

The effect of online-teaching and simulated-training during COVID-19 Lockdown on students (An Audit and Survey)

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ABSTRACT

Introduction: Through the covid period the concept of distant, online, and hybrid learning evolved in reaction to lockdown. This hindered the capability of students to receive and practice on patients as they should do.

Methodology: The current study compared data from two classes that had different education systems because of COVID-19. Class 2020 had nearly a complete online teaching of the theoretical part, practical, and minimal patient interaction. Class 2021 had the opportunity to try both systems because of the partial lockdown in 2020 and the complete return to work in 2021.

Results: There was a significant improvement in pass percentage after returning to the ordinary in-class system ($P = 0.0389$). There was a statistically significant ($P=0.02$) dissatisfaction by class 2020 regarding the quality of practical teaching during lockdown (55% of students) compared to 30% of students' dissatisfaction in 2021 in the classroom. There was no statistical significance between both classes regarding the fact that patients provide better skills compared to dummies and models; 91% of students in the case of 2020 preferred real-time patients and 85% of students in class 2021. There was a statistically significant satisfaction regarding overall satisfaction from the education system ($p=0.003$) in class 2021 compared to class 2020; where 93% of 2021 were satisfied compared to 65% of students in 2020 were satisfied.

Conclusion: Any disruption to the technical real-life training on patients violates and affects the quality of training; maybe this type of training can be used as an introductory phase before clinical training.

Trial Registration: ClinicalTrials.gov Identifier: NCT06009913

Key Words: Covid-19; Online teaching; lock down

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INTRODUCTION

The coronavirus disease (COVID-19) pandemic that struck the world starting in 2019, affected all aspects of normal human life in almost every country around the globe. Dental education was among the most influenced areas by this pandemic. [1] Governments around the world enforced several regulations to stop the rapid progression of the disease. Among these regulations were social distancing, lockdown, and immediate suspension of schools and universities. [2] Dental clinical training had to be discontinued since the disease is airborne and dentistry as a profession is at high risk of contracting similar forms of diseases due to the aerosols generated and close proximity between the dentist and patients. [2] The university suspension, has led to the evolution of alternative educational modalities. [3] Pedagogic classroom teaching was replaced by online teaching, yet the clinical component of training remained on hold at the early times of the pandemic in an attempt to break the cycle of disease spread. [4]

In Egypt, the situation was no different from the rest of

the world. Most dental schools were suspended except for emergency dental and surgical services. Online teaching tools were utilized to replace the theoretical teaching part and similar tools were utilized to demonstrate practical and clinical components of training till further notice. [5] [6] At our institute (Faculty of Dentistry, Ainshams University) when the students were permitted back into the dental school, the patients' services were still not fully restored. So, it was decided that actual clinical training and assessment were replaced by simulated training on mannequins rather than on real patients.

In this survey we compare the students' perception and satisfaction of two different classes; one receiving a full online education and simulated training and assessment, to the following class that received a hybrid education model along with both simulated and clinical training.

The primary objective is to determine whether distant learning is an acceptable tool in dental education. The secondary objective is the formulation of a future educational recommendation based on student results and satisfaction rate.

Methodology

The aim of the current audit

Evaluation of the quality of teaching of oral surgery curriculum during the COVID-19 lockdown.

The Objective

The primary objective is to determine whether distant learning is an acceptable tool in dental education. The secondary objective is the formulation of a future educational recommendation based on student results and satisfaction rate.

The Standards used for evaluation.

The course report was published by the faculty-student affair section and the student survey.

Sample size calculation

based on research published regarding the incidence of the capability of online teaching in delivering information by fixing alpha at 0.05 and beta at 0.2 the incidence of overall satisfaction was 28% in an article published by Hettiarachchi et al. [7] The minimal sample size to be included is 21 in each class. In the current study, 40 students were included to avoid any possible dropout.

ETHICS & ENGAGEMENT

This audit data was collected from the course report published by the faculty-student affair section. All students shared in the survey signed an informed consent that their data can be used and presented for research and audit purposes. All adjunctive research presented in this audit got ethical clearance from the Faculty of Dentistry Ain Shams University Ethical Committee.

Clinical trial registration

The current study is registered in clinicaltrial.gov under the reference number (NCTXXXXXXX)

The Study hypothesis

The null hypothesis is that there is no difference between the quality of dental education using distance learning and dummies versus real-time teaching and practicing on patients.

