



Students' Perception of Anatomy Learning Method During the COVID-19 Pandemic: A Qualitative Study

M. Al Mubarakah^(✉), D. Kurniawati, and S. Handayani

Sebelas Maret University, Surakarta, Indonesia
marwatunnisa@gmail.com

Abstract. The Pandemic COVID-19 has brought us changes in learning techniques, including teaching anatomy. A different method of learning provides a special experience for both students and lecturers. The study design used was a qualitative phenomenological study. Place and duration of study from August 2021 to May 2022 at the Medical Faculty of Sebelas Maret University. We conduct semi-structured interviews face to face by zoom and transcribed verbatim. All responses were subjected to qualitative analysis, and themes were derived. A total of six female and six male participants from the institution gave feedback. One of the main themes identified was subjective factors with sub-themes including intention, private matter, physical issues, preparation, and students' feelings. The second theme was fixed external factors with sub-themes including teaching method, regulation, quality control, social issue, and learning facilities. The third theme was modifiable external factors of anatomy learning which had sub-categories of comprehension, material resources, distraction, and interaction. The study focuses on the experiences students faced when learning anatomy for the first time through online and blended approaches during the COVID-19 pandemic. The data on learning components collected and proposed for future curricula may assist policymakers in informing curricular modifications regarding anatomy in the future.

Research Contribution: This study is designed to understand the students' perception of learning anatomy in online and offline classes during the COVID-19 pandemic. An insight into their experiences may help policymakers to improve the anatomy curriculum in the future.

Keywords: Anatomy · Learning · Online · Blended · Students' perception · COVID-19

1 Introduction

The 2019 coronavirus illness (COVID-19) first appeared in Wuhan, Hubei Province, China, at the end of December and quickly spread worldwide [1]. A new approach to education is being introduced due to the unusual COVID-19 pandemic, which has also generated significant uncertainty in politics, the economy, society, and culture [2, 3].

Although there have already been transformational developments in medical education, such as virtual reality technologies and online learning [4], COVID-19 has accelerated this transition since students must practice social distancing [5]. Since the illness is so contagious, regular lectures have become challenging [6].

In the first and second years of medical school, anatomy is taught as a fundamentally important topic. Since it is clinically applicable, a clear understanding is necessary for safe practice [7]. As a result, research has focused on successful teaching strategies for anatomy. However, there is still a lack of consensus on anatomy teaching techniques [8]. A correct grasp of human anatomical structures requires medical students to have a strong understanding of anatomy, which requires more than just learning via dissection [9].

Anatomy educators developed innovations and creative instruction in response to COVID-19, highlighted in several papers. The significance of the possible effects of incorporating digital technology into medical education for the future of learning and assessment has been underlined in some earlier research [10]. Adopting blended learning and multiple learning methods may make it easier to adjust during COVID-19, according to a study by Owolabi and Bekele [11]. Therefore, the aim of this study was to overcome the limitations of these previously reported studies and to determine the students' perception of learning anatomy in online and offline classes during the COVID-19 pandemic. An insight into their experiences may help policymakers to improve the anatomy curriculum in the future

2 Method

The informed consent of the study was obtained from the participants. Data collection during in-person interviews was facilitated by using a semi-structured interview form. To enable the case-oriented analysis that is the goal of this methodological approach, samples in qualitative research often have a modest size. It is also crucial to remember that because qualitative models are purposeful, participants are chosen based on their ability to offer information with various rich textures. Students interested in participating in the study and sharing their perspectives on learning during the epidemic received recommendations from the 2018 class leader. A total of six female and six male participants from the class of 2018, which consists of 237 medical students, gave feedback about their experiences with online instruction during the COVID-19 pandemic. The writer took the audio throughout each interview—the verbatim transcriptions of the recorded interviews. Three authors with theme analysis experience analyzed the transcripts [12]. Transcripts were used to produce the thematic analysis identifying the main themes.

