



(RESEARCH ARTICLE)



The effectiveness of Emergency Remote Education (ERE) according to Medicine, Nursing, and Dentistry students

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Abstract

Introduction: Due to the Covid-19 pandemic the Universities had to reinvent themselves and adapt to the new reality. Different versions of Emergency Remote Education (ERE) emerged, in which theoretical classes were taught remotely to the detriment of practice, which would be taught at another time. The discipline of Anatomy, based on practice, needs to undergo adaptations. Practical classes in medicine, dentistry, and nursing were temporarily suspended to be taught in a subsequent period, dissociated from theoretical teaching, and carried out remotely online.

Material and Methods: Interviewed 451 health area students from a public university. All students had completed at least one period of Anatomy at ERE and at least one period in person.

Results: The majority of students, from all courses, did not agree with the usefulness of remote classes, but they participated in online tutoring and students do not seem to believe that remote teaching could lead to insecurity in the application of anatomy in the clinic. There was reported similarity in the effectiveness of remote classes compared to face-to-face classes and a large percentage of medical (n=135) and nursing (n=35) students believe that theoretical classes do not lead to clinical insecurity, unlike dentistry students (n=73) who think so.

Conclusion: In general, the student did not fully approve of the ERE, but did not feel disadvantaged in the teaching of Anatomy, and prefers face-to-face teaching. Most of them attended a monitoring in the ERE, and believe it is most difficult to study practice in Anatomy after theoretical classes.

Keywords: Teaching Anatomy; Emergency Remote Education (ERE); Effectiveness of ERE on Anatomy teaching.

1. Introduction

All health courses take place during the first years of the University and are divided into practical and theoretical activities [1,2,3]. During the COVID-19 pandemic, the virtual learning environment was the main activity. Teaching strategy used by higher education institutions to carry out classes. An example of this is the Human Anatomy discipline, which, despite depending on practical meetings, was taught through Emergency Remote Education (ERE)[4,5,6]

In the COVID-19 pandemic, with the need for social distancing as a way of preventing the spread of the virus, educational institutions had to reinvent themselves and adapt to the new reality. Different versions of Emergency Remote Education (ERE) emerged, in which theoretical classes were taught remotely to the detriment of practice, which would be taught at another time.

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The discipline of Anatomy, as it is based on practice [7,8,9,10], suffered a great impact on its *modus operandi*, leading to adaptations in the way of teaching, learning, and discussing the subject. In the Medicine, Dentistry, and Nursing courses at the Federal University of Juiz de Fora (UFJF), practical classes could not be remote and were temporarily suspended to be taught in a subsequent period, dissociated from theoretical teaching, carried out online. Meeting the curricular requirements and their Pedagogical Projects. Then, with the gradual release of face-to-face teaching, a hybrid system was installed - theoretical video classes concomitantly with face-to-face practical classes [11,12].

Strategies were therefore needed on the part of teachers, managers, and Universities so that the implementation of this ERE affected student learning possibly. Reports[13] about the teaching of Anatomy for Medicine during the pandemic show us some examples of these challenges and the measures adopted to minimize its harmful effects on the teaching-learning process.

After this release, it was possible to replace the missing practical classes (corresponding to the theoretical ones already taught via video classes in the first phase of the ERE). Subsequently, hybrid teaching was followed in these three courses, where theoretical classes were combined (still online, to avoid crowds) and practical classes in small groups, with great distance between students[12].

With knowledge of the events in this complex period, and given the arduous task of the trans and post-pandemic, whether for Medicine, Dentistry, and Nursing students, or teachers, Anatomy teachers for these courses, it becomes imperative and highly enriching for Research/Science, and also for future Anatomy teaching guidelines, to investigate the impact of ERE on the learning of anatomical sciences.

The student, the main object and scope of didactics and teaching, must therefore actively act in measuring this impact. That said, the objective of this article emerged: to evaluate the perception of students of these three courses, regarding the impacts on the study of Anatomy in times of ERE, whether in the hybrid system or with practice and theory in dissociated times.