Audit sample

Final year students studying oral surgery in 2019/2020/ and 2020/2021/.

Survey Questions

A short survey composed of five-questions was distributed among 40 students from each class to assess the student's satisfaction with the quality of the education.

The survey questions:

- (1) Technical skills taught during the academic year were valuable or not.
- (2) real patients provide higher skills compared to dummies and models
- (3) Teaching in a real classroom is better than teaching through an online portal
- (4) do you prefer the introduction of dummies before real-time patients
- (5) Regarding overall satisfaction with the education system

The survey portal had a percentage satisfactory meter. Responses over 50% or equal to 50% were considered yes and responses below 50% were considered no.

Statistical assessment:

The chi-square test was used to assess the statistical significance of the results using SPSS software.

RESULTS

The number of students attending class 2020 was 323. The number of students who passed the exams in 2020 was 287 (89%). Regarding the grading of successful students, 7 students got a GPA of more than 3.4 (2.8%), 124 students got GPA between 3 and 3.3 (38.4%), 108 students got GPA between 2.6 and 2.9 (33.4 %) and 46 students got GPA between 2 and 2.5 (14.24%).

The number of students attending class 2021 was 373. The number of students who passed the exams in 2021 was 348 (93%). Regarding the grading of successful students, 51 students got a GPA of more than 3.4 (13.7 %), 130 students got GPA between 3 and 3.3 (35. %), 114 students got GPA between 2.6 and 2.9 (30.6 %) and 53 students got GPA between 2 and 2.5 (14.2%).

Regarding The students' grades showed that there was a significant improvement in pass percentage after the termination of online teaching and return to the ordinary in-class education system ($P = 0.0389$). The results also showed that there was a significant increase in the percentage of students getting excellent degrees after returning to the normal system also ($P < 0.0001$).

Regarding question (1) Technical skills taught during the academic year were valuable or not; the students experienced lockdown and had technical skills lectured online and had half of their practice on dummies or models had an overall dissatisfaction (55% of students) didn't like this method of introducing skills compared to 30% of students dissatisfaction with ordinary clinical teaching in the classroom; and the difference was statistically significant ($P=0.02$). (Figure 1)

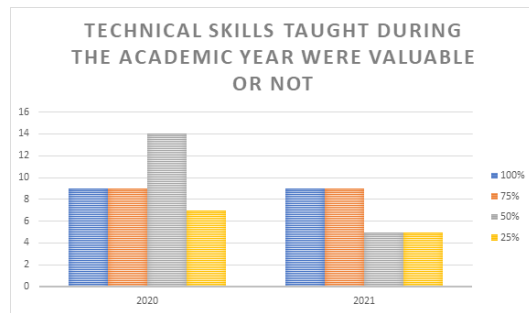


Figure 1: Bar Chart showing student response to the question (Technical skills taught during the academic year were valuable or not)

Regarding question 2 (real patients provide higher skills compared to dummies and models); there was an overall acceptance that real patients provide better skills compared to dummies and models; 91% of students in case of class 2020 preferred real-time patients and 85% of students in class 2021 preferred real-time patients. There was no statistical significance between both classes' results. (Figure 2)

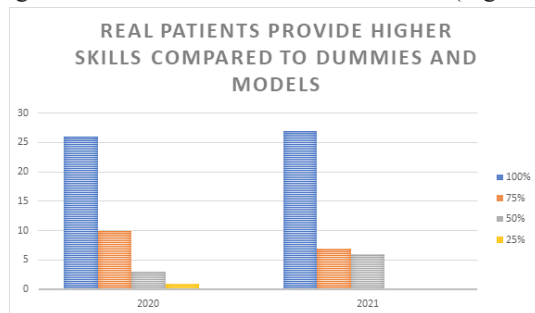


Figure 2: Bar Chart showing student response to the question (Real patients provide higher skills compared to dummies and models)

Regarding question 3 (Teaching in a real classroom is better than teaching through the online portal). Students of class 2020 who received complete online teaching for theoretical curriculum preferred to return to real classrooms (73%) compared to students of 2021 who received mixed teaching preferred had significantly different opinions ($P=0.04$) where only 50% of students preferred real classroom. (Figure 3)