3 Findings

The findings reflect the student's impressions and opinions on the advantages and disadvantages of online and blended anatomy instruction. One of the main themes identified was subjective factors with sub-themes including intention, private matter, physical issues, preparation, and students' feelings. The second theme was fixed external factors with sub-themes including teaching method, regulation, quality control, social issue, and

Table 1. Number of words mentioned by participants

Code	Number of Participants
Private Matter	4
Physical Issue	7
Intention	20
Students Feeling	16
Preparation	5
Quality Control	2
Socia Issues	3
Learning Fascilities	21
Teaching Method	46
Regulation	15
Comphrehension	67
Material Resources	30
Distraction	22
Interaction	29

learning facilities. The third theme was modifiable external factors of anatomy learning which had sub-categories of comprehension, material resources, distraction, and interaction (Table 1).

3.1 Subjective Factors

3.1.1 Intention

Several factors influence students' intention to learn. Based on the interviews, there are pupils whose learning intentions grow from within themselves or outside. One of the students whose purpose is to learn from themselves said, "After receiving poor grades regularly, my drive to study anatomy steadily decreases. However, when I could still adapt to what I had learned, there was a certain sense of accomplishment. So, even if it is still remedial, I have become used to cadaveric preparations. At that time, I resolved the matter" (medical student 10). Meanwhile, other students who get the external motivation experience can immediately increase their enthusiasm for learning, but some immediately lose confidence when disappointed. One student said, "When there is an oral pretest before starting the practicum, many students are afraid of being punished if they cannot answer correctly. Therefore, they get the spirit of learning from this oral pretest" (medical student 5). Another student said, "When learning online, I get bored quickly and am too lazy to study because there are no friends who are actively invited to interact with Covid-19 constraints, so we have to sit for very long, stiff, so learning doesn't last long" (medical student 2)

3.1.2 Private Matter

Every student should objectively receive the same resources and facilities. However, the results that each of them gets might fluctuate significantly, which is partially caused by personal factors that each person experiences differently, such as workload, starting point, and mindset. One of the participating students said, "Additionally, adjustments were made for the new student orientation time, community service projects on campus, and groups off campus. As a result, you appear very busy and occasionally bored, making studying difficult" (medical student 10). Other students believed something more significant than the resources and instructional strategies, notably their mindset. He said, "Actually, learning comes from the individual. If the student is interested in studying and shows no intention to pay attention, it is pointless even if the technique and facilities are of the highest quality" (medical student 12).

3.1.3 Physical Issue

The learning that the university carried out full online in the early year of the pandemic provided experience with various limitations, especially for students' physicality. One of the students said, "I think I have limited vision. If I use a laptop device for too long, my eyes are dry, and sometimes it hurts. Therefore, I feel more comfortable offline face-to-face and interacting more" (medical Student 11). Another student thinks, "The continuous sitting position facing the laptop, especially in a non-ergonomic place, makes my body achy" (medical student 2). On the other hand, offline learning also brought physical difficulties to some students. He said, "On the other hand, offline learning also brought physical difficulties to some students. He said, "In college, in my opinion, assistance and lectures prefer online. The one with eye pain is a loss if it's behind, so it's better in the front" (medical Student 2).

3.1.4 Preparation

The preparation stage is one of the initial stages in learning that students usually directly or indirectly go through, which can potentially affect the process and final results. Online and offline both provide their difficulties at this point of planning. These are the difficulties students have when preparing for online exams. She said, "First, I prepared a number that needs to be contacted in case of an incident. Do not focus too much on the exam, so you forget to zoom in. The kit is also ready for internet credit if there is a Wi-Fi problem. Sometimes the exam website is also overloaded, and it may not record our answers" (medical Student 4). On the other hand, some students concurred that the setup for the offline study was problematic. A participant remarked, "The difficulty is that I have to get up before dawn, pack a lot of laboratory stuff, plan the transportation, and arrive early because my house is far away. I prepare beforehand and attend quickly to avoid being late on campus" (medical Student 5).

3.1.5 Students Feeling

When offline learning was held for the first time, many students felt they were being watched because all teachers with various regulations were fully present. On the one

hand, this feeling encourages pupils to study, but on the other, it has the opposite effect since it tends to disrupt concentration. One of the participating students said, “My feeling after the offline practicum is finally delighted. Unfortunately, I need to face a verbal pretest when I am then forced to prepare, whether I like it or not, since the questions are picked randomly, triggering the adrenaline of worrying punishment for being unable to react and respond” (medical student 8). As opposed to that, another student said, “Wet or dry cadavers will be assigned immediately during the in-person examination. We move to the other question by the ring of time exam. When it is blank, it makes me feel much more panic and uncomfortable” (medical student 1).

