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## REMOTE TEACHING IN DIGESTIVE SYSTEM ANATOMY CLASSES

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**Abstract:** The Digestive System I course (6700004) is integrated with anatomy, cell biology and physiology and is offered to students at the Faculty of Medicine of the University of São Paulo (FMUSP). In 2021, due to the Covid-19 pandemic, Digestive System I was taught remotely. The digestive system anatomy classes were taught synchronously to Classes A and B. The synchronous classes were recorded and made available on the Google Classroom Platform and MedUSP Digital/FMUSP. Strategies such as the “Minute of Reflection”, the “Anatomical Challenge”, the presentation of videos and photos of the anatomy of the digestive system and exercises to fix the anatomical content were created to aid the teaching-learning process. The “Minute of Reflection” took approximately 20 minutes, the lesson was interrupted and the students revisited the subject taught up to that point for one minute, after which a period was opened for the students to ask questions about their doubts, which were answered. The “Anatomical Challenge” consisted of using Mentimeter. So that the students wouldn't lose touch with the practical anatomy lessons, the slides showed photos of anatomical parts and videos of practical anatomy lessons on the digestive system. After the lesson, in order to fix the anatomy concepts, students were given a Google Form with pictures of anatomical parts to answer. It can be concluded that the use of various resources during synchronous classes may have contributed to learning satisfaction and retention of the concepts of anatomy of the digestive system.

**Keywords:** Human Anatomy, Digestive System Anatomy, Active Teaching, Teaching-learning process, synchronous online classes

## INTRODUCTION

The teaching of anatomy requires intense work and memorization, which makes it a difficult area for the teaching-learning process (Hopkins et al., 2011).

The authors Estai & Bunt (2016) demonstrated that students in anatomy classes need several methods used together to improve learning, such as: the use of plastinated anatomical specimens, computer-based learning, the use of previously dissected anatomical specimens, the use of active methods such as flipped classes and the use of cadaver dissections and anatomical specimens. According to the authors, the ideal way to improve the teaching-learning process would be to use all the integrated methods.

For the study of anatomy during the Covid-19 pandemic, the authors Kochhar et al. (2022) reported that through a survey with questions for students who had human anatomy classes in person and virtual classes. The authors concluded that by dissecting cadavers, students acquire skills in the anatomy laboratory that are necessary for the development of complete doctors who would be more confident and skillful in making decisions.

Another study on the teaching of anatomy during Covid-19, by Harmon et al. (2021) using questionnaires, showed that the use of cadavers in laboratories decreased during Covid-19. Before Covid-19, cadaveric materials were used in laboratories in greater quantities. In this period of COVID-19, computer-based assessment has increased and assessment materials have changed from cadaveric material to images. In addition, the use of digital teaching resources has increased during Covid-19.

(2022) analyzed the impact of the COVID-19 pandemic on anatomy teaching for doctors and dental students. They investigated whether remote methods could replace traditional anatomy classes in whole or in part. The responses were unanimous in their preference

for face-to-face classes. The students ranked online anatomy classes and pre-recorded anatomy classes second in terms of effectiveness and preference. In conclusion, remote learning cannot replace the traditional method of teaching anatomy, but online classes can be incorporated into anatomy curricula as an additional tool.

In their review, the authors Iwanaga et al. (2021) discussed the impact of the COVID-19 pandemic on anatomy teaching. The authors point out that during the pandemic, students did not have access to cadavers, which have been the main way of learning anatomy since the 17th century. The need to implement new anatomy teaching methods to apply to current and future education. With the integrated use of dissection of anatomical parts and the use of prosection, the use of 3D parts, the use of plastinated parts, online resources, the use of atlases and textbooks, the use of virtual reality, the use of social media, the use of virtual atlas platforms and traditional classes,

The author Castelucci (2023) demonstrated the use of different educational strategies to improve the teaching-learning process in synchronous remote classes on anatomy of the locomotor system during the Covid-19 pandemic for the physiotherapy course at the University of São Paulo.

This work aims to demonstrate the use of various educational methods used in remote synchronous classes, such as “Minute of Reflection”, “Anatomical Challenge, use of videos, use of photos of anatomical structures, exercises in thematic rooms in the anatomy part of the digestive system of the subject Digestive System I (6700004) in the 2nd semester of 2021 during the Covid-19 pandemic.