2. Materials and Methods

This research was a descriptive and cross-sectional study, in which data from a structured questionnaire (survey type) was evaluated, composed of closed questions, previously established, and capable of demonstrating in the evaluation of the health areas' students (from the Anatomy discipline at UFJF), its relationship with the teaching of this science during ERE. The students were informed about the study and signed the informed consent form to participate in the research and the questionnaire was administered via Google Forms, with the students already in advanced stages, therefore immersed in the medical clinic. The student was invited to participate voluntarily in compliance with complete confidentiality. The study was submitted to the UFJF Ethics Committee, meeting all the requirements for research of such scope.

The inclusion criteria were students from the UFJF Medicine, Dentistry, and Nursing courses who studied Anatomy: 1) In at least 1 period completely in person; 2) And at least 1 academic period of ERE, either with theory before practical replacement or the hybrid system (marking the post-pandemic, and the gradual return of face-to-face activities in teaching at UFJF). In this case, students who chose not to participate in the study, who responded incompletely to the questionnaire, or who had still attended all Anatomy only in ERE or only in the face-to-face system were excluded from the research.

The instrument used in the research, applied in simple interviews, was structured with closed questions, previously tested with 12 multiple-choice questions based on the "Liker Scale" with five answer options each: I completely agree; I partially agree; neutrality (neither agree nor disagree); I partially disagree and disagree. To determine the questions that were included in the questionnaire, we referred to the most modern and suggestive articles on the subjects "Teaching Anatomy" "New Strategies and Methodologies in Anatomical Teaching", and "Challenges of teaching Anatomy at ERE".

The parameters studied were based on a systematized script, considering the demographic variables: gender; age; marital status, your current academic period, in addition to the temporal relationship with the practical teaching of anatomy, whether it was at ERE, whether it was pre- or post-pandemic. The questionnaire asked: A) What was your Anatomy study system during the ERE?; B) Were anatomical theoretical classes useful tools? C) Remote theoretical classes were sufficient to improve the confidence in the clinical application of Anatomy? D) Were there similarities in the effectiveness between remote and in-person teaching? E) Do the remote theoretical classes lead to insecurity in

applying Anatomy in the clinic? F) Can individual study and practical classes reduce gaps in theoretical classes? G) Was there great difficulty in understanding practical Anatomy with online theoretical classes?

The data obtained were tabulated in an Excel spreadsheet, version 21.0, and processed using the SPSS program, version 20.0 - or more modern - (Chicago, IL, USA).

3. Results

The research involved 451 students, 254 from the Medicine course; 132 from Dentistry; and 65 from Nursing, from a Public University, UFJF. All students were already, in 2024, in the final periods of the course. They are all part of the four classes that underwent regular face-to-face anatomy teaching, as well as remote and hybrid teaching.

Data analysis showed us that in the medical course, there was a certain rejection of the effectiveness of online Anatomy theoretical classes, registering an increase from total agreement to total disagreement (n= 20, 24, 24, 72, and 114 respectively, in the variables) as shown in Figure 1. However, the majority of Nursing students tended to fully or partially not recognize the usefulness of this type of class (n=45). In dentistry, a tie can be considered when we add those who agree, totally or partially, or are neutral (n=46) with those who disagree on the subject.