3.2 Fixed External Factor

3.2.1 Teaching Method

Students get various instructional techniques throughout the pandemic, along with teaching modifications that include technology. Here are some ideas and concerns provided by students during the course. One of the students said: “...Since we have not received the material yet and are essentially starting from zero, I prefer to attend introductory lectures online. As opposed to the practicum, where we studied what we wanted to learn, we already knew and explored what we had previously learned during the activity” (medical student 9). The majority of individuals, however, prefer to do tasks offline when they involve a skill. The participant said, “When the anatomy practicum is offline, there is no technological distance or distraction, allowing us to view and touch the cadaver clearly and ask the lab assistant directly questions...” (medical student 11).

3.2.2 Regulation

Following the spread of the pandemic, the educational system has continued to change, and a lecturer often changed some rules to raise the standard of anatomy instruction and learning. Medical student 7 told us how the situation at offline practicum. He said, “Throughout the practicum, students will frequently be divided into smaller groups for each shift. The laboratory assistant will give each group the whole course material. The assistant guided the demands of the subject linearly with the topic they had mastered. Therefore, regulations changed as soon as practicum went online”. One of the student participants said, “Some students still complete their practicums online, in which case there will be a live report of the cadaver’s features from one camera angle while the students in attendance can record from another” (medical student 4). In offline exams, a cadaver will be in front of the students, and they will be given questions specific to that segment. Students will switch to a different cadaver every minute to answer the following question with a bell-ringing marker. While taking exams online, however, this is not possible. One participant shared his experience with the guidelines for online exams. She said, “As of now, the multiple-choice format of the online exam questions makes them easier. The diversity of questions is also less broad because some questions are the same as the previous year This lab applies the assumption of innocence to prevent cheating. As a result, both the front and rear cameras of the gadget will monitor the exam” (medical student 4).

3.2.3 Quality Control

During the hybrid stage, only a few students were permitted to go to the laboratory while the rest only learned from zoom meetings, was difficult. Most students who studied from zoom felt that studying from the cadaver the other students experienced bad live video and lecturer assistants' low voices while describing the cadaver. One student said: "the position of the camera which was standing and when moved from one table to another table make the video was bad, even the sound disturbed to enter the zoom" (medical student 1). According to other students: "we who stayed in the zoom was like stepchildren, as the assistant in the laboratory only paid attention to the student in the laboratory, I could not ask anything and only could see the unclear video" (medical student 12). Another student felt the quality was substandard because any student who came to the laboratory could be assigned for this task. He said: "the quality of sound and video was bad because there was not any particular committee who was prepared for this task" (medical student 9).

3.2.4 Social Issue

The experience of having the cadaver in the offline laboratory practice led the student to feel their difference in the social context. As they witnessed their privilege and superiority as a medical student compared to mediocre people. One of the participants supported it by saying: "experience as the medical student, we supposed to see and touch it directly, although it's in a bad state. As from the screen anybody can see it, not only a medical student" (medical student 12). Another student said: "because anyone can see the photo or pictures from google, but if cadaver, not everyone can see it" (medical student 3).

3.2.5 Learning Facilities

The faculty prepared various learning facilities to support the student. The Cadaver was one of the most influential facilities that only can be provided by offline classes. Most pupils felt the advantages of cadavers especially because they could see the organ from various angles, touch its texture and consistency, and compare it with the ideal image, then it affected their visualization and comprehension. A student said: "In offline practice, I can know the shape of the liver, its various size for each cadaver, its surface, its consistency -hard or not- while holding it" (medical student 3). Linear with that experience, as online learning mostly provided 2D images and sometimes 3D applications, students hardly visualized the organ from other positions. One of them said: "as we only see from photos and videos, if we want to observe it thoroughly where the front is, behinds, or other sides, it will take much effort because we should pause the recording then screenshot it first" (medical student 6). However, as there were many cadavers and not all cadavers had good quality, some students experienced difficulties in identifying many structures from the cadaver, particularly during the examination. A student stated: "For the offline exam, it depends on luck whether we get good or bad condition cadavers. I ever got bad quality cadavers, and I even could not identify what structure is it" (medical student 1). During the introductory class, the small classroom made the student feel noisy, airless, crowded, and uncomfortable. One of the participants said: "we were tired because we should have come at 6 a.m while the classroom was too small, stuffy,