## MATERIAL AND METHOD

The subject Digestive System I (6700004) is integrated with anatomy, cell biology and physiology and is offered to students at the University of São Paulo Medical School (FMUSP). The course was taught to students in the 2nd semester of 2021.

This work demonstrates the educational strategies used in digestive system anatomy classes during the Covid-19 pandemic. It was necessary to adapt anatomy teaching with the use of synchronous online classes using Google Meet. The synchronous classes were recorded and made available on the Google Classroom and MedUSP Digital platforms.

The following teaching strategies were used:

Use of synchronous classes to maintain student-teacher contact and interaction.

Use in synchronous class slides of photos of anatomical specimens used in the laboratory together with photos of atlases. This was used so that students didn't lose touch with the practical side of anatomy. The photos of the anatomical parts were taken in the anatomy laboratory of the Anatomy Department of the Biomedical Sciences Institute of the University of São Paulo by Prof. Dr. Patricia Castelucci.

Educational strategies such as the creation of the “Anatomical Challenge” using Menti-meter were used to improve the teaching-learning process. The “Anatomical Challenge” was used 3 to 4 times during the synchronous lesson, after each lesson topic, with the aim of retaining anatomical knowledge. Each “Anatomical Challenge” consisted of 02 questions.

A “Minute of Reflection” was created in which the lesson was interrupted every 15 to 20 minutes. The students were given one minute to look at the material that had been taught, after which they were able to answer any questions they had.

Videos of practical classes on the anatomy of the digestive system were shown during the synchronous classes. These videos were made in the anatomy laboratory of the Department of Anatomy at the University of São Paulo by Prof. Dr. Patrícia Castelucci. The videos were made available on the MedUSP digital platform.

Exercises were used with Google Forms for students to answer in groups in the topic rooms created in synchronous classes.

## RESULTS

Figure 1 shows the remote synchronous lecture on the anatomy of the digestive system given to medical students at USP's Faculty of Medicine.

Figure 2 (A, B) shows the slide from the remote synchronous lesson with an atlas figure and a photo of an anatomical part.

Figure 3 (A, B) shows an example of an "Anatomical Challenge" using Mentimeter. In letter A, the structure is presented with answer options. After the students have answered for a while, the result is shown in letter B.

Figure 4 (A, B) shows videos of anatomical parts in which anatomical structures from the lessons are demonstrated.

Figure 5 shows a model of an exercise done on Google Forms, which the students did in groups in themed rooms during the synchronous class to fix the anatomical content.

Figure 6 shows a model of the Classroom Platform where the material for course 6700004 (Digestive System I) was stored, in this figure (A) it shows an example of the anatomy part. In addition, figure B shows the MedUSP Digital Platform for storing the recording of the synchronous class and the videos made in the anatomy laboratory of the Department of Anatomy at USP's ICB.

## DISCUSSION:

This work demonstrates strategies for improving the teaching-learning process during the Covid-19 pandemic in the anatomy of the digestive system part of the Digestive System I course. Synchronous online classes through Google Meet were used. The following resources were used in the synchronous classes: "Minute of Reflection", "Anatomical Challenge" with the use of Mentimeter, the use of figures and videos of practical classes on the anatomy of the digestive system and the use of Google Forms exercises carried out in groups by creating thematic rooms.

Authors Harmon et al (2021) showed that there was an increase in the use of digital resources in anatomy classes during Covid-19. In our work, we showed that there was also an increase in the use of digital resources in synchronous online classes during the pandemic.

As Iwanaga et al. (2021) reported in their review, anatomy teaching should have several resources used together to improve the teaching-learning process. In the present work, the use of a set of possibilities was demonstrated in order to achieve anatomical knowledge during the Covid-19 pandemic.

Papa et al. (2022) conducted a systemic review of anatomy teaching during the pandemic. In their work, they observed that remote anatomy learning improved the use of other technologies besides cadaveric dissection to teach anatomy. These findings are in line with the findings of the present study, since synchronous remote anatomy classes developed the use of other technologies. However, in the review by Papa et al. (2022), the studies agreed that cadaveric dissections should not be completely replaced.

