

COVID-19 Pandemic and Subsequent Demand for E-Learning: Insights of Students' Perspective

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Abstract

Introduction: COVID-19 pandemic outbreak has restricted the ability to conduct in-person learning which affected medical education. One of the most immediate changes introduced has been the broad cancelling of face-to-face and being replaced by E-learning.

Objectives: the purpose of this research is to evaluate undergraduate and postgraduate student educational experience and perception towards implementing online learning and assessment during the COVID-19 pandemic.

Material and Methods: cross-sectional questionnaire-based analysis of the undergraduate and postgraduate student's perceptions about online teaching and assessment methods in Faculty of Dentistry Ain Shams University consisted of twenty-three questions that assess teaching approaches and communication, the information and communication technologies (ICTs) efficiency in the online learning, online assessment (OLA) regarding its effectiveness, fairness, feasibility and time saving in comparison to paper-based exams.

Results: 768 dental students in Faculty of Dentistry Ain Shams University participated in this survey, divided into 487 undergraduate and 299 postgraduate students. Nearly half of the undergraduate and postgraduate students approved that online teaching improves the learning process, most of the participants undergraduate and postgraduate students agreed that using technology saves teachers and students' time. Around 80% of undergraduate and postgraduate students agreed that online teaching increase the sense of creativity. Majority of the participants in both undergraduate (76%) and postgraduate students (81%) were satisfied with the motivation of learning regarding online assessment (OLA). The degree of satisfaction with OLA reflection of knowledge was 64.6% in undergraduate and 76.5% in postgraduate students.

Conclusion: Online teaching is an effective approach with a high demand to improve students' participation, interaction and communication, online assessment is a fair method, time saving and motivates students to learn.

Keywords: E-Learning; Pandemic; ICTs; COVID-19; OLA

Introduction

The coronavirus disease 2019 (COVID-19) pandemic outbreak has restricted the ability of medical schools to conduct in-person learning. The effect of COVID-19 on medical education is of high impact, attempts are rapidly to adapt the progressively required "social distancing". The shutdown of academic institutions, along with the novel challenge forced on health care systems worldwide, have affected the quantity and quality of medical education that led to immediate need for modern education to be implemented [1].

As a part of the social distancing measures taken to reduce the spread of the COVID-19, suspension of in-campus activities was confirmed in all educational institutions in almost all countries worldwide. One of the most instant changes were the broad canceling of face-to-face learning medical classes by all faculty to continue teaching and assessment of their courses [2].

E-learning for learners has a lot of benefits which include increase accessibility to information, better subject delivery, personalized instruction, content standardization, accountability, on-demand availability, self-paced independent study, interactivity, confidence, and increased convenience [3].

Online video meetings like WebEx, Zoom, lectures and tutorials have promptly replaced the in-class resident meetings and lectures. However, there are many associated issues with this new format. First, lectures and simulations composed only a minor component of the existing curriculum, so there were not enough prepared to satisfy a full clerkship. Furthermore, faculty have been adjusting to their own professional and personal needs in this rapidly changing climate, limiting the ability of faculty to create more educational content [4].

Online learning Assessment (OLA), as defined by McCann (2010) [5] is an electronic system for controlling assessment plans and outcomes rather than one for providing assessment methods and instruments. OLA improved the quality of learning and teaching methods. However, further research is carried out into the perceptions toward OLA. Applying OLA enables useful feedback and enhances learning/knowledge [6-8]. As Weaver (2006) [9] recognized timely and helpful feedback to educators is an important aspect and an essential component for reflection and development in the learning cycle. Alerting educators to their strengths and weak-

nesses can provide the means by which they can assess their performance and make improvements to future work [10,11].

Lawton., *et al.* (2012) [12] added other types of assessment. Assessments of the method of instruction itself are termed evaluative, such as evaluating the impact of various types of courses based on measuring and comparing the skills of educators after they have completed the different courses. Self-assessment or reflective assessment includes students evaluating their own learning and the conditions in which it arises.

The whole learning society and particularly assessment stakeholders were offered a wide range of potential benefits by the emergence of ICT (Information and communication Technology). In (2012) Vosylis, Malinauskiene, and Zukauskiene [13] documented, using ICT techniques supports cost-effectiveness, flexibility and control over format, large samples, lower cost, efficiency of data management, rapid access to contributors, increased participation, ability to follow up with contributors, and popularity among certain populations.

Ridgway., *et al.* (2006) [14] had showed the relationship between ICT and assessment in a number of ways: (1) Students use powerful and appropriate tools to support learning and solve problems in class but are then denied access to these tools when their "knowledge" is assessed. (2) ICT can support the development of higher-order thinking skills such as critiquing, reflection on cognitive processes, and "learning to learn," and can facilitate group work, and engagement with extended projects; ICT competence is itself a (moving) target for assessment. (3) ICT environment helps in achieving educational goals, teaching what is worth learning, and designing OLA. Integrating ICT in the education provides and supports the link between learning, teaching, and assessment especially in the light of current widespread availability of computer systems, easier access to the Internet, and an increase in the reliability of systems. Whatever assessment types are, their positive effects can be improved if curriculum coverage, teaching methods, and higher order skills and competencies such as problem solving, investigation, and analysis are involved in what is to be assessed [15-17].

OLA is an important and widely used method of learning systems and quite different from questions and tasks used in on-paper

assessment and in early implementations of computer-based assessment, the purpose of this research is to evaluate student educational experience and perception towards implementing OLA during the COVID-19 era.

Material and Methods

Implementing online teaching and assessment

Prior 2019, dental courses in many universities were mainly in form of theoretical lectures, practical tutorials and sessions. In addition, assessment was mainly paper-based exams. However, after COVID 19 outbreak all the dental universities were forced to complete the second semester by online form, which was completely new in some dental universities. The undergraduate and postgraduate student's perception about both online teaching and assessment is highly valued in order to monitor this valuable experiment regarding its limitations, strength and weak points.