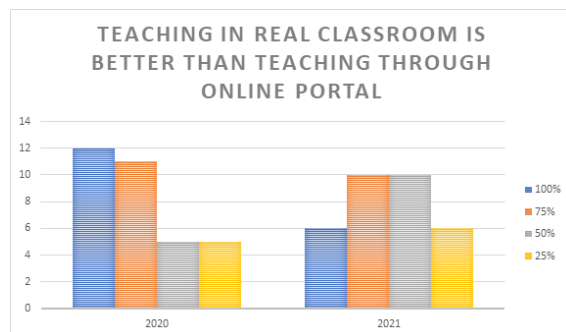


Figure 3: Bar Chart showing student response to the question (Teaching in a real classroom is better than teaching through the online portal)

Regarding question 4 (Do you prefer the introduction of dummies before real-time patients). Students of both classes recommended the introduction of dummies before real-time patients 78% of class 2020 and 80% of class 2021, and there was no statistical significance between both classes ($P=0.7$). (Figure 4)

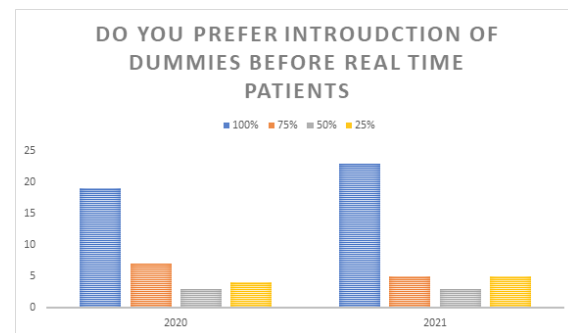


Figure 4: Bar Chart showing student response to the question (Do you prefer the introduction of dummies before real-time patients)

Regarding question 5 (Do dummies and models recreate real-life situations). There was overall agreement (insignificant difference $p=0.15$) between students of both classes that dummies and models didn't recreate real-life situations. Where 60% of students in class 2020 didn't find a recreating option and 75% of students in 2021 found so also. (Figure 5)

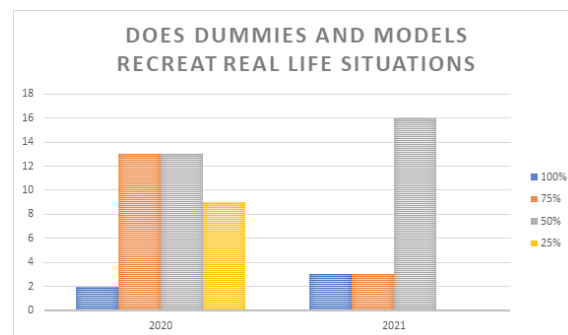


Figure 5: Bar Chart showing student response to the question (Do dummies and models recreate real-life situations)

Regarding overall satisfaction with the education system. There was statistically significant satisfaction ($p=0.003$) in students of class 2021 compared to students of class 2020; where 93% of students of 2021 were satisfied compared to 65% of students of 2020 were satisfied. (Figure 6)

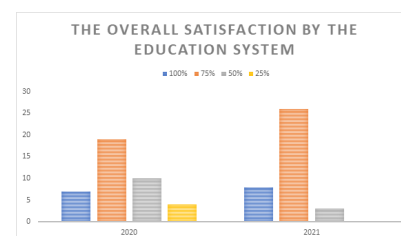


Figure 6: Bar Chart showing student response to the overall satisfaction with the education system.

DISCUSSION

Regarding the success rate of students during and after the pandemic, the results of the current study showed that the students' grades improved significantly when students returned to the ordinary classroom and ordinary clinical training. This was in agreement with De Paola et al. [8] who found that online teaching during lockdown reduced students grades by 1.4 credits per semester. Also, Altindag et al. [9] found that there was a reduction in the student's GPA during the lockdown.

Engzell et al. [10] found that there was about a 60% decrease in the performance of students during lockdown compared to normal education. Maldonado et al. [11] found that students during the pandemic experienced significant learning losses compared to previous semesters before the pandemic. Also, Clark et al. [12]

found that only low achievers benefit from online teaching and this may be attributed to the fact that they don't attend regular lessons compared to high achievers. However, we must mention that Clark et al. [12] found that there is an overall improvement in student performance in disagreement with our findings. The introduction of mannequins and hands-on for both examination and training was done in response to the pandemic. Winter et al. [13] at Marburg University mentioned that mannequin was successful in filling the clinical training gap. Some exams were performed through the lockdown period and also on dummies to reduce the risk of infection [14].

