A Unique Student Cohort's Perceptions and Preferences about Gross Anatomy Education in the Medical Curriculum: JABSOM Student Survey 2020
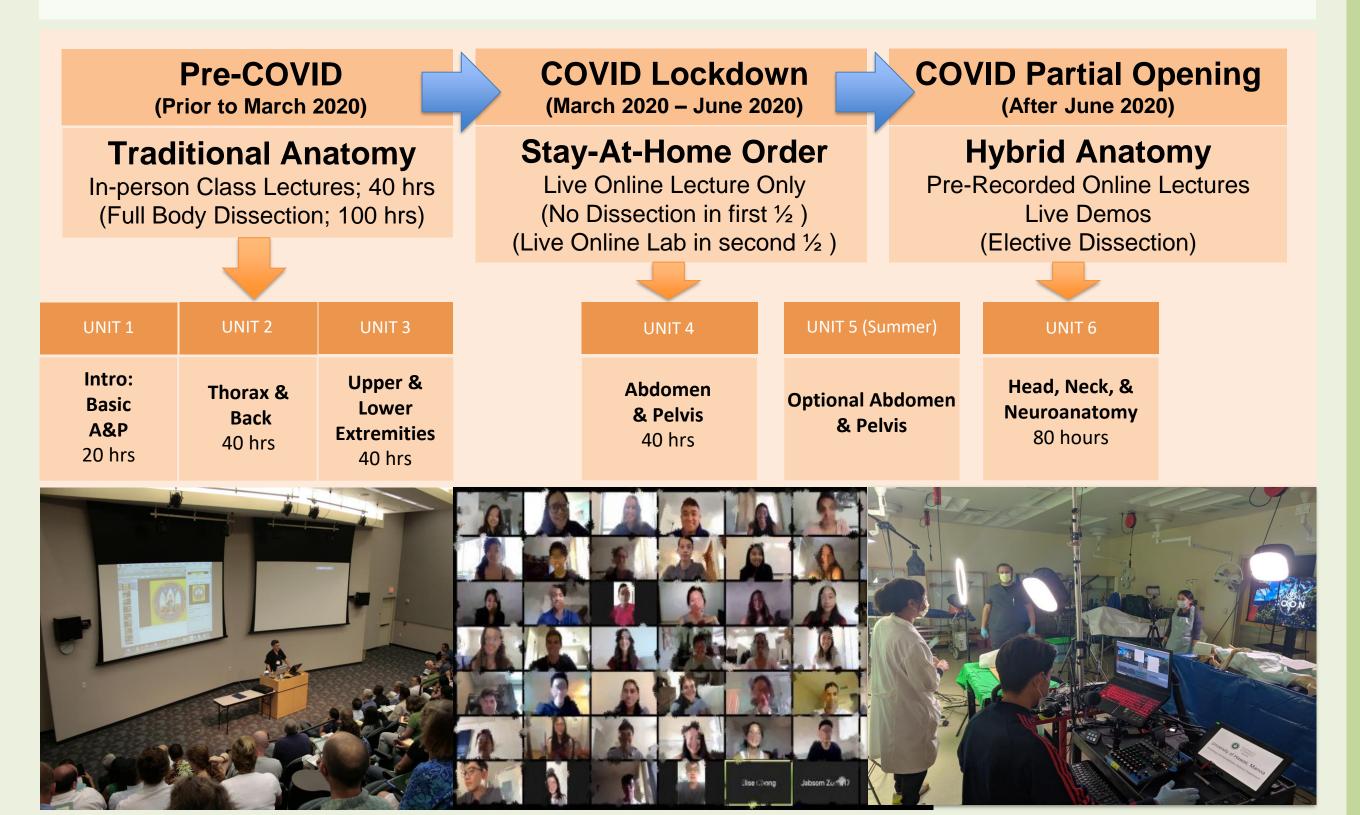
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Table 6. Average MCQ scores in MD6 (Head and Neck anatomy) for 2014-2020.