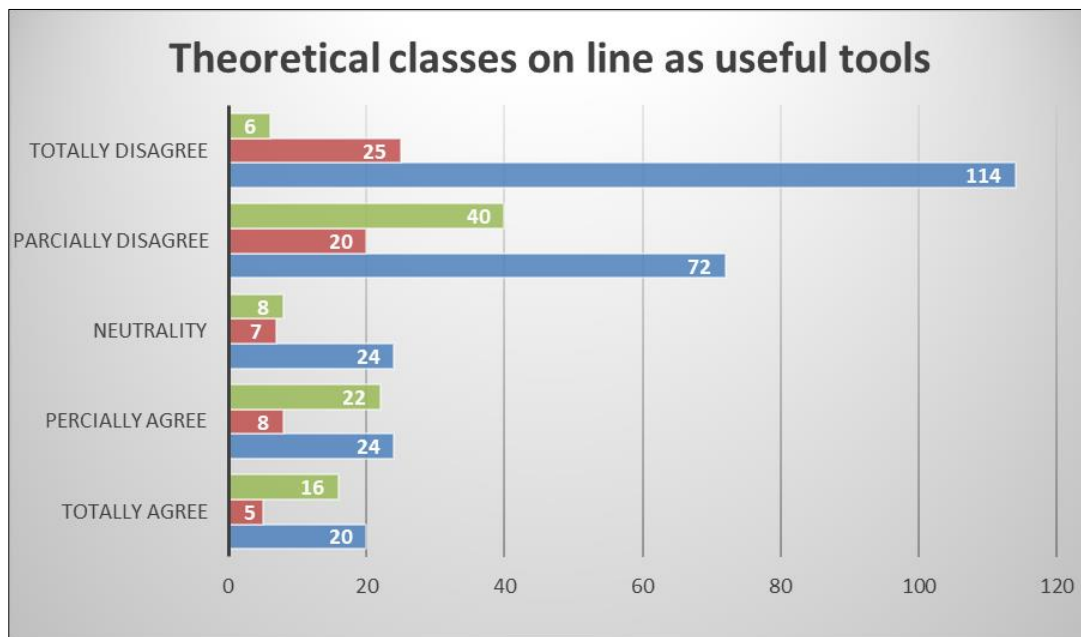


Figure 1 The numbers referring to the answers to the question: "If the theoretical classes were useful tools in the learning of Anatomy". The "X" axis shows the number of students, while the "Y" shows the different degrees of agreement with the question

Figure 2 shows the number of responses to whether monitoring during the ERE was a useful tool. Almost 2/3 of those interviewed from the medicine course answered yes (n=171), and the same happened in dentistry. Nursing students also increasingly demonstrated agreement with the importance of remote monitoring.

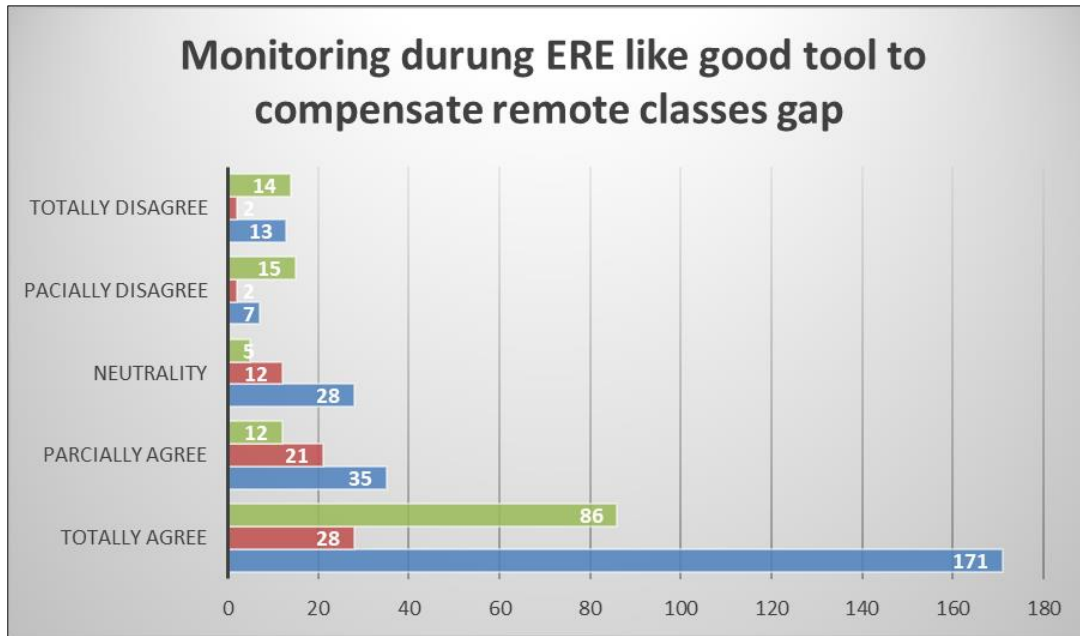


Figure 2 The numbers referring to the answers to the question: "The monitoring during ERE was a good tool to compensate for remote classes gap ". The "X" axis shows the number of students, while the "Y" shows the different degrees of agreement with the question