Students who had no clinical practice with patients showed a general dissatisfaction in our institute compared to students who had opportunities to practice with patients as our survey show. However, all students recommend the introduction of hands-on and manikin sessions before clinical practice on patients to get more confidence and skills. Based on the results of previous studies [2] it is documented that there needs to be some sort of reform to the way clinical training is conducted in dental schools, to face unforeseen challenges as that encountered during the COVID-19 pandemic.

In the study by Chang et al. [15], most students preferred the blended learning methods as they believed it provided more learning efficiency. Yet it can only augment and not replace the actual physical clinical training. Such a finding agrees with the results of the current study. Among the reported advantages to the online learning modalities applied during the COVID-19 pandemic, is the prevalence of much of the learning material for the students at hand. Which permitted more engagement regarding the didactic components of courses and allowed to successfully implement a flipped classroom model of teaching. [4] Online education is known to have many advantages such as the accessibility of educational materials, the flexibility of studying with the possibility of repeating content, and ultimately enabling the students to customize different study plans.

Hung et al. [16] Stated that dental students in the United States rated their online curriculum positively, with 87.6% reporting a high degree of comfort adapting to technology and only 12.4% feeling neutral. No students reported being uncomfortable with the online technology. Also, a systematic review of 59 studies published recently suggested that online education is equivalent to traditional teaching in terms of knowledge gained, skills gained, and student satisfaction [17]

In contrast to the previous studies, many other students from Egypt considered their clinical performance to be negatively affected by the transition to online platforms due to the COVID-19 pandemic, with the reduced exposure to patients hindering their development of clinical skills and professionalism [6]. The exact effect of the COVID-19 pandemic on the clinical skills of final-year students who did not have enough time to compensate for lost educational time was difficult to assess and consequences may only become evident in the subsequent years.

Even after schools re-opened, students observed a negative impact on patient attendance at appointments during the beginning of the COVID-19 pandemic. A recent study reported a significant reduction in the use of emergency dental services by 38% at the start of the COVID-19 outbreak in China, suggesting COVID-19 influenced people's dental care-seeking behavior [17]. This might be because people were reluctant to go outside and leave the house, and were less willing to seek dental care. It is important to mention that the prolonged suspension of clinical training is likely to impact the clinical confidence and competence of dental students. Virtual clinical learning innovations are currently being proposed to complement standard clinical practice as a safe way to acquire practical clinical skills through simulation exercises, without direct contact with patients to minimize COVID-19 transmission risks [18]. Such systems provided the tutor and students with continuous and integrated feedback. Virtual reality (VR) simulators have the capability of tactile feedback, which allows students to touch and feel dental tissue virtually. Studies have shown that the use of VR has improved the acquisition of manual dexterity in dentistry courses in the operative area [19].

large investments from colleges are required to provide faculties not only with intense training on the technical aspects of the virtual platform itself but also on basic principles of instructional design for effective online delivery to promote student engagement and appropriate assessment methodology. In addition to the infrastructure and resources which are required to support the complete transition of the teaching strategy. In conclusion, For the time being in Egypt as well as other developing countries, there is still no substitute for clinical training, which is the core curriculum of dental schools, however, online case-based discussions, treatment planning exercises, and extra clinical sessions at the end of the year may be helpful to make up for the lost learning due to any emergency disruptions.

CONCLUSION:

Online teaching and/or hybrid teaching is a successful tool in delivering information in the future and there is an overall agreement of its effectiveness. However, any violation in technical real-life training on patients violates and affects the quality of dental treatment; maybe this type of treatment can be used as an introduction phase before working on real-time patients.

CONFLICTS OF INTEREST

The authors declare that there are no conflicts of interest.

Declarations

The current study got as ethical approval and participants in survey consented to participate. The students signed and informed consent that their responses may be used for publication. All the raw data is available upon request. There is no conflict of interest between authors and any association. The current study is self-funded. All authors equally contributed and acknowledged.

Ethics approval and consent to participate

The current audit and survey was approved by the Faculty of Dentistry Ain Shams University ethical committee under the acceptance number 1281/September 2023.