Study sample and design

The study was designed as a cross-sectional questionnaire-based analysis of the undergraduate and postgraduate student's perceptions about online teaching and assessment methods in Faculty of Dentistry Ain Shams University.

Questionnaire development and design

A self-developed questionnaire was adopted from Attia MA, 2014 [17] and consisted of twenty-three questions distributed into four sections.

Section 1 included demographic data recording (age, gender, academic degree). Section 2 included questions regarding online teaching approaches, creativity, sense of participation and communication. Section 3 included the information and communication technologies (ICTs) efficiency in the online learning. Section 4 included the online assessment regarding its effectiveness, fairness, feasibility and time saving in comparison to paper-based exams

17 questions were answered using a 3-point Likert scale (agree, neutral, and disagree), 3 multiple-choice questions and 3 linear scale questions scored from 1 to 5 (1 = very bad, 5 = excellent). The questionnaire was written in English, with brief explanation about the purpose of the study. The confidentiality and sole use of the information for the mentioned purpose were ensured and that completing the questionnaire is considered informed consent of

the participants. Approval to conduct this study was given by the Faculty of Dentistry, Ain Shams University, research ethics committee (FDAsuRecR062004).

A pilot study was performed on 10 undergraduate and postgraduate students before the commencement of the study to determine the acceptability and clarity of the questionnaire and to confirm its validity. Depending on the comments, minor changes were made before questionnaire distribution. The questionnaire was then transformed into a google online form and the link was sent to the undergraduate and postgraduate students.

Data analysis

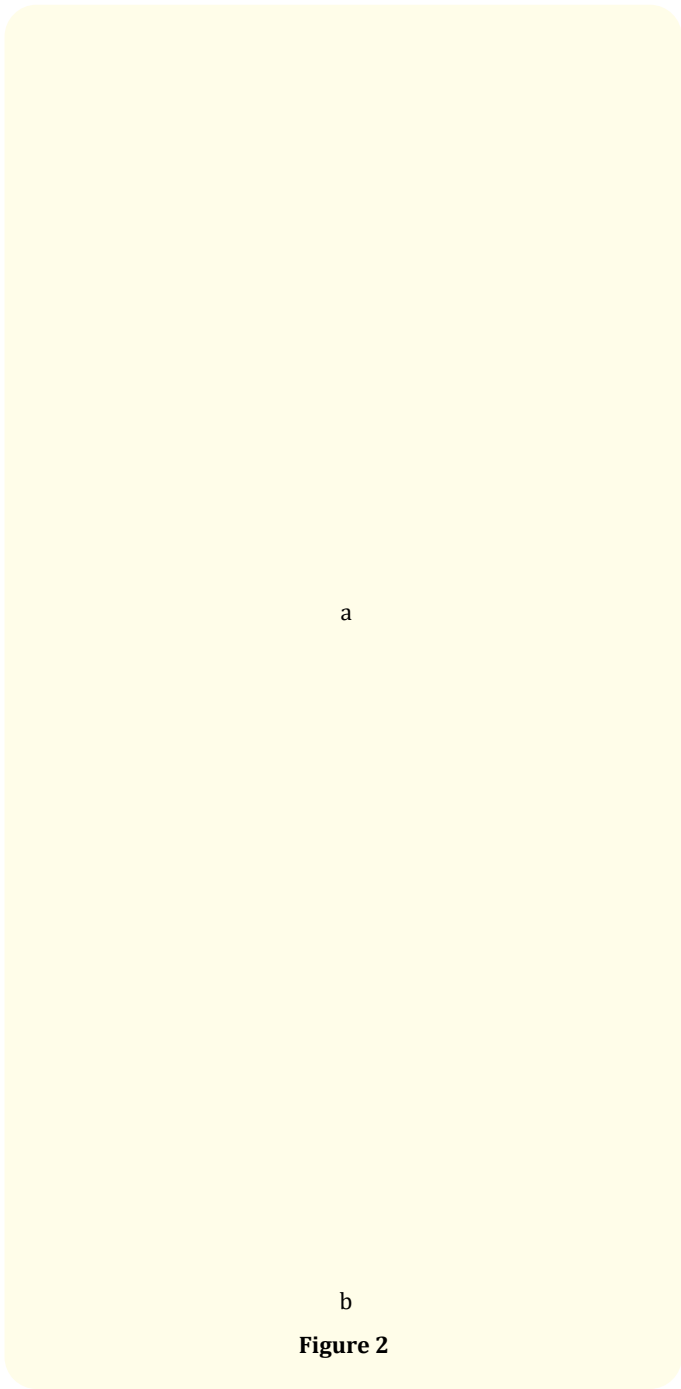
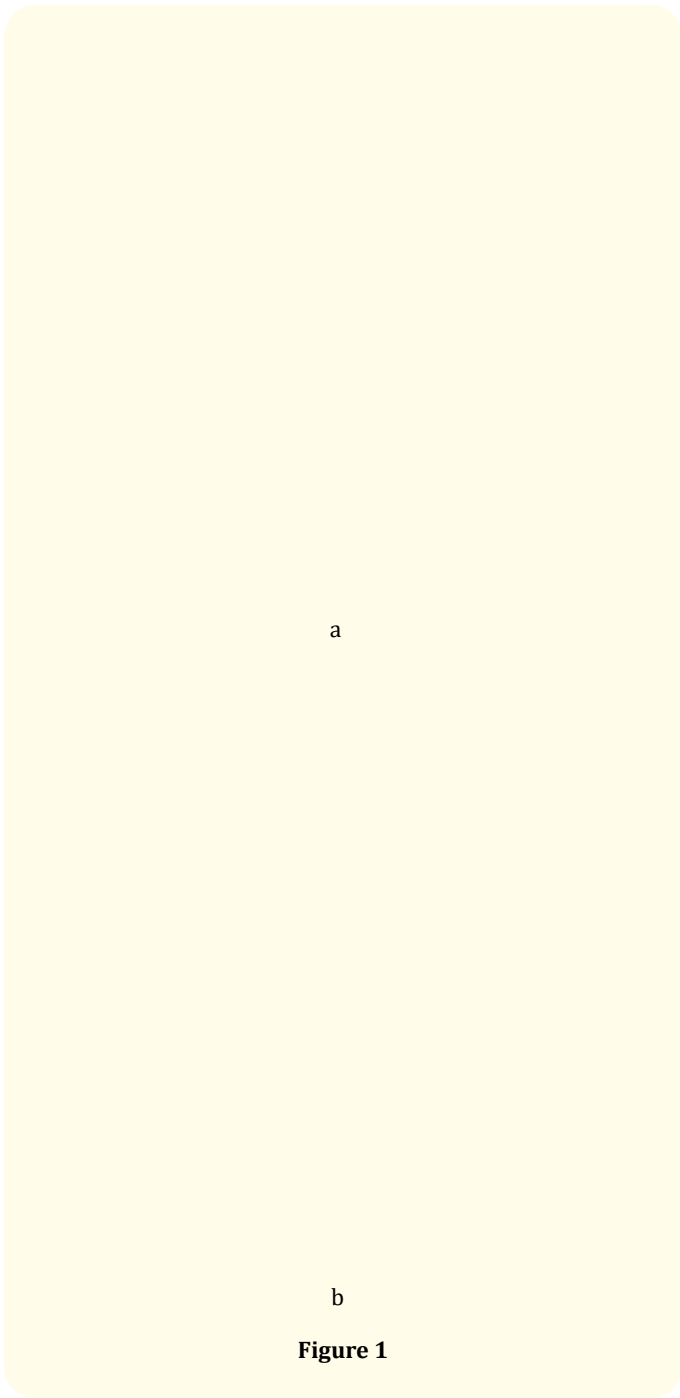
Data were analyzed using Statistical Package for Social Sciences (SPSS) (version 16, SPSS Inc., Chicago, IL, USA). Descriptive and crosstab analysis were used to analyze the demographic data. Responses were quantified as a percentage of the total number of responses received for each question.