A fairly uniform distribution between the answers was found when the question asked whether online Anatomy classes raise confidence in applying the content in the clinic. Despite the large number of neutralities (Figure 3), 87 medical students (34% of the total) seem to agree yes, while 50% (n=127) disagree in some way. Disagreement was practically growing among Dentistry students, with 71 students doing so in full or part. A greater number of students who disagree was also seen in nursing, making up almost 60% of this group (n=38).

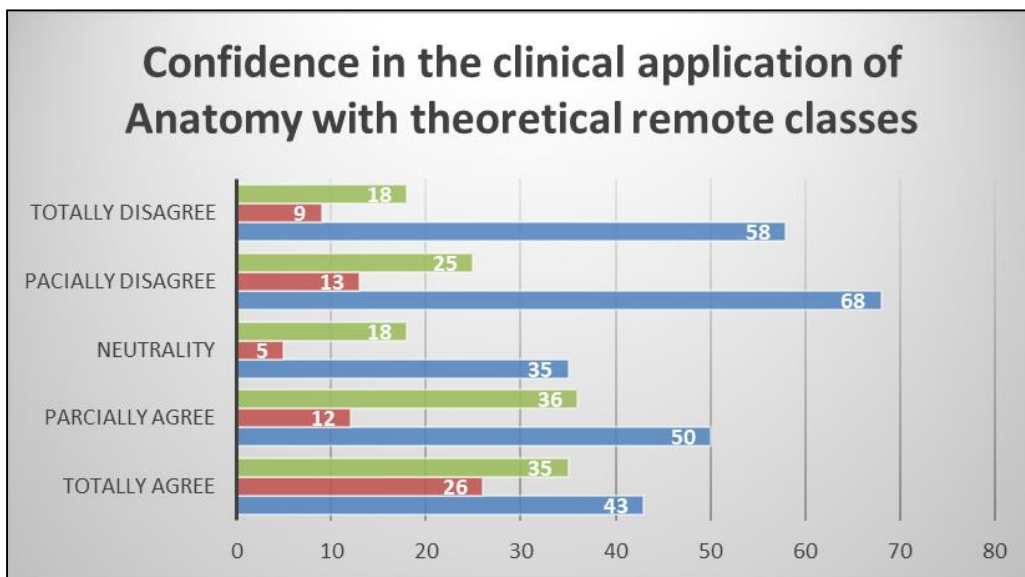


Figure 3 The numbers referring to the answers to the question: "If there is confidence in the clinical applications of Anatomy after theoretical remote classes". The "X" axis shows the number of students, while the "Y" shows the different degrees of agreement with the question

When the question was about the similarity in the effectiveness of online classes about face-to-face classes, the distribution was large across all courses, highlighting a great neutrality in the position of Dentistry students (n=45) and one, to some extent point, slight total disagreement in nursing (n=21). Among medical students, 51% (n=128) did not agree with the situation (Figure 4).

