dental education	Highly Unsatisfactory	15	18	18	14	0	0.001*
	Unsatisfactory	13	19	30	24	44	
	Neutral	37	28	25	45	22	
	Satisfactory	24	23	19	10	33	
	Highly satisfactory	12	13	7	7	0	

## Discussion

Currently COVID-19 pandemic has changed the traditional classroom-based education to the e-learning platform worldwide. Dental education has no exception to this change. Since dental education switched to online e-learning platforms, dental

students' attitudes towards this are not fully explored. Hence the present determined the perception and experience of dental students in Riyadh city regarding e-learning.

The study findings indicated that only 30% of the participants agreed to the satisfactory use of e-learning in dentistry. A study conducted by Ahmad *et al.* (2014) [14] observed that many students were quite comfortable and at ease searching, finding, and uploading online tutorials. The numbers of resources that are readily available are appropriately utilized for the conveyance of online content, e.g., social networking, email, virtual classrooms, learning management systems (L.M.S.), and Web 2.0. In the Saudi Arabian context, King Saud University has selected social networking (mainly Google Moderator and Twitter) to convey their online material as the initial online learning effort for the preclinical orthodontic course. Social networking applications are accessible through all laptops, mobile devices, and tablets, allowing the teacher to contact his students outside and inside the classroom irrespective of time. The results which were obtained from our research were marginally varied from these results.

According to our study, when the participants were inquired regarding their learning prospects' readiness, nearly 18% of the participants had stated that they were highly unsatisfied with the methodology. This result was found to be contrasting to the study carried out by Anderson & Reid (2012) [15]. When questioned about online tutorials' excellence, a large number of students (61.2%) were not pleased with the procedural videos and flash lectures and required additional upgrading. The major success was enjoyed with an efficient online learning system when high definition online tutorials were widely available. The students' learning criteria have evolved based on quality of audio and image, delivery technique, multimedia design, learning style preferences, and internet speed. Consequently, all these points should be mindfully assessed to make resourceful online lectures and achieve students' approval [15].

A previous study conducted among New York University students showed an inclination towards combined e-learning and traditional learning [16]. In this study, 54 percent of dental students agreed that online material aided their traditional learning methods and motivated them to study more and understand the concepts better. 34.9 percent labeled online learning content beneficial to them, and 28 percent agreed that e-learning should replace traditional learning techniques. Whereas, in our scenario, only 20% of the students were satisfied and highly motivated, and nearly 22% of the students were disappointed with the level of motivation they received from e-learning [16].

The participants from Nierenberg *et al.* (2018) study were enquired about their access to the learning resources, and the outcomes reflected a change in adapting the habit of e-learning. It was also noted that there was a surge in the e-learning adaptation as the students realize that online courses are more time-efficient. Earlier, the results were 17.3%, and later it reached 36.4% [17]. Whereas, in our study, only 29% of the total participants agreed on the effectiveness of accessing the learning material. This is important as there is a possibility to a prime concern, and learning habit provided an added advantage. Imaginably expected, the outcome reflected that the large number of each student sample conducted over four years sensed that e-learning is beneficial for revising the syllabus in the end. This is very relatable as every other student has a unique attitude to prepare for the exams and so the e-learning helps each of them attain it at their location, time, and speed, which they want [17].

Previous studies have indicated the perception of e-learning as the upgraded teaching method (i.e., E-book Helpfulness). It keeps students involved with better learning outcomes. Consequences show that e-textbooks are supposed as savories of student learning skills in two supplementing ways: (1) E-textbook helpfulness upgrades students' knowledge results openly, and (2) Student Involvement plays an integral intermediating part between Learning Outcome and E-textbook Helpfulness. These results indicate that the efficacious alteration of e-textbooks needs schools to offer essential means (e.g., digital library) and faculty to encourage pupils to read e-textbooks, enthusiastically [18, 19]. Our analysis found that almost 20 percent of the study participants were satisfied, and 21 percent were dissatisfied with e-learning in dental education.

Limitations of the study included that it was conducted among dental students of universities of Riyadh only. Hence generalizability of the study finding is not possible. Further national-level studies should be conducted to confirm the current study findings.

## Conclusions

Gender comparison was not associated with the perception of e-learning in dental education. Satisfaction levels were significantly improved as the number of dental years increased from 1<sup>st</sup> year to 6<sup>th</sup> year. However, R.E.U. students showed a positive perception of the time flexibility and ease of learning compared to other colleges. E-learning has positively impacted the students, but they need time to adjust to this change, especially at the beginning of their undergraduate education.

**Author contribution:** NAF contributed to the design, literature review. F.A.J. involved in literature search, data collection. A.O. contributed to the literature search and manuscript writing. F.A. conducted manuscript review and editing. T.A. conducted manuscript review and editing. A.A. performed an analysis of the data, S.H.A. Final review of manuscript and editing

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**Informed Consent:** Written and oral informed consent were obtained from all individual participants included in the study. Additional informed consent was obtained from all individual participants for whom identifying information is included in this manuscript.

**Data and Materials Availability:** All data associated with this study are present in the paper and/or the Supplementary Materials.

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