crowded, and the other students were noisy when the assistant lecturer was teaching us” (medical student 12). Another student added: “it was really cramped, you know the capacity of that room was supposed only for around 100 while we-around 200 students-should sit there...” (medical student 10).

3.3 Modifiable External Factor

3.3.1 Comprehension

The student comprehension was influenced mostly by how the lesson was delivered (in an online or offline way) and the examination. Some definite facilities that increased the student’s understanding were cadavers and the cadaver application. One of the students said: “in my opinion, seeing and touching the cadaver affected my understanding, and in the online learning we couldn’t see the real cadaver so we did not know the real shape” (medical student 3). Another student stated: “..seeing the cadaver in person made us know how far our understanding is, also we could know the structure directly, implement the knowledge that we got from the books or the lecturer’s materials before” (medical student 5). Another student added: “the application could increase the student’s comprehension more because there are 3D images that we can rotate” (medical student 5). Most students felt that the exam, both the type of the question and the depth of the question will affect their understanding. The multiple choice question in the online exam could push the student to answer it randomly at the last minute while the fill-in-the-blank questions in the offline exam did not give that same opportunity to the student. One of the participants said: “...for the online exam, it was like studying superficially because there were options, and we could remove some of them before choosing the right one...” (medical student 2). According to most students, the offline questions were harder and could measure their comprehension level better, as he said: “..in the offline exam, the one who understands the material well can answer the question although the cadaver used for the exam might be different from the cadaver when the laboratory practice. Automatically, the harder the question is, the better the comprehension is” (medical student 3).

In contrast, one of the students stated that the comprehension of a student can be judged not only by the exam score but also during the process of learning. He stated: “...to measure comprehension from exam score, it could not be a 100% parameter because the exam score could be manipulated. Maybe the lecturer could ask the students directly to measure the depth of their comprehension” (medical student 6).

3.3.2 Material Resource

The main sources of learning which were used by the student were the lecturer’s presentation slide, the summary book written by the lecturer’s assistant (known as RAUL), and the introductory class presentation slide. Besides that, most students utilized textbooks, recordings from the class, youtube/websites, or other applications to support them in learning anatomy materials, and they did not find any difficulties in accessing those materials. One of the students said: “...the materials provided by the faculty were enough. I studied from the lecturer’s assistant presentation slide, the lecturer’s presentation slide, and sometimes I looked for the meaning of difficult words” (medical student

3). Another participant said: "For instance, RAUL, it made studying become really really easy. If in the laptop we could not zoom in the picture, while in the book we could mark it with our pencil easily" (medical student 10). According to some students, those materials supported each other and did not confuse them. A student said: "I never found any difficulties in accessing them...they did not make me more confused as they contained the same things but they completed each other" (medical student 4). Another student supported this by saying: "...my sources of learning were detailed as it was written in English. Then when I read from the lecturer's materials, it became simpler. So I thought it would simplify the anatomy atlas that was very detailed" (medical student 5).

3.3.3 Distraction

During online learning, various distractions from the environment, smartphones, or the regulation disturbed students thus dividing their focus. Most students stated that either noise from surrounding sounds, parents asking for help, or the unsupported environment led them to not give full attention to the class. One of the participants said: "...actually I can focus, but when I just started to be immersed in studying, my parents asked me to carry out something..." (medical student 2). Another student added: "...when online we were at home, sometimes the noise from passing motor sounds or the situation at home were not conducive, they were distracting my concentration..." (medical student 5). The smartphone presence, particularly on social media, bothered students' attention when they started to feel unfocused in class. A student said: "studying online means we were faced with two devices, while the handphone was my profound source of distraction" (medical student 1). Another student said that: "sometimes I opened the chatroom or scrolled my social media account when my signal was stopped and I was left behind..." (medical student 4). As some lecturers did not force the student to open their camera/video, most students felt that they could do anything else at the same time during the class. One of the participants added: "when offline we faced the lecturer directly, we were connected in a room so we really followed the class. But if online, we could join from anywhere, and with laid down, it could affect the understanding..." (medical student 6).