Year	Average Score (%) + SD	Failures
2020	84.2 ± 8.5	0
2019	83.1 ± 8.5	3
2018	84.1 ± 8.2	2
2017	84.3 ± 7.5	0
2016	84.4 ± 8.8	3
2015	83.3 ± 9.5	3
2014	81.9 ± 7.6	1

INTRODUCTION

Anatomy is traditionally taught with in-person lectures followed by cadaveric dissections. The COVID pandemic imposed rapid and major changes to anatomy education. In-person activities were halted and immediately replaced with online lectures and laboratories. Hybrid learning, combining novel in-person and online activities, was implemented during Covid partial re-opening. As part of hybrid instruction, students elected to dissect (D) or not (N) providing a unique contrast since dissection requires a significant time and effort. Probing student perceptions with these disparate approaches could provide insight into best practices. The purpose of this study is to assess the perceptions of a unique student cohort arising from the COVID pandemic with respect to gross anatomy instruction. We hypothesize that perceptions concerning the delivery of gross anatomy education, as well as its educational significance, differ between D and N groups.
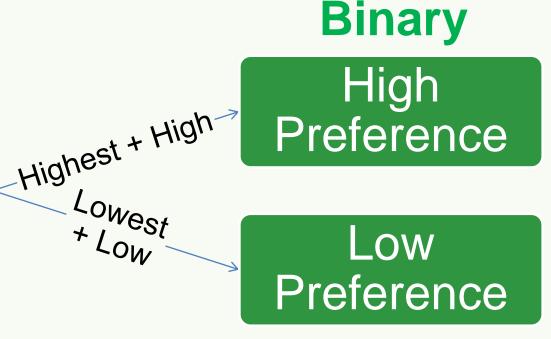
	COVID Lockdown	COVID Partial Opening
Pre-COVID (Prior to March 2020)	**COVID Lockdown** (March 2020 – June 2020)	**COVID Partial Opening** (After June 2020)
Traditional Anatomy In-person Class Lectures; 40 hrs (Full Body Dissection; 100 hrs)	**Stay-At-Home Order** Live Online Lecture Only (No Dissection in first ⅓) (Live Online Lab in second ⅓)	**Hybrid Anatomy** Pre-Recorded Online Lectures Live Demos (Elective Dissection)

UNIT 1	UNIT 2	UNIT 3	UNIT 4	UNIT 5 (Summer)	UNIT 6
Intro: Basic A&P 20 hrs	Thorax & Back 40 hrs	Upper & Lower Extremities 40 hrs	Abdomen & Pelvis 40 hrs	Optional Abdomen & Pelvis	Head, Neck, & Neuroanatomy 80 hours

METHODS

Survey Instrument

The survey comprised 3 general questions concerning gross anatomy instruction as well as 1 question each concerning lecture and laboratory preferences. Four-level Likert scales were employed to assess trends (lowest, low, high, highest) as well as a binary opinion (low, high).

Likert Scale
- 1 = Highest preference
- 2 = High preference
- 3 = Low preference
- 4 = Lowest preference

Highest + High
Lowest + Low

Binary
- High Preference
- Low Preference

Students were asked about the usefulness of anatomy, preference of lecture-based instruction (slide decks without lectures, in-person lectures, live online lectures, and pre-recorded lectures), and preferences for dissection laboratories (no lab, live online labs, class in-person labs, and hybrid labs).

Participants

Groups	# responses	Response Rate
JABSOM CO 2023 (n=79)		
Students Who Elected to Dissect (D, n=40)	40	100%
Students Who did NOT to Dissect (N, n=39)	39	100%

Data Analysis

Data comprised counts and percentages of response. Fisher's exact tests were used to compare the two subgroups. For more than two response categories with a significant difference (p<0.05), post-hoc comparison was performed. All quantitative analyses were performed using R (version 4.0). Average class exam scores were also compared retrospectively.

RESULTS: Students responses to questions about lectures and dissection

Table 1. Student responses to the questions about learning preferences in gross anatomy lectures (n=78[1])