Results

768 dental students in Faculty of Dentistry Ain Shams University participated in this survey, divided into 487 undergraduate and 299 postgraduate students (259 master and 40 doctoral students). The responders were predominantly females 319 (65.5%), 182 (60.87%) in undergraduate and postgraduate students respectively. The age range were from 18 - 25 in undergraduate, 68% of postgraduate were in age range 25 - 30, followed by 25.7% in age group from 31 - 40.

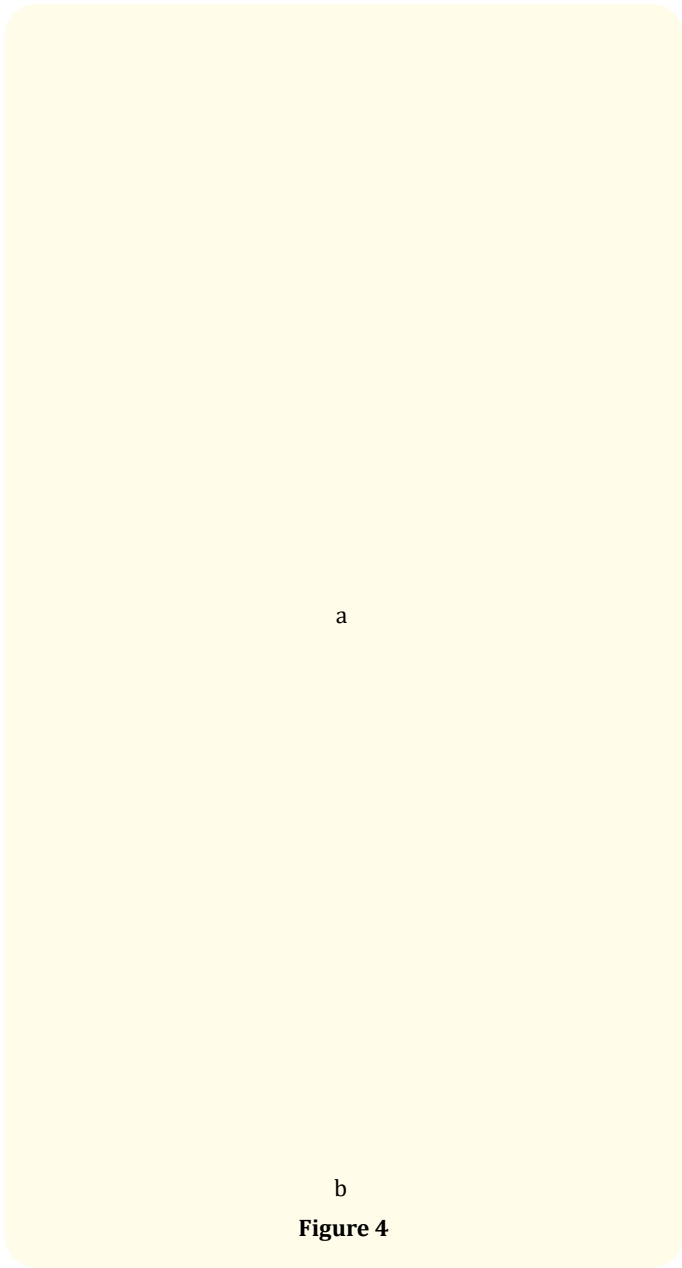
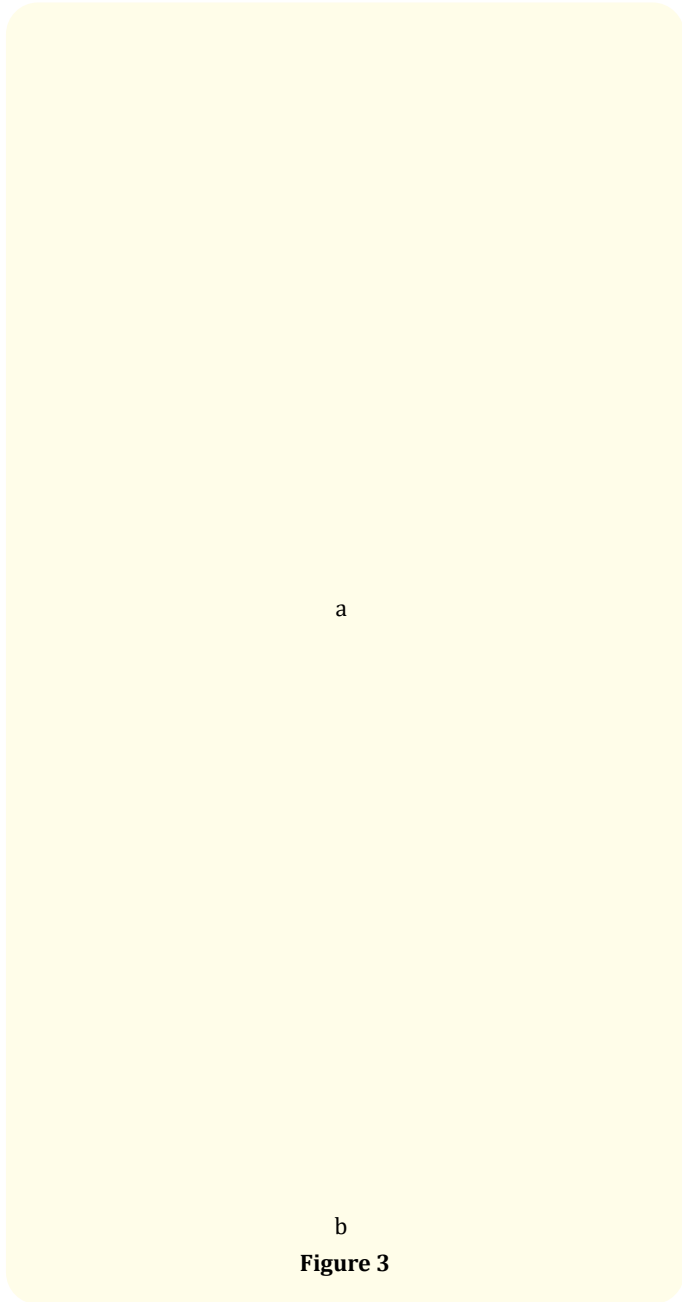
Regarding that online teaching improves the learning process, nearly half of the undergraduate (21 + 37%) agreed on that, the postgraduate had a higher percent of agreement (45.5 + 32%), the disagreement percentage was double in undergraduate than the postgraduate (41.4, 22.4%) respectively (Figure 1a). The same was true regarding the appropriate adaptation of the teaching methods to the virtual environment, 39.4% of undergraduate disagree, on the contrary only 19% of postgraduate disagreed (Figure 1b).