REFERENCES

1. Chavarria-Bolanos D, Gomez-Fernandez A, Dittel-Jimenez C, Montero-Aguillar M. E-Learning in Dental Schools in the Times of COVID-19: A Review and Analysis of an Educational Resource in Times of the COVID-19 Pandemic. *Odvotos International Journal of Dental Sciences*. 2020; 22(3): 69-86.
2. Haridy R, Abdalla MA, Kaisarly D, El Gezawi M. A cross-sectional multicenter survey on the future of dental education in the era of COVID-19: Alternatives and implications. *J Dent Educ*. 2021; 85(4): 483-493.
3. Santos GNM, da Silva HEC, Leite AF, Mesquita CRM, Figueiredo PTS, Stefani CM, et al. The scope of dental education during COVID-19 pandemic: A systematic review. *J Dent Educ*. 2021; 85(7): 1287-1300.
4. Kerksra RL, Rustagi KA, Grimshaw AA, Minges KE. Dental education practices during COVID-19: A scoping review. *J Dent Educ*. 2022; 86(5): 546-573.
5. Shehata MK, Abouzeid E, Wasfy NF, Abdelaziz A, Wells RL, Ahmed SA. Medical education adaptations post COVID-19: an Egyptian reflection. *J Med Educ Curric Dev*. 2020; 7(eCollection): 1-9.
6. Hassan MG, Amer H. Dental Education in the Time of COVID-19 Pandemic: Challenges and Recommendations. *Front Med (Lausanne)*. 2021; 8(eCollection): 1-6.
7. Hettiarachchi S, Damayanthi BW, Heenkenda S, Disanayake DM, Ranagalage M, Ananda L. Student satisfaction with online learning during the COVID-19 pandemic: A study at state universities in Sri Lanka. *Sustainability*. 2021 Oct 25;13(21):11749.
8. De Paola M, Gioia F, Scoppa V. Online teaching, procrastination and student achievement. *Economics of Education Review*. 2023 Jun 1;94:102378.
9. Altindag DT, Filiz ES, Tekin E. Is online education working?. *National Bureau of Economic Research*; 2021 Aug 2.
10. Engzell P, Frey A, Verhagen MD. Learning loss due to school closures during the COVID-19 pandemic. *Proceedings of the National Academy of Sciences*. 2021 Apr 27;118(17):e2022376118.
11. Maldonado JE, De Witte K. The effect of school closures on standardised student test outcomes. *British Educational Research Journal*. 2022 Feb;48(1):49-94.
12. Clark AE, Nong H, Zhu H, Zhu R. Compensating for academic loss: Online learning and student performance during the COVID-19 pandemic. *China Economic Review*. 2021 Aug 1;68:101629.
13. Winter J, Frankenberger R, Günther F, Roggendorf MJ. Dental Education during the COVID-19 Pandemic in a German Dental Hospital. *International Journal of Environmental Research and Public Health*. 2021 Jun 27;18(13):6905.
14. Alrashdi M, Hameed A, Aljabr A. COVID-19 and a call to adapt dental education. *Frontiers in Dental Medicine*. 2021 Apr 30;2:664460.
15. Chang TY, Hsu ML, Kwon JS, Kusdhany MLS, Hong G. Effect of online learning for dental education in Asia during the pandemic of COVID-19. *J Dent Sci*. 2021; 16(4): 1095-1101.
16. Hung, M., Licari, F. W., Hon, E. S., Lauren, E., Su, S., Birmingham, W. C., et al. (2021). In an era of uncertainty: Impact of COVID-19 on dental education. *J. Dent. Educ.* 85, 148–156.
17. Van Doremalen, N., Bushmaker, T., Morris, D. H., Holbrook, M. G., Gamble, A., Williamson, B. N., et al. (2020). Aerosol and surface stability of SARS-CoV-2 as compared with SARS-CoV-1. *N. Engl. J. Med.* 382, 1564–1567.
18. Hollis W, Darnell LA, Hottel TL. Computer assisted learning: a new paradigm in dental education. *The Journal of the Tennessee Dental Association*. 2011 Jan 1;91(4):14-8.
19. Miyazono, S., Shinozaki, Y., Sato, H., Isshi, K., and Yamashita, J. (2019). Use of digital technology to improve objective and reliable assessment in dental student simulation laboratories. *J. Dent. Educ.* 83, 1224–1232.