3.3.4 Interaction

One of the prominent differences between online and offline learning was the interaction between students and lecturers or the lecturer's assistance. Possible to ask directly without pause, feeling connected, and discussing questionable materials with friends or lecturer's assistance drove most students to favor offline learning rather than online learning. One of the students said: "...as the materials were taught in-person by the lecturer's assistance every time we had questions, we could ask directly to them and were answered at the same time. I think it was more effective..." (medical student 12). Another student added: "seeing friends face-to-face made the interaction felt more realistic...like not disconnected, and could ask the lecturer's assistance immediately if did not understand something..." (medical student 9). As for online learning, offline camera and time pause because of the signal were factors that affected students to hesitate in interacting with the lecturer or lecturer's assistance. One of the students stated: "...the

lecturer sometimes called students randomly, but because they were off-cam and did not answer, the lecturer preferred to ask the on-cam student. However, the students who were on- cam only those particular people...” (medical student 3).

4 Discussion

In general, the findings reflect the student’s impressions and opinions on the advantages and disadvantages of online and blended anatomy instruction. This research divides these perceptions into two categories that are both crucial—internal and external—with the latter being further subdivided into fixed and modifiable components.

The intention is the first internal aspect that impacts students’ academic performance. During the pandemic, students are unavoidably obliged to have negative feelings about the modifications to their educational system. With the inadequacies and setbacks they encounter, we will thus discover students who remain engaged in the learning process, but some individuals rapidly lose their aim and excitement in these circumstances. According to previous research, students’ mindsets are fundamental to their ability to learn and deal with problems in the classroom. Mindsets are presumptions, ideas, and approaches that individuals or groups of individuals hold. Whether we are aware of it or not, these ideas significantly impact what we want and how effective we are at getting it [13, 14]. In other words, every aspect of our existence is impacted by our beliefs. By turning on the right mentality, you may more easily overcome problems that come up every day [15]. The following internal factor discussion focuses on health-related concerns, personal matters, and students’ feelings. The students found their limit, encountered it, and then grew up with self-awareness and self- realization. According to previous research, we propose that some students are more likely than others to identify obstacles during goal pursuit and that these are pupils with higher levels of self-awareness [16]. In sum, self-awareness is closely linked to goal monitoring. This may really explain why improved goal-related performance, an expanded repertoire of problem-solving techniques, and enhanced goal-directed effort are all linked to higher levels of self-awareness [17].

Students would better resolve discussions related to internal factor problems independently. However, universities can take on a role in facilitating the brand learning process. Based on the regulations and experience, students are more interested in adapting to post-pandemic blended learning, where introductory lectures are conducted online, and practical skills-related are carried out offline. According to Warman’s (2018) research [18], blended learning is a valuable, beneficial, and practical technique to aid students in their learning. He said that it can increase students’ motivation in the classroom. Furthermore, blended learning has improved utility, motivation, and pleasure in the learning environment for students, according to research by Friatin, Rachmawati, and Ratnawati (2017) [19].

While the Covid-19 pandemic occurred, the online and blended method made cadavers which is the main learning facility only could be provided by the faculty for a few students. Indeed, most of them believed that cadaver observation and touch were important for them. Data from universities in the United Kingdom and Ireland showed that lack of practical sessions and cadaveric exposure were the weakness of anatomical education during the COVID-19 pandemic [20]. Indeed, supporting our participants’ perceptions,

the three-dimensional anatomical structure, familiarity with the various and fine details, integration of theoretical knowledge and practical application, and the relationship with the pathology provided by cadaver exposure were also pointed out in some previous research [21–23]. Furthermore, the emotional feeling that some participants felt while learning from cadavers as medical students might also be closely associated with their cultural and religious views [23].