Most of the participants undergraduate (68 + 21%) and postgraduate (78 + 15.7%) students agreed that using technology saves teachers and students time (Figure 2a). Only 20% of undergraduate and 12.7% of postgraduate disagreed that using information and communication technologies (ICTs) in teaching and learning makes it easy (Figure 2b).

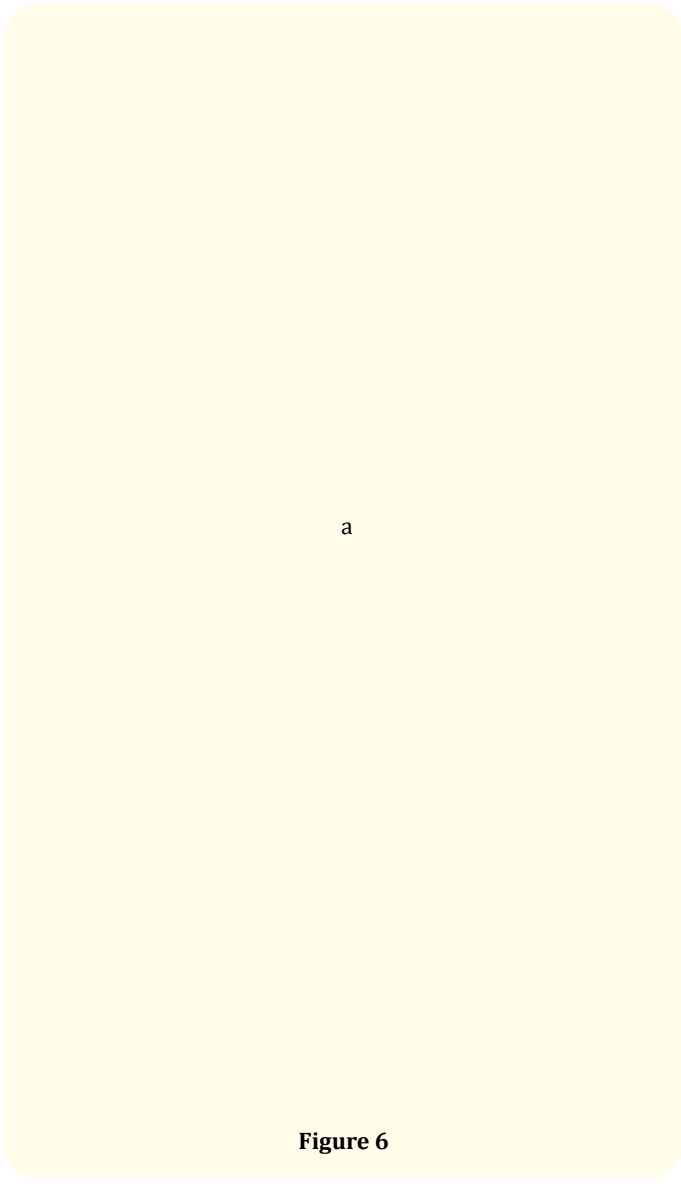
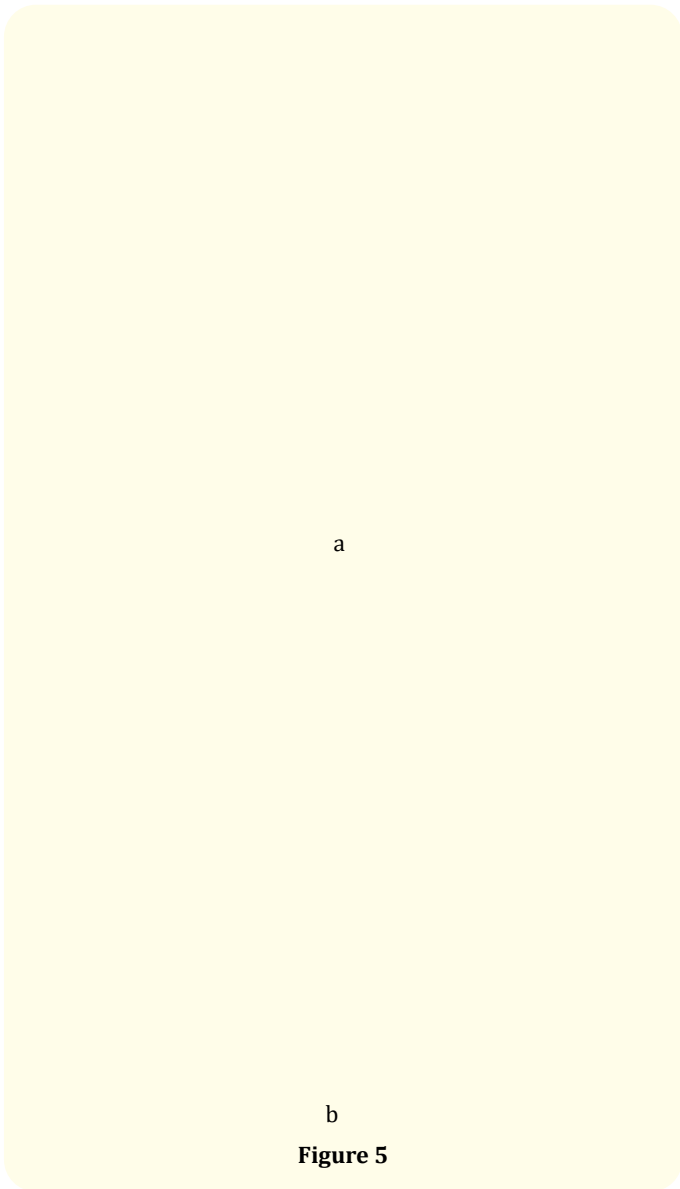


