

Hybridized dental hygiene psychomotor skills instruction: The COVID-19 challenge

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1 | PROBLEM

As the world reacted to COVID-19 during the spring of 2020, so did the University of Mississippi Medical Center School of Dentistry's Department of Dental Hygiene. The first-year dental hygiene preclinical instrumentation course transitioned to distance learning at mid-term. Approximately 36 hours of laboratory time remained. The problem was finding a hybrid format that would allow for the development of the fine psychomotor skills necessary in dental hygiene.

2 | SOLUTION

Educational literature on synchronous and asynchronous methods of distance education specific to fine psychomotor skills development was scarce,¹⁻⁵ forcing the dental hygiene faculty to develop our own. Our instruction to be followed in three ways: (1) live sessions hosted through the university-sponsored platform titled Big Blue Button (BBB), (2) pre-recorded videos developed by the course director via Flipgrid, and (3) student-submitted videos in Flipgrid.

Additionally, the dental hygiene department purchased magnetized cell phone mounts that attached to existing metal plates on the typodonts and clamped onto a chair. Students purchased a specific device that would allow them to extend their cell phone out and over their typodonts. Students received course and laboratory mate-

rials pre-assembled by faculty. Table 1 and Figure 1 demonstrate the armamentarium we used.

FlipGrid and BBB complemented each other in their abilities to closely mirror the traditional laboratory setup. FlipGrid allowed the course director to record instructional videos on the fundamentals of each instrument, as well as technique demonstrations for the facial and lingual aspects of each sextant. Videos remained available to students and faculty throughout the entire semester.

The class was divided into small groups and assigned times to participate in 1-hour synchronous conferences in BBB. Students were assigned videos to watch in FlipGrid prior to conferencing. During BBB meetings, students received individual instruction and feedback from two faculty. Afterwards, students were required to practice on their own for a specified amount of time and then upload a video of their progress. Later, the course director reviewed and provided feedback on student submissions.

Exploring and calculus removal practical exams were scheduled in Flipgrid. Each opened at 8:00 AM and closed at 4:00 PM on test dates. The course director provided written and verbal directions in BBB. Students were allowed the day to practice; however, a video depicting their "best" performance had to be submitted before close. Four faculty were assigned a specific instrument and area to review and grade for intrarater reliability. The same grading rubrics distributed at the beginning of the semester were used. Once graded, the course director opened videos for students to self-evaluate their submissions using the rubric. The course director assigned each student to one of the

TABLE 1 Armamentarium used for hybrid preclinical instruction

1. Typodonts (Kilgore)
2. Periodontal instruments (Hu-Friedy)
3. Universal Magnet Clamp Mount Holder for Mobile Devices (MagicMount XL)
4. Gooseneck Phone holder (Gooseneck Phone Holder, Lamicall Phone Stand: Adjustable Lazy Holder Phone Mount)
5. Laptop (students' own)
6. Cell phone (students' own)
7. Internet

**FIGURE 1** Hybrid education set up

four faculty. Once students self-evaluated, the student emailed their faculty to set up an online synchronous session for remediation.

Students returned to campus just prior to the original scheduled comprehensive final practical; therefore, the comprehensive practical was administered in the traditional format. In addition, there was one 3-hour laboratory session left on the schedule. This session gave faculty and students time to address difficulties before the final.

3 | RESULTS

To highlight what went well we used descriptive statistics to compare the 2020 final lab practical grades with the previous 4 years final practical grades. We noticed more variability in final exam performance compared to previous 3 years (Interquartile ranges of 9.3 in 2020, 5.7 in 2019, 4.6 in 2018, 5.8 in 2016) as expected of de novo approaches. We also compared performance on practicals administered pre-COVID and post-COVID to evaluate performance consistency. Continued testing throughout the semester indicated that our cohort's performance continued to thrive despite the disruption to the learning medium.

However, some things, like internet availability/connections and availability of items, did not go well. We learned a lesson with the university learning management system, which was not reliable for uploading videos. Flipgrid provided a video repository, but was not interactive and is designed for K-12 students. Nonetheless, Figure 2 reveals student performance in the course was consistent with previous years' face-to-face instructional methods.

The pandemic proved a breeding ground for innovation. This report is the first evidence we found that assessed effectiveness of teaching dental hygiene instrumentation with a focus on applying fine psychomotor skills through hybrid education, specifically via asynchronous videos and synchronous interactive web-based video sessions. More research on this topic is warranted.

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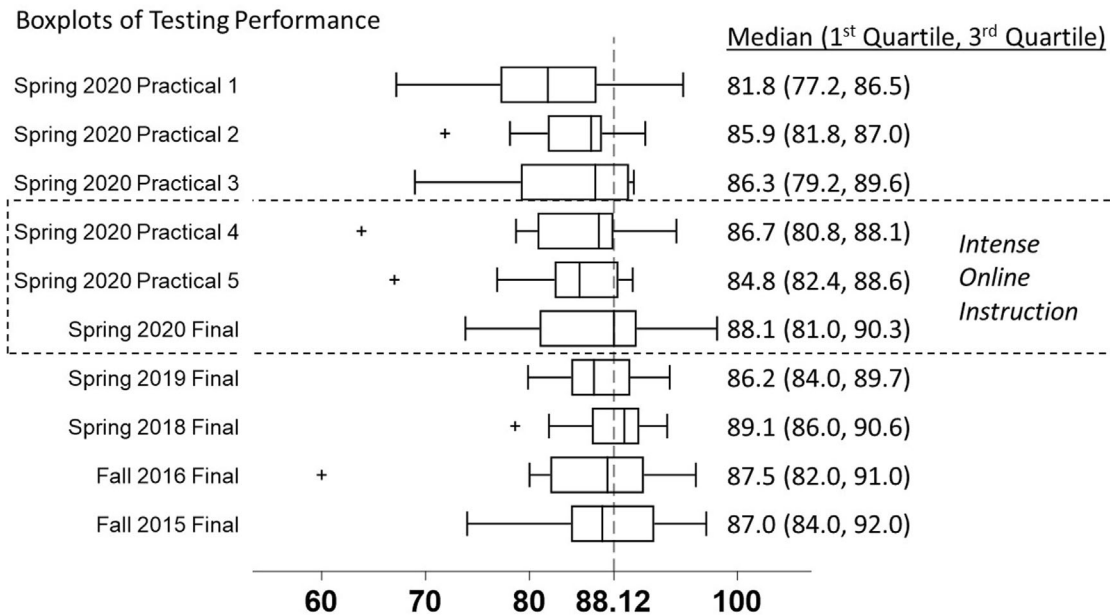


FIGURE 2 Boxplots of testing performance

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