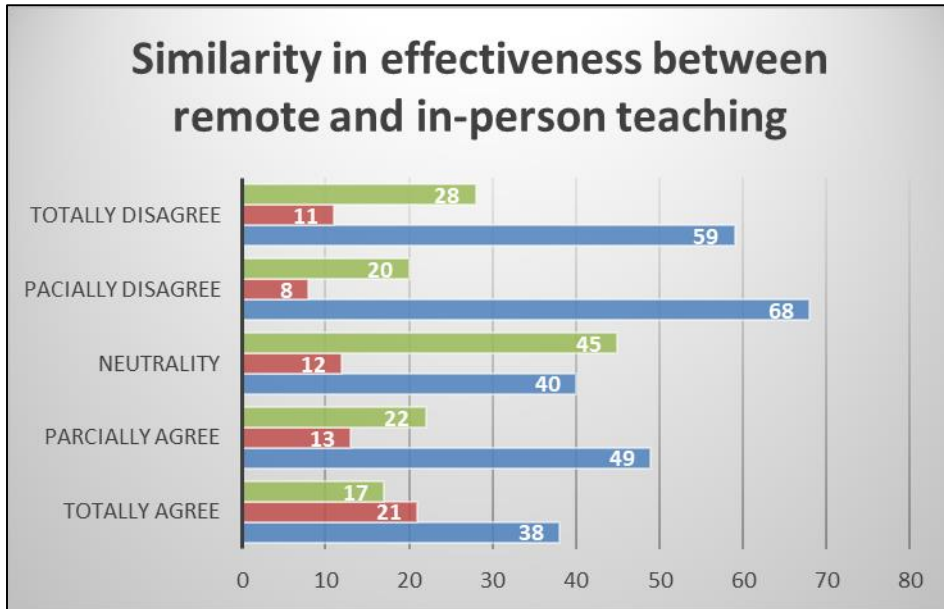


Figure 4 The numbers referring to the answers to the question: "Whether there is a similarity in effectiveness between remote and in-person teaching". The "X" axis shows the number of students, while the "Y" shows the different degrees of agreement with the question.

Figure 5 shows the response data for the question "Whether remote theoretical classes lead to insecurity in the clinical application of Anatomy", which seems to be quite rejected by nursing students, where more than 50% of students (n=35) disagreed in some way. When we look at the data from dentistry students, greater agreement (n=73), total or partial, is noticeable. Contrary to the latter course, few medical students (n=59, or 23% of them) believe so.

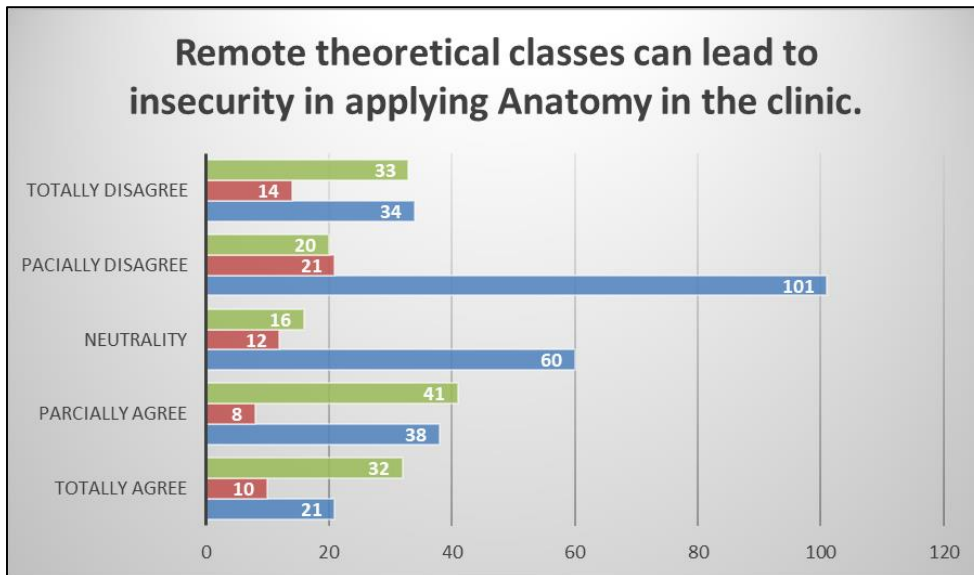


Figure 5 The numbers referring to the answers to the question: "Whether Remote theoretical classes can lead to insecurity in applying Anatomy in the clinic". The "X" axis shows the number of students, while the "Y" shows the different degrees of agreement with the question.

When asked to answer whether individual study plus practical classes compensate for the possible flaws of remote theoretical classes, 15% of medical students (n=38) agreed totally or partially, while 194 (76%) totally or partially disagreed. Total disagreement was striking among dentistry students (n=67) and a certain almost uniform distribution was detected in nursing (Figure 6).