On the other hand, Gonçalves et al. (2024) evaluated teachers' perception of students' anatomy learning in relation to the types of methodologies applied in remote teaching during the pandemic. The results showed

## Anatomy: esophagus, stomach and small intestine

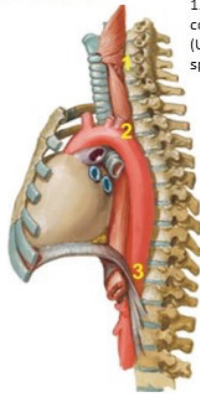


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Foto: Prof Patricia Castelucci



## Esophagus



1. Cervical constriction (Upper esophageal sphincter - cricoid)
2. Broncho-aortic constriction
3. Diaphragmatic Constriction (Lower esophageal sphincter)

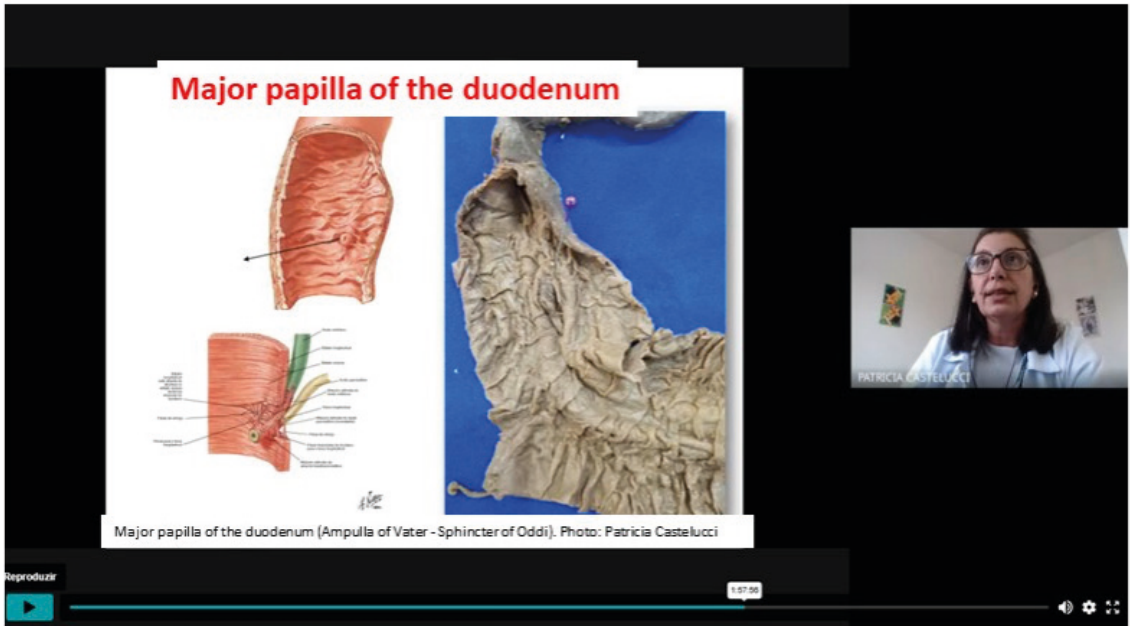
Netter 3a ed.

20:20



Figure 1. Demonstrating a synchronous lesson on the anatomy of the digestive system. Photo: Patricia Castelucci

