


Connecting the dots: Lessons learned from student performance in the pandemic era

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1 | PROBLEM

As a result of the recent COVID-19 pandemic, dental schools across the country have had to rapidly restructure and reformat their dental curriculum.^{1–4} Yet the impacts on students' performance with social distancing, remote learning, and other protocols implemented have not been well evaluated.

2 | SOLUTION

Thirty-eight second-year predoctoral students participated in an operative preclinical course during the COVID-19 pandemic. To optimize learning, didactic lectures were separated from the preclinical exercises and provided remotely via Zoom. Our previous study showed that the majority of students prefer either recorded live lectures or prerecorded lectures with follow-up Q&A than non-recorded lectures⁵ (Figure 1). Thus, most of the Zoom lectures during the course were recorded and uploaded, and students were granted access to them. When this lecture series was completed and limited laboratory access was granted by the university, students were able to proceed with the in-person, hands-on portion of the course. The students were divided into smaller groups to maintain social distancing. However, students' access to the lab outside of their mandatory sessions was strictly limited. Upon completion of both the didactic and lab exercises, students were evaluated through a monitored, online-

based written examination, and a lab practical examination (class-II amalgam preparation/restoration and class III-composite preparation/restoration). The written exam in 2020 was given in an online, remote, multiple-choice (MC) format, while a hardcopy exam with MC questions was used from 2014 to 2019. The level of difficulty of the written exam was kept as similar as possible for the last 7 years to allow for comparison. During the pandemic, the LockDown Browser and camera-monitoring system (Respondus, Redmond, WA) was introduced to maintain academic integrity. The same format for the preclinical lab competency exam was used from 2014 to 2020. Students were also asked to voluntarily participate in an anonymous survey gauging their perceptions on how this new structure affected their education (response rate = 82%, n = 31).

3 | RESULTS

Despite the separation of didactic and preclinical learning, students scored well on both the written and lab examinations. Interestingly, the average written score was 78.3%, which was 4.7% higher than the collective 2014–2019 average performance. When comparing this year's performance to the previous 6-year averages for the simulation examination, students averaged 2.6% higher. The trend of better performance in the separated class year was also seen when analyzing each portion of the simulation examination (Table 1).

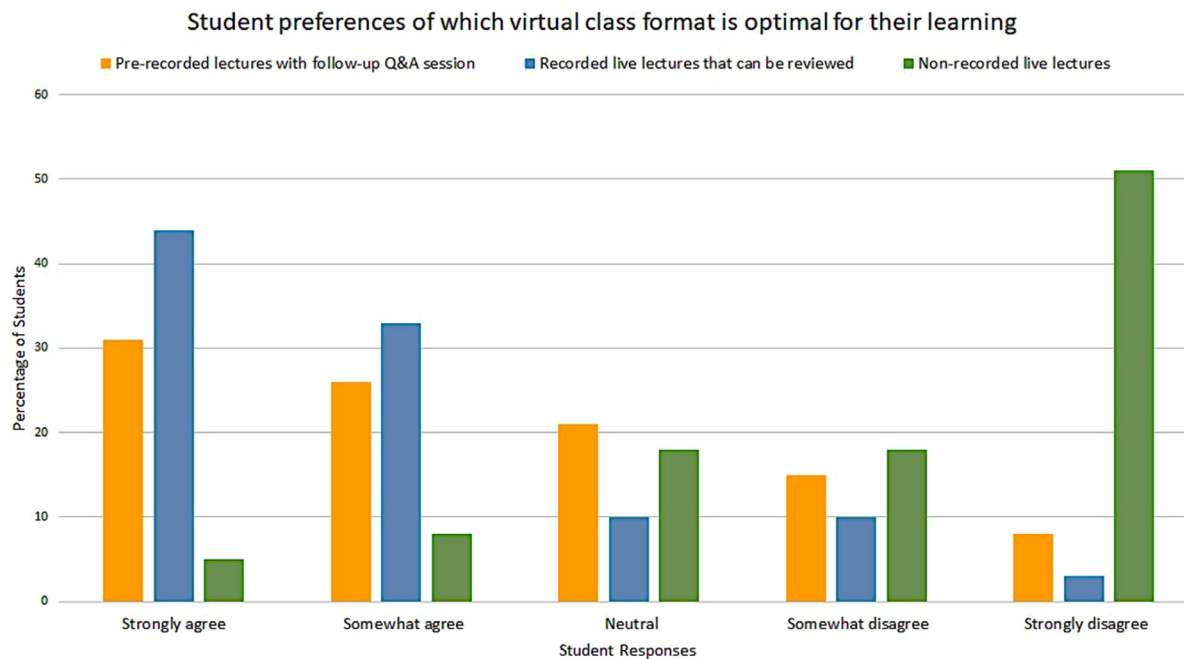


FIGURE 1 Student preference of which class format is optimal for learning (n = 39,100% response rate)