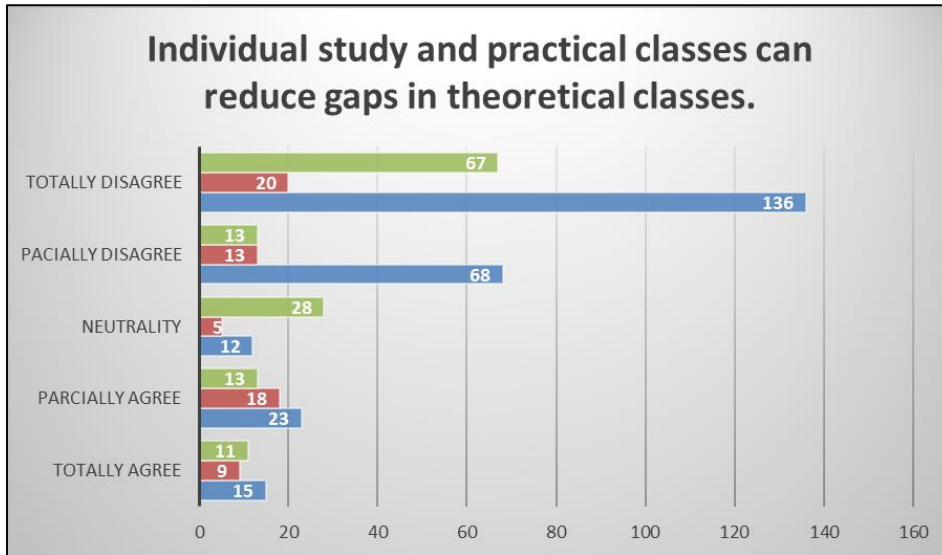


Figure 6 The numbers referring to the answers to the question: "Whether Individual study and practical classes can reduce gaps in theoretical classes." The "X" axis shows the number of students, while the "Y" shows the different degrees of agreement with the question

When asked whether there was greater difficulty in understanding the practice with the content that was taught remotely, compared to a normal face-to-face class situation, there was even a certain similarity in the proportionality of numbers between the courses, with great agreement across all courses. Medical students completely agreed with 44% (n=112), and nursing students (n=28), almost 50%. Those in dentistry (n=70) were more than half.

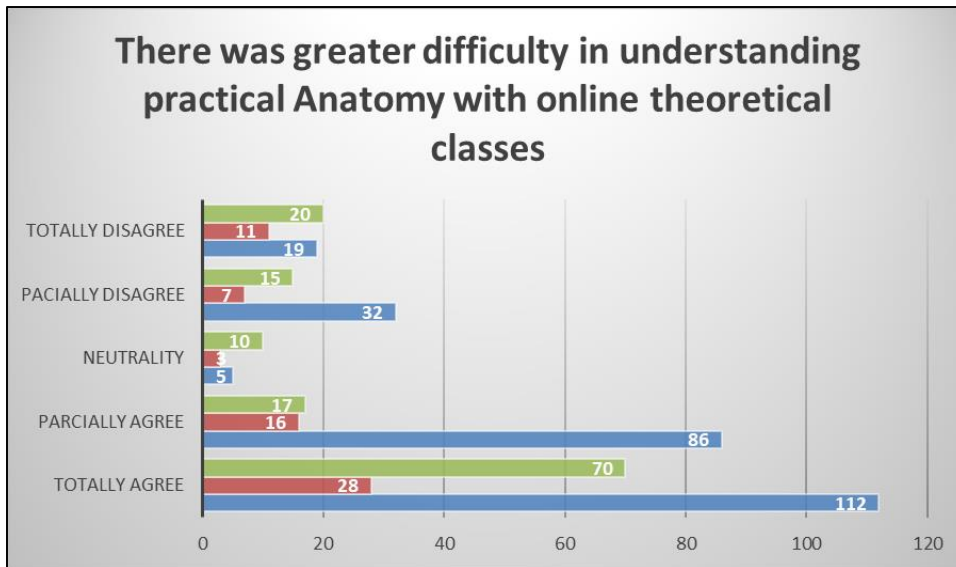


Figure 7 The numbers referring to the answers to the question: "If There was greater difficulty in understanding practical Anatomy with online theoretical classes". The "X" axis shows the number of students, while the "Y" shows the different degrees of agreement with the question

Finally, when analyzing the answers to the question: "Online theoretical classes are sufficient and effective when recorded and watched several times", we saw that the highlight was again the uniform distribution in nursing, in which 25 students disagreed and 25 completely agreed, while 151 students (60%) of the medical course, followed by 84 dentistry students, partially or completely disagreed (Figure 8).