A



B

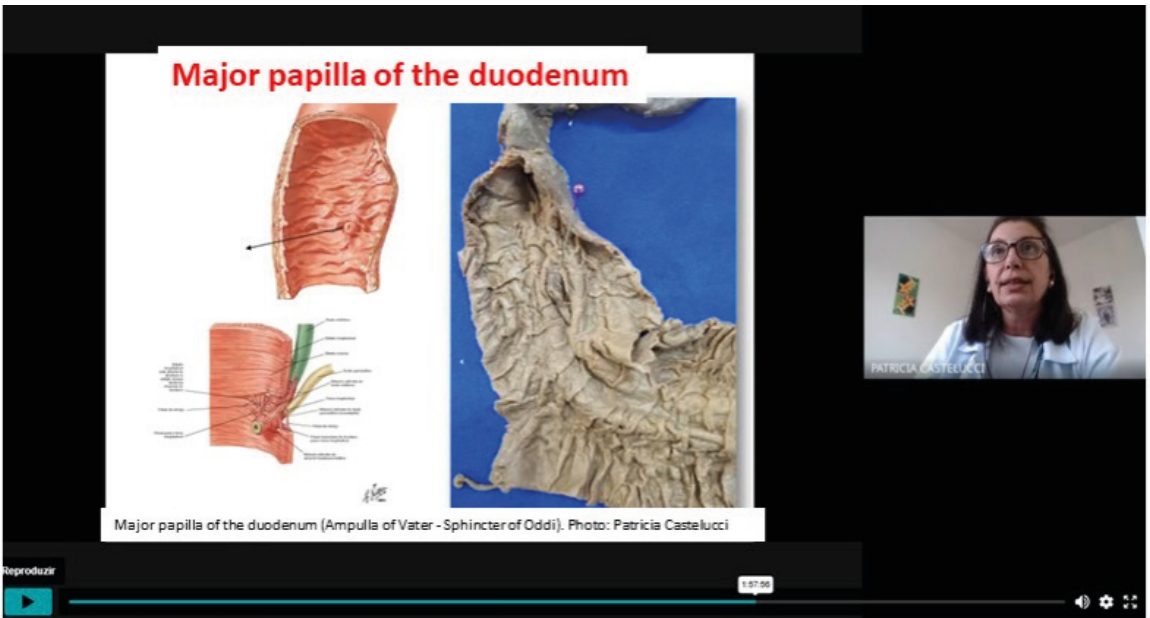


Figure 2. Demonstration of a synchronous anatomy lesson on the digestive system using photos of anatomical specimens. A - Photo of atlas using photo of anatomical part photographed from anatomy laboratory. B - Figure of anatomical parts. Photo: Patricia Castelucci

A

Acesse [www.menti.com](http://www.menti.com) e use o código 5993 7568

What is the name of the structure of the letter A?

0% 0% 0%

aortic hiatus    esophageal hiatus    abdominal portion of the esophagus

Reproduzir 1:04:57

Netter, 3<sup>a</sup> ed.

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B

Acesse [www.menti.com](http://www.menti.com) e use o código 5993 7568

What is the name of the structure of the letter A? meter

4% 86% 10%

aortic hiatus    esophageal hiatus    abdominal portion of the esophagus

Reproduzir 1:06:58

Netter, 3<sup>a</sup> ed.

PATRICIA CASTELUCCI

Figure 3 - Demonstration of a synchronous lesson on the anatomy of the digestive system in which the “Anatomical Challenge using the Mentimeter” is carried out. A - Mentimeter without the students’ answers. B - Mentimeter with students’ answers Photo: Patricia Castelucci