Regarding the effective participation of students in online courses, undergraduate had around double percent of disagreement (38.8%) than the postgraduate students (22.7%) (Figure

3a). More than half of the undergraduate participants (51.7%) and 26.7% of postgraduate students disagreed that online teaching improves sense of participation, interaction and communication (Figure 3b). Most of the participants in undergraduate (41.6 + 34%) and postgraduate (53 + 32.4%) agreed that using technology creates fun in learning (Figure 4a). Around 80% of undergraduate and postgraduate students agreed that online teaching increase the sense of creativity (Figure 4b).

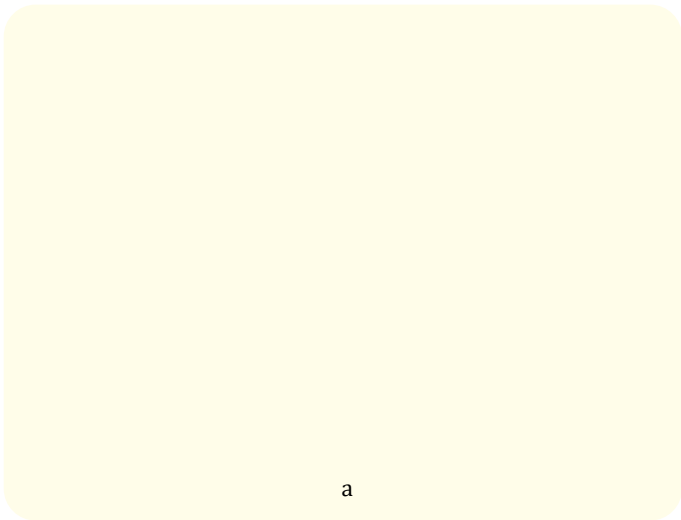


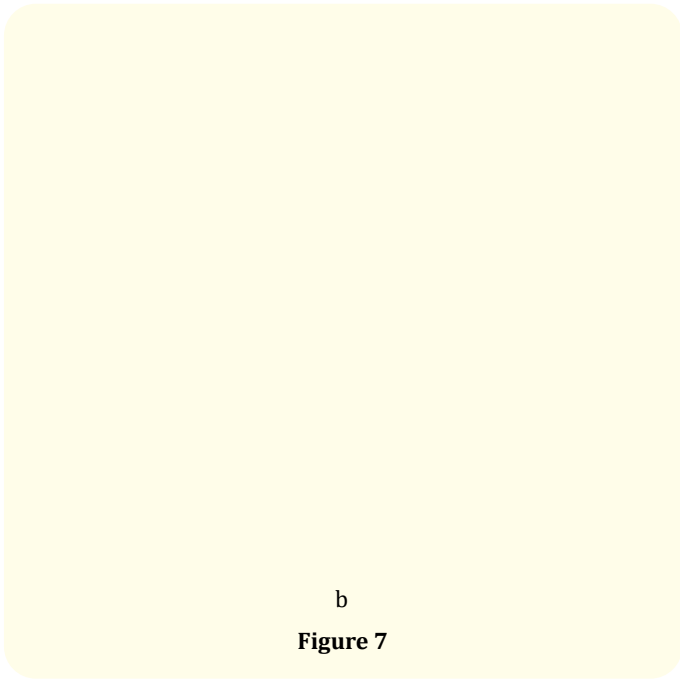
39% of undergraduate students and only 23.7% of postgraduate students disagreed that OLA can be a good alternative to traditional paper-based exams (Figure 5a). Nearly half of undergraduate (43%) and 27% of postgraduate students disagreed that OLA can include all the specializations (Figure 5b).