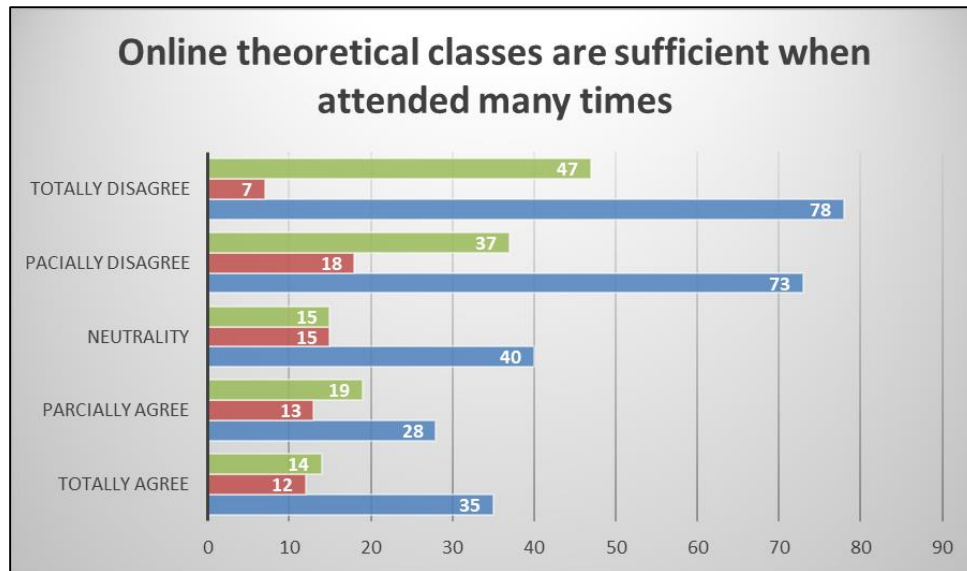


Figure 8 The numbers referring to the answers to the question: “Whether Online theoretical classes are sufficient when attended many times”. The “X” axis shows the number of students, while the “Y” shows the different degrees of agreement with the question

4. Discussion

During the COVID-19 pandemic, ERE was the main teaching strategy used by higher education institutions to conduct classes. In the Anatomy discipline, limitations were greater during this period, as practical meetings, which complement theory, were postponed. There is a lot of research that investigated the developments of this period[1,2,11] corroborating this article.

Taking the students' opinions about these theoretical anatomy classes in the remote system, we noticed a great rejection by the students interviewed from the three courses regarding this type of class. Even though we studied the opinion of students from Medicine, Dentistry, and Nursing courses, we could see a large discrepancy between the study by Silva et al [2] which, even with a small sample of 69 students interviewed in psychology, education physics, and physiotherapy, reported that the majority of these students considered that there was a good or very good affinity with the remote type of theoretical classes. And about this same issue, the majority of health academics indicated good or very good learning, in another similar study[3]. We must also take into account here the variable qualities of the classes, which, being different in each situation, may have contributed to this difference.

Cardoso[11], interviewing students in the first period of the Medicine Course at a private University, reported the motivation for asynchronous video classes on human anatomy, watched during the period of social isolation, despite the majority of students being very affected in their emotional state, Due to the social isolation imposed by the Covid-19 pandemic, this state did not interfere with the motivation for human anatomy video classes. Although totally divergent from our work, which shows that the overwhelming majority of students do not believe in remote classes as decidedly positive tools in the study of Anatomy, it is important to highlight that Cardoso's research[11] involved first-year students, that is, theoretically very more motivated than the students in our research, who were already in the third and fourth period of the course.