Question: Rank your preference from most to least	Overall, N = 78	Non-Dissection Group (N) N = 38, (48.7%)	Dissection Group (D) N = 40, 51.3%)	p-value[2]
In-person lectures (Pre-COVID), n (%)				NS
Lowest	27 (34.6%)	12 (31.6%)	15 (37.5%)	
Low	26 (33.3%)	10 (26.3%)	16 (40.0%)	
High	14 (17.9%)	8 (21.1%)	6 (15.0%)	
Highest	11 (14.1%)	8 (21.1%)	3 (7.5%)	
Live online lectures (COVID Lockdown), n (%)				NS
Lowest	6 (7.7%)	4 (10.5%)	2 (5.0%)	
Low	19 (24.4%)	12 (31.6%)	7 (17.5%)	
High	29 (37.2%)	11 (28.9%)	18 (45.0%)	
Highest	24 (30.8%)	11 (28.9%)	13 (32.5%)	
Pre-recorded lectures (COVID Partial Opening), n (%)				NS
Lowest	8 (10.3%)	7 (18.4%)	1 (2.5%)	
Low	8 (10.3%)	5 (13.2%)	3 (7.5%)	
High	26 (33.3%)	12 (31.6%)	14 (35.0%)	
Highest	36 (46.2%)	14 (36.8%)	22 (55.0%)	
Slide deck without lectures (COVID Partial Opening), n (%)				NS
Lowest	37 (47.4%)	15 (39.5%)	22 (55.0%)	
Low	25 (32.1%)	11 (28.9%)	14 (35.0%)	
High	9 (11.5%)	7 (18.4%)	2 (5.0%)	
Highest	7 (9.0%)	5 (13.2%)	2 (5.0%)	

[1] Note that one student provided invalid responses and thus the responses from this student were excluded from the analysis for the questions. [2] Fisher's exact test to compare Groups N and D. (Non-Dissection Group and Dissection Group)

Table 3. Student responses to the questions about learning preferences in gross anatomy labs (n=79)

Question: Rank your preference from most to least	Overall, N = 79	Non-Dissection Group (N) N = 39, (49.4%)	Dissection Group (D) N = 40, (50.6%)	p-value[1]
Class in-person labs (Pre-COVID), n (%)				NS
Lowest	13 (16.5%)	5 (12.8%)	8 (20.0%)	
Low	35 (44.3%)	19 (48.7%)	16 (40.0%)	
High	28 (35.4%)	14 (35.9%)	14 (35.0%)	
Highest	3 (3.8%)	1 (2.6%)	2 (5.0%)	
No labs (First ⅓ of COVID Lockdown), n (%)				0.031
Lowest	55 (69.6%)	25 (64.1%)	30 (75.0%)	
Low	7 (8.9%)	1 (2.6%)	6 (15.0%)	
High	5 (6.3%)	4 (10.3%)	1 (2.5%)	
Highest	12 (15.2%)	9 (23.1%)	3 (7.5%)	
Live online labs (Second ⅓ of COVID Lockdown), n (%)				NS
Lowest	5 (6.3%)	5 (12.8%)	0 (0.0%)	
Low	29 (36.7%)	12 (30.8%)	17 (42.5%)	
High	30 (38.0%)	13 (33.3%)	17 (42.5%)	
Highest	15 (19.0%)	9 (23.1%)	6 (15.0%)	
Hybrid labs (Partial COVID Opening), n (%)				NS
Lowest	6 (7.6%)	4 (10.3%)	2 (5.0%)	
Low	8 (10.1%)	7 (17.9%)	1 (2.5%)	
High	16 (20.3%)	8 (20.5%)	8 (20.0%)	
Highest	49 (62.0%)	20 (51.3%)	29 (72.5%)	

[1] Fisher's exact test to compare Groups N and D (Non-Dissection Group and Dissection Group).

Table 2. Student responses to the questions about learning preferences (two levels) in gross anatomy lectures (n=78[1])

Question: Rank your preferences from most to least	Overall, N = 78	Non-Dissection Group (N), (48.7%)	Dissection Group (D) N = 40, 51.3%)	p-value[2]
In-person lectures (Pre-COVID), n (%)				NS
Low (lowest or low)	53 (67.9%)	22 (57.9%)	31 (77.5%)	
High (highest or high)	25 (32.1%)	16 (42.1%)	9 (22.5%)	
Live online lectures (COVID Lockdown), n (%)				NS
Low (lowest or low)	25 (32.1%)	16 (42.1%)	9 (22.5%)	
High (highest or high)	53 (67.9%)	22 (57.9%)	31 (77.5%)	
Pre-recorded lectures (COVID Partial Opening), n (%)				0.025
Low (lowest or low)	16 (20.5%)	12 (31.6%)	4 (10.0%)	
High (highest or high)	62 (79.5%)	26 (68.4%)	36 (90.0%)	
Slide deck without lectures (COVID Partial Opening), n (%)				0.025
Low (lowest or low)	62 (79.5%)	26 (68.4%)	36 (90.0%)	
High (highest or high)	16 (20.5%)	12 (31.6%)	4 (10.0%)	