A



B

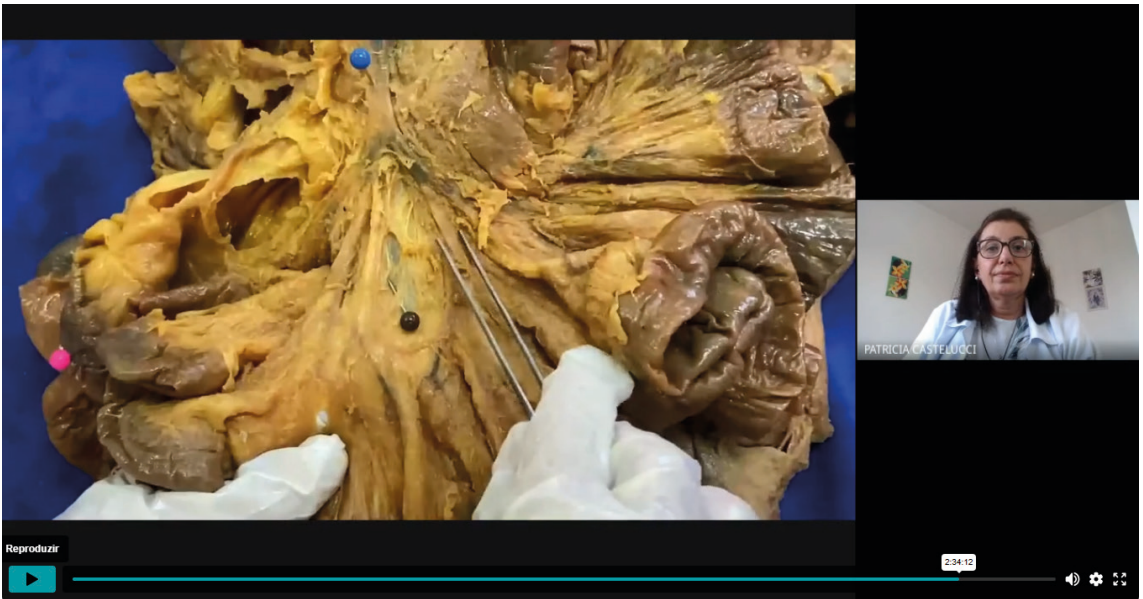


Figure 4 - Demonstration in the remote synchronous class with the demonstration of videos of anatomical parts prepared in the anatomy laboratory (A, B). Photo: Patricia Castelucci




A

TA: esophagus, stomach and small intestine

questions answers (88) settings

3. Indicate the name of the structure in letter A.



cardia  
 fundus  
 body of the stomach  
 gastric folds

B

TA: esophagus, stomach and small intestine

questions answers (88) settings

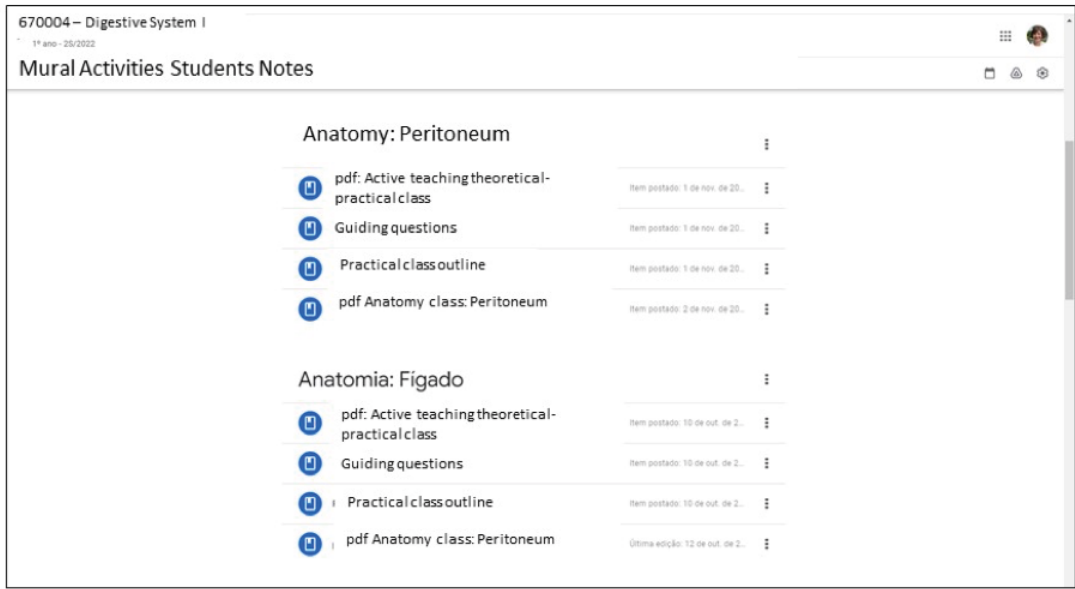
Total de pontos: 10

6. Lig-lig exercise

	Susp. ligament	Short st. vessel	Esoph. hiatus	Pylorus	Fixation
Diaph. constriction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Sphincter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Duodenal flexure	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Mesentery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ileum	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Figure 5 - Demonstration of exercise models made on Google Forms, which students did in groups in themed rooms during synchronous classes to fix anatomical content. Photo: Patricia Castelucci