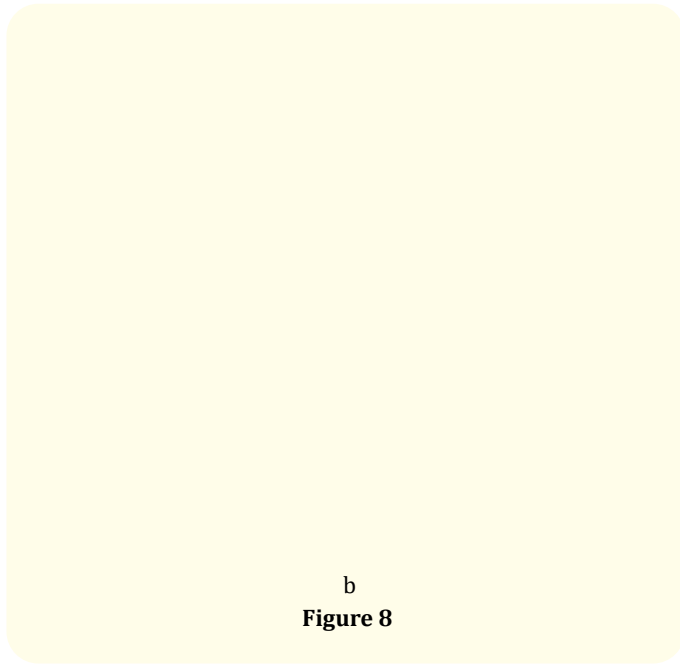
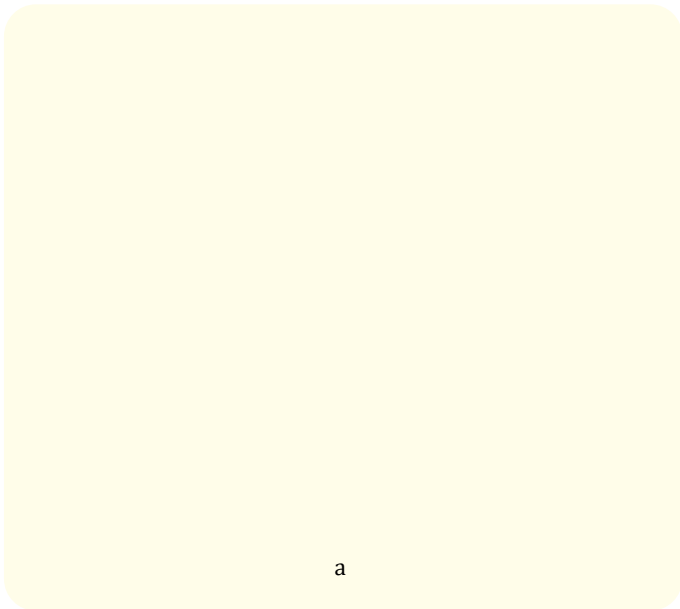
Majority of the participants in both undergraduate (76%) and postgraduate students (81%) were satisfied with the motivation of learning regarding OLA (Figure 6a). The same was true with the effectiveness of online assessment in learning, 80% of undergraduate and postgraduate students were satisfied (Figure 6b). The degree of satisfaction with OLA reflection of knowledge was 64.6% in undergraduate and 76.5% in postgraduate students (Figure 7a).

Most of the students believed that OLA is objective and fair in assessing their performance; however, the percent of disagreement were higher in undergraduate (34.5%) than postgraduate

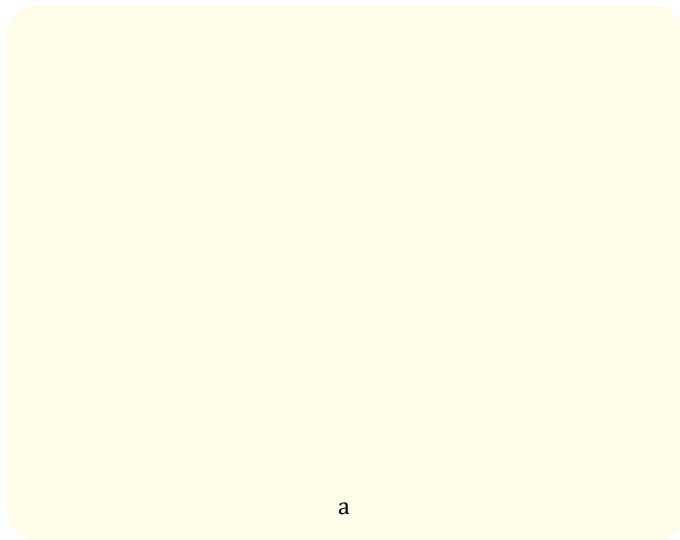




students (20%) (Figure 7b). The same was true regarding OLA is more interesting than paper-based exams 34.7% of undergraduate and 24.4% of postgraduate disagreed (Figure 8a). Most of the participants agreed that OLA is more rapidly accessible to remote students than paper-based exams, (53.8 + 20%) of undergraduate and (68.9+ 18%) of postgraduate students (Figure 8b).



86.6% of the undergraduate and 93% of the postgraduate students agreed that OLA is timesaving (Figure 9a). On the contrary, 34% of the undergraduate and 20.7% disagreed that OLA had an easier and greater control over the answers (Figure 9b). Most of the participants of undergraduate (18.6 + 55.6%) and postgraduate (36.4 + 46.4%) students agreed that OLA results raise no doubts (Figure 10a). The same was true regarding that cheating and plagiarism are hardly easier in OLA in comparison to paper-based exams, most of the undergraduate (36 + 32.6%) and postgraduate (35 + 42.4%) agreed on that (Figure 10b).