[1] Note that one student provided invalid responses and thus the responses from this student were excluded from the analysis for the questions. [2] Fisher's exact test to compare Groups N and D. (Non-Dissection Group and Dissection Group)

Table 4. Student responses to the questions about learning preferences (two levels) in gross anatomy labs (n=79)

Question: Rank your preference from the most to the least	Overall, N = 79	Non-Dissection Group (N) N = 39, (49.4%)	Dissection Group (D) N = 40, (50.6%)	p-value[1]
Class in-person labs (Pre-COVID), n (%)				NS
Low (lowest or low)	48 (60.8%)	24 (61.5%)	24 (60.0%)	
High (highest or high)	31 (39.2%)	15 (38.5%)	16 (40.0%)	
No labs (First ⅓ of COVID Lockdown), n (%)				0.014
Low (lowest or low)	62 (78.5%)	26 (66.7%)	36 (90.0%)	
High (highest or high)	17 (21.5%)	13 (33.3%)	4 (10.0%)	
Live online labs (Second ⅓ of COVID Lockdown), n (%)				NS
Low (lowest or low)	34 (43.0%)	17 (43.6%)	17 (42.5%)	
High (highest or high)	45 (57.0%)	22 (56.4%)	23 (57.5%)	
Hybrid labs (Partial COVID Opening), n (%)				0.020
Low (lowest or low)	14 (17.7%)	11 (28.2%)	3 (7.5%)	
High (highest or high)	65 (82.3%)	28 (71.8%)	37 (92.5%)	

[1] Fisher's exact test for bivariate analysis to compare Group N and Group D (Non-Dissection Group vs.Dissection Group).

Table 5. Student responses to the questions about gross anatomy dissections (n=79)

Question	Overall, n = 79	Non-Dissection Group (N) n = 39, (49.4%)	Dissection Group (D) n = 40, (50.6%)	p-value[1]	Graphical Display
Is gross anatomy dissection useful?, n (%)				<0.001	
No	10 (12.7%)	10 (25.6%)	0 (0%)		
Yes	69 (87.3%)	29 (74.4%)	40 (100%)		
Would you prefer to have ...?, n (%)				<0.001	
Elective dissection	54 (68.4%)	39 (100%)	15 (37.5%)		
Mandatory dissection	24 (30.4%)	0 (0%)	24 (60.0%)		
No dissection	1 (1.3%)	0 (0%)	1 (2.5%)		
Do you prefer to have an instructor in the lab at the time of your dissection?, n (%)				0.002	
No	0 (0%)	0 (0%)	0 (0%)		
No preference	8 (10.1%)	8 (20.5%)	0 (0%)		
Yes	71 (89.9%)	31 (79.5%)	40 (100%)		

Graphical display legends:
- No by N (25.6%)
- Yes by N (74.4%)
- Yes by D (100%)
- Elective by N (100%)
- Elective by D (37.5%)
- Mandatory by D (60%)
- None by D (2.5%)
- No preference by N (20.5%)
- Yes by N (79.5%)
- Yes by D (100%)

[1] Fisher's exact test to compare Groups N and D (Non-Dissection Group and Dissection Group).

Q: What do you like about online learning in Gross Anatomy?

Flexibility: "liked that lectures could be watched whenever…at one's own pace"

Appreciate the versatility of presenters and different interactive modalities

Better for preparation: "Felt more prepared because it gave time for the material to settle before actually seeing the specimen in person"

Better for spatial recognition: "We can see the anatomic structures dissected beautifully by experienced faculty with instructions on HOW to dissect them.

Better visibility: "Live dissections with Dr. Lozanoff felt like 'the best seat in the house.' Before, we had to peek over people's shoulders in the lab."

Camaraderie: not being able to see my classmates in person; feelings of disconnect with my class"

"Zoom fatigue"