To limit the spread of the COVID-19 virus, the faculty held cadaver live tutorials using platforms such as Zoom for most students, similar to many Medical Faculty in the UK [20]. Although this method increased students' academic performance better than two-dimensional presentations [24], the time needed to produce high-quality resources and learn how to use technologies was an issue that supported our participants' statement [25]. To conquer the quality control problems experienced by most students, according to Gewin, 2020 [25] and Prabhath 2022 [26], the teacher should not rely on live video because the quality can't be controlled and it would be better to stream the video asynchronously as it was recorded days before.

The changing teaching method between offline and blended way during the COVID-19 pandemic pushed the student to adjust their source of learning to increase their understanding. Besides cadavers, our participants' experienced the benefit of 3D application in their anatomy comprehension. This finding is consistent with previous research reporting better visualizing deeper structures [27], better exam scores [28], enhanced students' motivation to learn anatomy [29], and better academic performance when combined with face-to-face anatomy laboratories [30]. However, even during this present study, most students still used materials shared by the faculty in the form of PPT as their most helpful source of learning [26].

The type of exam questions simultaneously adjusted with the changing of the teaching method. Supporting our students' experience, the previous research pointed out that the MCQ type exam in online way was easier than the practical exam because the student felt comfortable using computers for gross anatomy examinations [31]. Furthermore, although students felt comfortable working with cadavers during the practical exam, the effect of moving around the laboratory stimulated nervous and tense feelings [31]. However, this finding was inconsistent with research in Nigeria where students had the worst exam score in MCQ exams compared to oral, practical, and essay exams. Additionally, other students in Jordan shared similar feelings to our participants that they might believe some of them were attempting the assignments honestly and others may be obtaining help from study material or senior students [32]. Therefore, multidimensional assessment should be implemented in order to evaluate various skills of the students objectively as they will minimize each other's shortcomings [33].

Interaction and student engagement were one of the most complained about issues during the COVID-19 pandemic [20, 26, 32]. Most students preferred to interact with the lecturer or their peers in the traditional face-to-face way rather than through virtual meetings [26, 32]. In online meetings, having team discussions and engaging with instructors in small groups improved student-student and student-teacher interactions [34, 35]. Moreover, similar to our hybrid method, conducting live in front of students teaching sessions (LISTS) where some students attend in the laboratory while the majority of students sit down in front of the desk computer was proved to increase classroom discussion,

students' enjoyment, preference, satisfaction, and examination score compared to the pure online way [36]. Some other ways to improve student engagement were timely feedback from instructors [37, 38], interactive and formative quizzes/polls/assignments [26, 39], live discussions about pre-recorded dissection videos [40], and synchronous software packages containing interactive polls [20].

Interruption from the surrounding environment, smartphones, and the regulation led students to become distracted. While face-to-face classes forced students to attend with full attention in a room, the different home environments could drive students to feel too comfortable or uncomfortable thus their motivation decreased [41]. Furthermore, the smartphone that was used to access the online class was also connected to the internet, which made the student prone to be engaged with non-lecture activities, such as social media, notifications, messages, etc. [41, 42]. Indeed, this circumstance was highly prevalent both in synchronous and asynchronous ways and has proven to have a negative impact on students' performances [42, 43]. Ultimately, the learning environment and student choices had a prominent effect on the learning outcome regardless of the lecture modalities [42].

The limitation of this study is the small sample size and the interview was held via Zoom sessions. Indeed, this led to limitations in seeing the whole body language that is important in a qualitative study. Furthermore, the results are finite to a particular university. However, because it is a qualitative method, the findings can portray students' feelings deeper and in a more detailed way.

5 Conclusion

The study focuses on the experiences students faced when learning anatomy for the first time through online and blended approaches during the COVID-19 pandemic. Factors from within students that can influence the perception of teaching anatomy are private matters, physical issues, intention, student feelings and preparation. In addition, student perceptions are also influenced by external environmental factors. Some of these factors can be changed and regulated, but some are not. External factors that cannot be changed (Fix External Factors) consist of quality control, social issues, learning facilities, teaching methods and regulation. Meanwhile, external factors that can be changed and controlled by students consist of comprehension, material resources, distraction and interaction. In conclusion, the data on learning components that were collected and proposed for future curricula in this research may assist policymakers in informing curricular modifications regarding anatomy in the future.

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