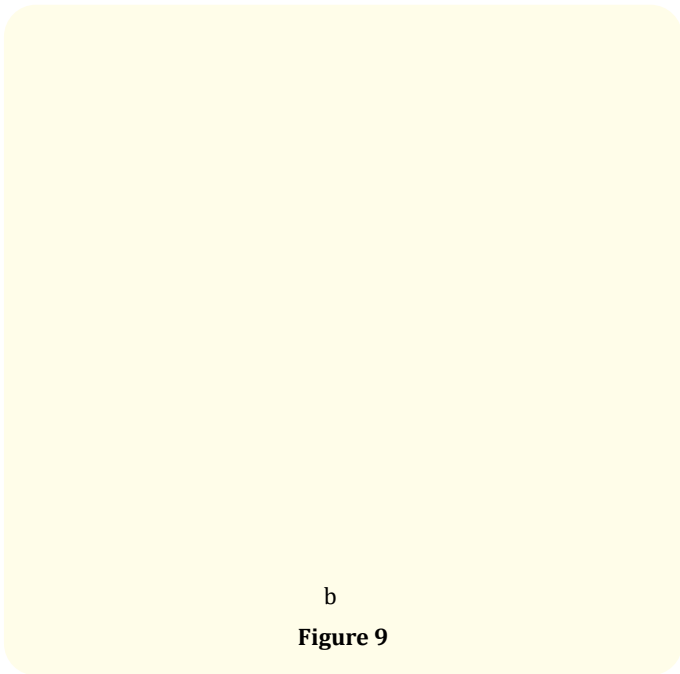


Figure 9

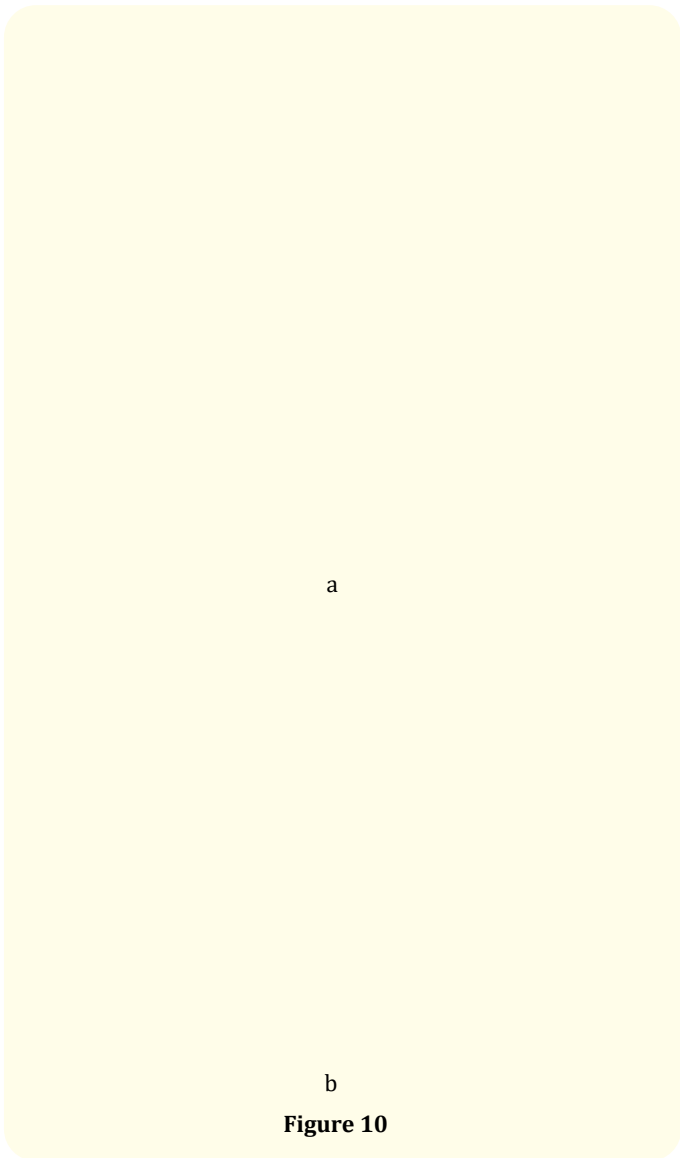


Figure 10

Discussion

On 11th March 2020, the World Health Organization (WHO) declared the COVID19 caused by the 2019 novel coronavirus (2019nCoV) a pandemic which created significant obstacles for dental educators regarding the delivery of healthcare and education so in the COVID-19 era, the need for innovative solutions to optimize educational endeavors has accelerated [18,19].

The coronavirus disease (COVID-19) pandemic has had a worldwide impact on the population, global economy and health care systems. This era has paved the way for dental students to learn anywhere, anytime and on any device using electronic learning, or *e-learning*. The E-learning has been shown to be equally effective as other educational approaches for acquisition of knowledge, skills, and behaviors [20,21]. The effectiveness of e-learning varies widely across different courses. Potential advantages of e-learning include flexibility, control over learning activities, and data collection for assessment, course improvement, and adaptive instruction so we designed this research to measure the degree of satisfaction of under and postgraduate students regarding online learning, teaching and assessment in Faculty of Dentistry, Ain Shams University, Egypt. We select both under and postgraduate students because the degree of satisfaction most probably differ according to academic level [22].

The teaching methods in virtual classroom are more superior than that in traditional classroom as the resource sharing feature in virtual classroom allows professors to share varied content in different formats with the students in real time while delivering lectures on various course topics. This resource sharing feature supports sharing of various file formats - MS Word, MS Excel, Power point Presentations, PDF files, flash presentations, flash video because of that most of postgraduate students was agree that the online teaching approaches improve the learning process and the teaching methods adapted to the virtual environment are appropriate (45.48%, 44.15%) while (37.17%, 35.32%) of undergraduate students was neutral [23].