A



B

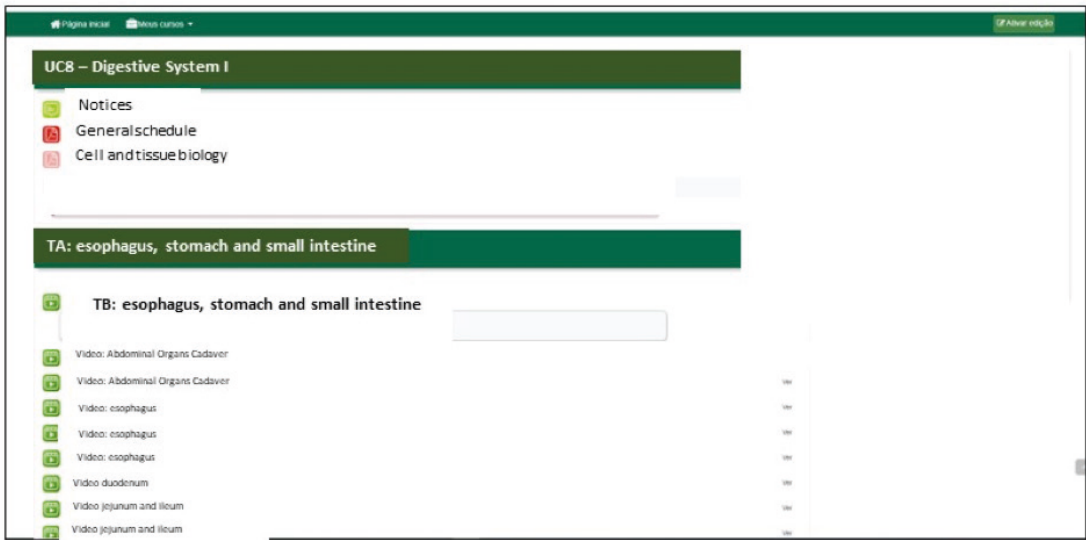


Figure 6. Showing the Classroom Platform (A) with material from subject 6700004 such as Cell and Tissue Biology, Physiology and Anatomy. Figure A shows part of the Digestive System Anatomy material. B - shows the MedUSP Digital Platform of USP's Faculty of Medicine where the material from the 6700004 course on Cell and Tissue Biology, Physiology and Anatomy was stored.

that there was no statistically significant difference in teachers' perception of learning in relation to the type of methodology used. In addition, the authors compared the type of methodology used before and during the pandemic and there was also no difference when comparing perceptions of learning.

Chang et al. (2022) during the Covid-19 period, anatomy teachers at National Taiwan University used asynchronous online video for anatomy classes and reduced the number of students in groups using the anatomy laboratory in April 2020. The aim of this study was to investigate the impact of these changes on medical students' learning. They analyzed whether the teaching strategies could have a negative and temporary influence on medical students learning anatomy. The use of smaller groups in laboratory classes such as dissection could have a negative effect on learning to dissect cadavers. Our work demonstrated the need to use synchronous classes due to the pandemic. In previous years, course 6700001 was offered face-to-face, however, it was not possible to compare the effect of face-to-face or online synchronous classes on anatomy learning.

We demonstrated that there has been an increase in the use of virtual teaching resources to improve the teaching-learning process of anatomy of the digestive system. The authors Mammi et al. (2023) also pointed out that the COVID-19 pandemic may have accelerated the modernization and implementation of new solutions in the teaching of morphological sciences such as anatomy. During the period, an increase in the use of educational methods with technological tools was observed. The authors Mammi et al. (2023) point out that the traditional approach with the use of cadavers associated with educational technology tools can be a way of improving student performance in the study of anatomy.

Salman et al. (2022) studied the students' perspective of their involvement with digital resources during the Covid-19 pandemic. The students faced many challenges, such as a lack of high-performance internet connections, problems interfacing with the platforms, as well as students looking forward to face-to-face classes with cadavers. Our work did not explore the students' vision during the pandemic, but it shows that digital educational technologies were also used to teach anatomy.

Saverino (2021) makes an interesting reflection in which, due to the use of technological resources, the use of active teaching and other modalities developed during the Covid-19 period, the teaching of anatomy may become more interesting, which can help students to achieve deeper learning, which will allow them to apply the knowledge in the clinical context.

In conclusion, this work has shown that the use of various resources during synchronous classes on the anatomy of the digestive system during Covid-19 has helped to improve the teaching-learning process. These resources developed during remote synchronous classes can be used in face-to-face classes on the anatomy of the digestive system.

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