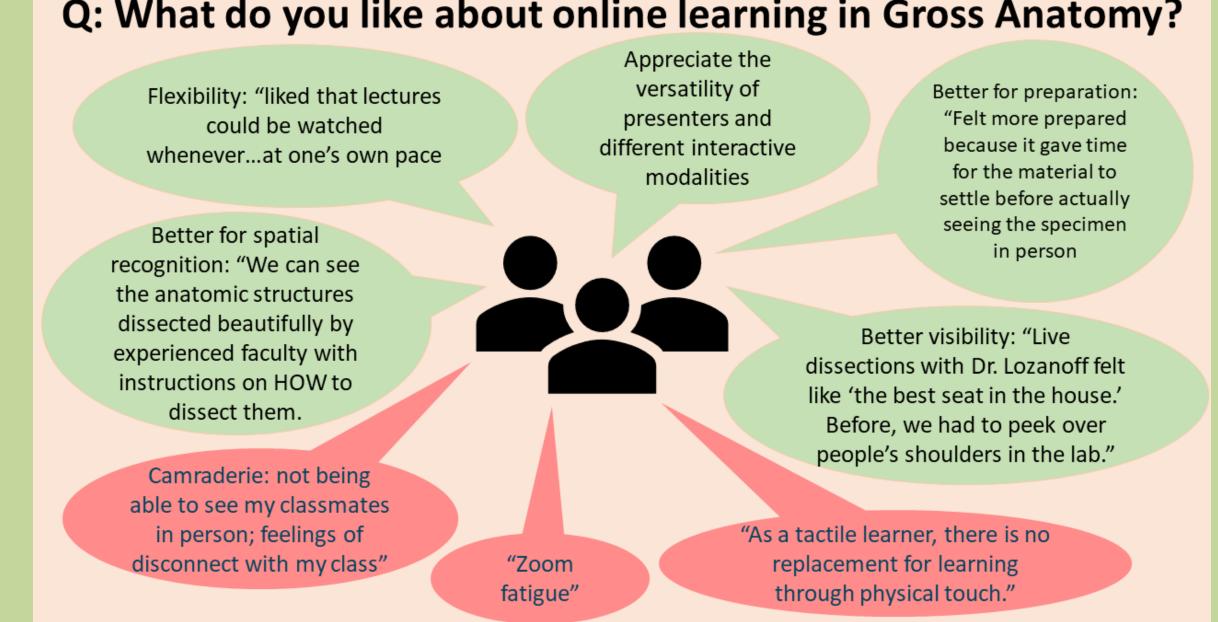"As a tactile learner, there is no replacement for learning through physical touch."

Figure 1. Qualitative responses to open-ended questions regarding student preferences of online learning in gross anatomy.

RESULTS

- D students rated gross anatomy's usefulness more positively than N students (overall 87%; D 100%, N 74%, p<.001).
- **More N students thought anatomy dissection should be elective** (overall 68%; D 38%, N 100%, p<.001).
- **No student preferred the absence of instructors**
- **Pre-recorded lecture was the most preferred**, notably by D students (≥high preference levels: overall 80%; D 90%, N 68%, p=0.03). **More than 90% of responses to open questions about the usefulness of pre-recorded lectures were positive.**
- **Slide decks without lecture was the least preferred** lecture-based modality (≤low preference levels: overall 80%; D 90%, N 68%, p=0.03).
- **Hybrid lab was the most preferred** laboratory type (≥high preference levels: overall 82%; D 72%, N 79%, p=0.02).
- **No lab was least preferred** and more disfavored by D students (≤low preference levels: overall 79%; D 90%, N 67%, p=0.01).

DISCUSSION

- **Most students found dissection to be a useful educational activity**, even among Group N students, whom we hypothesized would not
- All D students preferred having instructors at the time of dissection, suggesting that **dissections with guidance best serves students**
- Pre-recorded lectures and live online lectures were strongly preferred compared to traditional in-person lectures or slide decks without lecture, suggesting the benefit of continuing this curricular modification
- Students expressed that **watching lectures at their convenience benefited anatomy comprehension**
- Overall preference trends decreased for slide decks without lecture and in-person lectures in both N and D. Increasing preferences were observed for live online lectures and more strongly with pre-recorded lectures, suggesting that **students favor a partial-COVID curriculum.**
- **"No lab" was the least preferred by the overall class.** D expressed a significantly great negative trend (p=0.031), compared to N, even though both rejected the concept of no labs, suggesting that **the total absence of gross anatomy would be a disservice to medical students**, especially tactile learners.

CONCLUSION

A survey was used to assess medical student perceptions of online instructional innovations in response to the COVID pandemic-imposed limitations of in-person gross anatomy learning.

1) Dissection laboratories are valued by the majority of students, but preferred as a faculty taught, elective activity.
2) Students prefer asynchronous pre-recorded lectures over in-person lectures
3) Hybrid labs, comprising online dissection demonstrations are most preferred while no labs are least preferred.
4) Lecture and Laboratory preferences trend similarly regardless of dissection/non-dissection preference.

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