The virtual classroom does not take more time and consider a more effective learning experience because of the fun and short interactive modules can be paused and repeated if needed although teaching in the virtual classroom could be more suitable for many student because it gives students the flexibility to study on the schedule that works best for them that explain why most of both under and postgraduate students agreed that online teaching does not take more time than classroom teaching (78.26% and 68.1% respectively) [24].

Most of both under and postgraduate students (64.21%, 46.20%) found that using information and communication tech-

nologies (ICTs) in teaching and learning makes it easy. One of the most vital contributions of ICT in the field of education is- Easy Access to Learning, ICT has an impact not only on what students should learn, but it also plays a major role on how the students should learn [25].

About (47.49%) of postgraduate students agree that they have an adequate access to participate effectively in online courses due to the availability of computers and email, a communications revolution has taken place which has impacted the interaction between faculty and students. Above all, online students must possess a high degree of self-reliance, responsibility, and self-discipline.

Virtual consults, telemedicine. Virtual consults as part of telemedicine are extensively utilized for safe and effective patient care as well as resident education amidst the pandemic. Efficient collaborative tools involving both residents and attendings have been reported in a variety of specialties, such as Oral Maxillo-facial and Oral Medicine. However, the glaring limitation of this method is the inability to perform a physical examination, with clinicians relying solely on remote data because of that most of postgraduate student agree that the online teaching develops a sense of participation, interaction and communication among learning society members (39.46%) while (71.75%) of undergraduate students disagreed [26].

Online tools should incorporate as much interactive technology as possible, to provide active, engaging learning. Online picture diagnosis quizzes in image-centric specialties, such as Oral Medicine or Oral Radiology, can prove invaluable for the continuous medical education of trainee also the students find it attractive when there is multimedia incorporated, such as videos or recordings, in the examination as they highly engage students in both learning and assessment. Visual and auditory learners are more focused on content that supports multimedia than content which is presented in plain text and long sentences [27].

Teachers need to help students develop the mindsets required for creativity. Part of this is helping students gain content knowledge. This should include how to visualize and how to get in the habit of noticing, as well as how to ponder the ramifications of their solutions while thinking in an interdisciplinary manner with creativity. Teachers also need to help students develop the skills required for creativity so we find that most of participate agree that online teaching can increase their creativity [28].

Assessment and feedback are fundamental components of educational practice, from early childhood through to university and continuing professional education. Medical education is no exception. Not only do assessments help teachers to determine students' knowledge and skill base, but assessments also affect student learning by shaping and directing further study. Online assessment in medical education offers many advantages over traditional forms of assessment: students can be provided instant feedback on their progress, tutors can more easily monitor learners' progress and achievement of milestones, and automated marking accelerates a once time-consuming burden for medical education institutions. Online assessment enables the provision of continuous and real-time feedback; it can be delivered at a time and place that suits both the learner or the educator, and it can be combined with bite-sized chunks of relevant learning [29-31].

At present, online assessment largely provides an alternative for the written examination that is used to assess a single candidate in isolation. But new technologies will soon enable assessors to break out of existing limitations. Online assessment is usually used to assess knowledge (ideally, applied knowledge); however, newer technologies will enable the assessment of simulated clinical skills online [32]. Online assessments also make it easier to explore the details of students' performances. Teachers can analyze, summarize and display data, identify items on which entire classes experience difficulty and inspect the details of individuals' performances. Easier electronic access to diagnostic detail is a significant advantage of online assessments over traditional test booklets. In relation to relevancy of OLA, 39% of undergraduate students and only 23.7% of postgraduate students disagreed that OLA can be a good alternative to traditional paper-based exams, as the majority of the students thought that papers may well be relevant and useful for exploring students' knowledge and their writing ability. While nearly half of undergraduate 43% and 27% of postgraduate students agreed that OLA can include all the specializations [33,34].

Majority of the participants in both undergraduate 76% and postgraduate students 81% were satisfied with the motivation of learning regarding OLA, as online learning environment has the potential to develop more engaging and meaningful learning experiences in addition, learning environment could provide a better quality of interaction particularly for courses with particular or laboratory classes [35].

Regarding the effectiveness of online assessment in learning, 80% of undergraduate and postgraduate students were satisfied. In web-enhanced courses, students have more responsibilities placed upon them than traditional face-to-face learning environments. Students must become active rather than passive learners. The degree of satisfaction with OLA reflection of knowledge was 64.6% in undergraduate and 76.5% in postgraduate students [36].

Most of the students believed that OLA is objective and fair in assessing their performance; however, the percent of disagreement were higher in undergraduate 34.5% than postgraduate students 20%. Research has shown that students in online learning performed better than those receiving face-to-face instruction. The best online learning combines elements where students go at their own pace, on their own time, and are set up to think deeply and critically about subject matter. The same was true regarding OLA is more interesting than paper-based exams 34.7% of undergraduate and 24.4% of postgraduate disagreed. OLA creates a rich and engaging experience for students by incorporating the best features of online learning environments [37,38].

An online learning environment provides benefits of increased flexibility and convenience with greater reach to learners in multiple locations, regarding to this, most of the participants (53.8 + 20%) of undergraduate and (68.9 + 18%) of postgraduate students agreed that OLA is more rapidly accessible to remote students than paper-based exams [39,40].

The use of online assessments saves a lot of time and money. Often the assessments can be completed in less time, multiple candidates can complete the online assessment at the same time and there is no need for specialized (and expensive) personnel. Also, the test takers are able to take the assessment during class, or at home, using their own devices. You get to see their results and answers and get instant feedback about your chosen topic. That helps you, as a researcher, recruiter, teacher or trainer, to learn more about your users and adapt to their needs, strengths and weaknesses because of that 86.6% of the undergraduate and 93% of the postgraduate students agreed that OLA is timesaving. while only 34% of the undergraduate and 20.7% disagreed that OLA had an easier and greater control over the answers.

Conclusion

Online teaching is an effective approach regarding learning, saving time, however improvement in students participation, interac-

tion and communication is needed to be enhanced. In addition, online assessment is fair method, time saving and motivates students to learn.

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