The same positive opinion regarding remote classes was defended by Fossa [12] who, after analyzing the results of a survey with medical students, demonstrated the students' adaptation and satisfaction with the methodology that alternated asynchronous and synchronous classes, and in particular, the use of videos recorded by teachers (Cognitive Support Station), which received much approval. Interestingly, our interviewees, who mostly did not agree with the effectiveness of remote classes, were reticent when comparing this type of class with in-person classes, with only a certain amount of agreement among nursing students. In other words, there was a certain similarity in the numbers of agreement, disagreement, and neutrality, when we proposed that online and in-person classes would have the same effectiveness.

It is also clear that the vast majority of academics interviewed here demonstrate positive perceptions about the contribution of remote monitoring, demonstrating its relevance for the teaching-learning process of academics in distance learning[1,2,3, 8], as our study showed, in which approximately eight out of ten students approved remote monitoring during the period of absence.

Analyzing the data regarding the efficiency of remote theoretical classes, it can be inferred that for the majority of students, this efficiency is not supported, but that not even with great individual effort and practical classes, this deficiency can be resolved. More than 50% of students from all three courses involved in the studies, therefore, believe that a face-to-face theoretical class is essential. In a way, it corroborates the study by Silva et al[3] which showed that there was a positive correlation between attendance in individual study and frequency in online tutoring, with the good performance of students in the Anatomy subject, which was also confirmed by Oliveira et al [14].

In the trans and post-pandemic period, schools of Medicine, Nursing, and Dentistry sought feasible ways to introduce improvements in the teaching-learning process, including the use of virtual laboratories (Weblab)[4] and podcasts[5] to reduce the theory-practice gap and increase confidence in the use of Anatomy in the clinic. This distance, which could certainly lead to a reduction in confidence in how the student will use their knowledge of anatomy in clinical practice, was reflected in this research when we asked whether there would be confidence in the clinical application of Anatomy after a remote course in this discipline. The students were divided, those in nursing think so, however, in dentistry the varied distribution between the levels of responses tends to indicate a slight agreement. In medicine, it was detected that for the majority, remote classes do not generate this insecurity in professional practice. The peculiarities between the courses, the focus given in the classes and even, again, the quality of the classes and how the ERE was conducted in these courses can contribute to this discrepancy.

Barbosa [15], drew attention to the difficulties in accessing the internet during the pandemic, which can also be affected by the student's social condition. It was also reported in this study that the assessment of internet quality in asynchronous classes was better than in synchronous classes, that is, when classes took place and could be recorded to be watched at another time, the use could be better. In a way, this contrasts with the data from this research, in part, as it was evident that the majority of medicine, nursing, and dentistry students disagreed with the hypothesis that better learning would happen if asynchronous classes, recorded and watched several times, would be more efficient.

Finally, it seems to us that remote classes, for our students, do not offer ideal scientific support for practical classes, in line with what Paulino et al[6] wrote in their meta-analysis on emergency remote teaching in the Medicine course. Of our interviewees, more than 50%, made us believe that even a well-done practical class, associated with individual study, does not overcome the deficiencies of an online theoretical class, which is, in a way, supported by data from the research in question, when We detected that, according to the students, there would be greater difficulty in anatomical practice following remote classes.

5. Conclusions

We can lower that:

- Most students did not consider remote anatomy classes to be useful;
- Most of the interviewees, from all courses, attended the seminars proposed during the pandemic;
- They were non-specific, that is, they did not demonstrate a tendency to agree or disagree with the effectiveness of remote anatomy teaching, but they do not believe that this form of classes will harm, or is harming them in the clinical application of anatomy, although medicine students have a little most disagreed and nursing student's a little more agreed.
- Students prefer face-to-face teaching of theoretical Anatomy to remote teaching, and agreed that the posterior individual study or practical classes study does not reduce the lack of a remote class;
- They consider that with remote classes, the understanding of the practice is more complex.

Compliance with ethical standards

Disclosure of conflict of interest

The authors declare that they have no conflict of interest.

Statement of informed consent

The authors declare that informed consent was obtained from all individual participants included in the study.

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