TABLE 1 Average performance on preclinical lab competency examinations and a final examination from 2014–present

| Year of exam | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | Average | 2020 |
|---|-------------|------------|-------------|-------------|-------------|-------------|--------------------------|------------|
| | n = 36 | n = 35 | n = 35 | n = 34 | n = 34 | n = 34 | of 2014 to 2019, n = 208 | n = 39 |
| Preclinical lab competency exam score (%) | 78.5 ± 14.0 | 80.2 ± 9.3 | 79.6 ± 11.4 | 82.9 ± 9.5 | 81.1 ± 9.8 | 78.0 ± 12.4 | 80.1 ± 11.1 | 82.7 ± 8.9 |
| Class II amalgam prep score (%) | 69.0 ± 14.2 | 76.2 ± 9.6 | 73.8 ± 10.5 | 79.2 ± 12.1 | 75.6 ± 10.1 | 71.9 ± 13.5 | 73.2 ± 11.7 | 78.8 ± 9.6 |
| Class II amalgam rest score (%) | 78.5 ± 13.7 | 83.3 ± 8.0 | 83.9 ± 8.0 | 83.5 ± 9.6 | 84.4 ± 10.4 | 82.1 ± 12.2 | 82.6 ± 10.3 | 85.9 ± 6.7 |
| Class III composite prep score (%) | 84.5 ± 10.4 | 84.3 ± 7.1 | 79.1 ± 14.0 | 83.6 ± 8.3 | 81.2 ± 7.7 | 78.6 ± 11.3 | 81.9 ± 9.9 | 84.6 ± 9.0 |
| Class III composite rest score (%) | 82.1 ± 12.6 | 77.0 ± 9.8 | 81.6 ± 10.3 | 80.9 ± 11.4 | 83.5 ± 8.7 | 80.3 ± 9.9 | 80.9 ± 10.5 | 81.4 ± 8.6 |
| Final exam score (%) | 67.2 ± 6.8 | 68.1 ± 4.7 | 74.3 ± 5.7 | 81.0 ± 5.2 | 75.0 ± 5.4 | 76.0 ± 4.7 | 73.6 ± 7.1 | 78.3 ± 4.8 |

Student feedback shed light on the strengths and weaknesses of this reformatted course. For the preclinical lab course, students felt that the reduced number of students in each lab session was optimal for learning (87%) and for their health and safety (94%) (Figure 2A). However, students were not satisfied with the limited access to the lab outside of mandatory sessions (78%) (Figure 2A). Even though students felt that providing lectures that preceded lab exercises was not optimal for their learning (68%) (Figure 2B), they also reported that this separation of lectures and lab exercises resulted in providing them with more time for self-directed learning with quality online materials. Students reported that in particular recorded didactic lectures were tremendously helpful because they allowed students to revisit topics covered in lectures and review relevant information prior to each lab session as well as the written examination.

These findings demonstrate that the quality of student learning may have been maintained during the pandemic. High-quality, online materials, such as recorded lectures, may play an important role in filling the gap between distanced didactic lectures and preclinical and clinical exercises. Additional factors might have led to students' higher performance, such as stronger performers preclinically and academically in this class year and greater student engagement stemming from stricter regulations. Further research is needed in the pandemic era and beyond.

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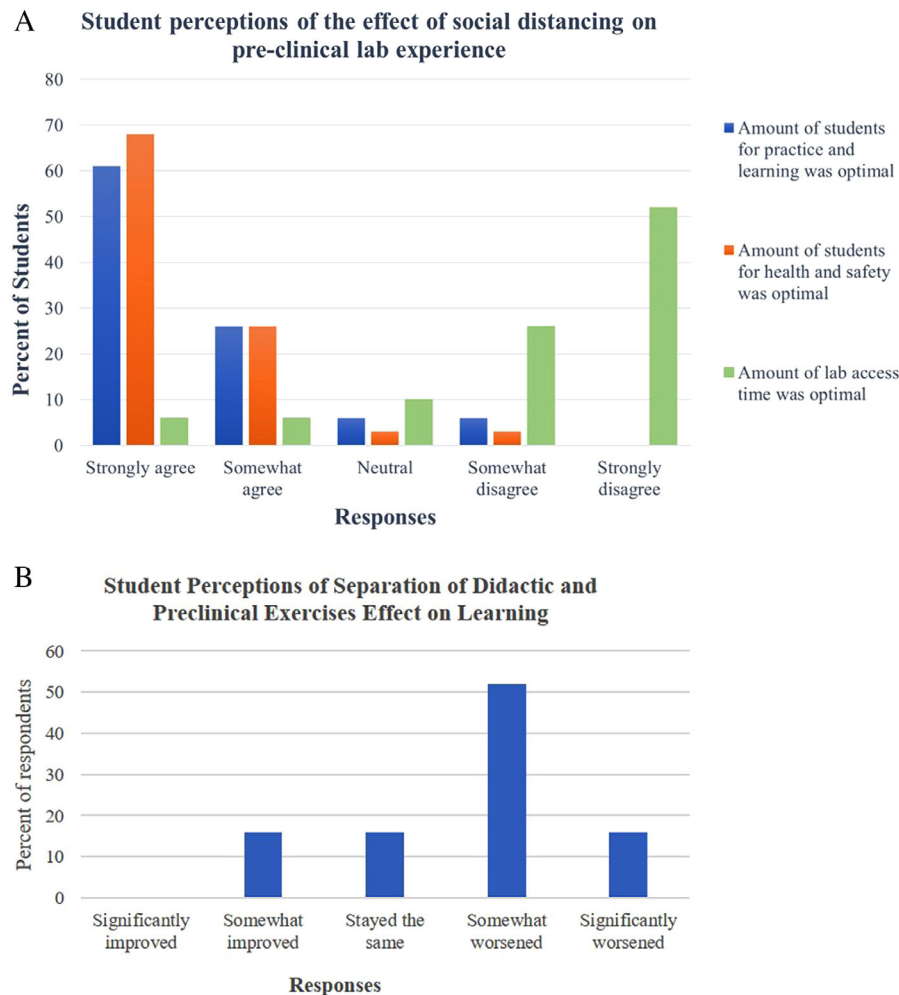



FIGURE 2 Student perceptions of the effect of social distancing on their preclinical laboratory experience (response rate 81%, $n = 31$). 2A: Student perceptions of number of students, lab access and health and safety. 2B: Student perceptions of separation of didactic and preclinical exercises effect on learning

CONFLICTS OF INTEREST

The authors have no conflicts of interest to disclose.

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